NOVEL INSTRUMENTS IN WORK AND CONSUMPTION: THE CASES OF COWORKING AND SUSTAINABLE BEHAVIOR

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„Men love to wonder, and that is the seed of science“

Ralph Waldo Emerson (1803 – 1882)

Danksagung

Zu Beginn eines größeren Vorhabens fallen zuerst diejenigen auf, die schon kurz vor dem Ziel stehen. Nicht anders ging es mir, als ich nach wenigen Tagen der Promotion im August 2018 das Sommerfest des Arbeitsbereichs Marketing und Services besucht habe: umringt von Professoren und anderen Doktoranden, die teilweise über mehrere Jahre Erfahrung verfügten, standen meine beiden Kollegen und ich als Neueinsteiger bereit. Die folgenden Monate und Jahre sollten von schnellen Lernkurven geprägt sein, bei denen ich von vielen Personen begleitet wurde und denen ich meinen ehrlichen Dank aussprechen möchte.

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Bayreuth, im August 2021 Cristopher Siegfried Kopplin

ABSTRACT

Slowly, but gradually, we experience a shift towards an awareness of ecological, economic, and social problems. While environmental damage is an obvious challenge that needs to be tackled, sustainable behavior also includes an economic and a social dimension. The thesis at hand seeks to shed light on the topic by including all three facets to provide a holistic picture and avoid overemphasizing one aspect while neglecting the others. The triad of sustainability indicates that demands for responsible behavior affect any area of our personal lives; however, some fields stand out as salient manifestations of the overall transformation process. Two of these phenomena are a shift in work practices and the emergence of coworking spaces, which are open and accessible hubs for community-based collaboration and innovation, and altering consumption patterns, focusing on reducing individual possession, and as such, consumption of resources, and sustainable materials.

Both phenomena can be described from the perspective of the sharing economy, which emphasizes that using a good does not necessarily imply owning it. Instead, technological advancements such as social media platforms are employed to identify and match supply and demand. Thus, the thesis focuses on technology's role, particularly so-called workstream collaboration tools, which offer dashboard-like qualities and allow the integration of various third-party applications. Hence, they provide all-round, all-in-one solutions for technology implementation. The qualities and user perceptions of workstream collaboration tools are the heart of Part One of this thesis, which examines their benefits within coworking spaces. Consequently, Part One stresses the role of technology as an enabler of the sharing economy and sustainable behavior, using the example of colocated and interrelated work.

Part Two emphasizes the individual role in sustainable consumption. Fashion, transportation, and nutrition are identified as essential influence factors of a society's sustainability. Hence, in line with Part One, perceptions of different solutions in the form of shared e-scooters, sustainable clothing, and plant-based food substitutes are examined. While a general tendency towards sustainable behavior can be found, research and practice need to consider a vast amount of heterogeneity. Addressing differences in individual attitudes and demands is critical to fuel the overall transformation to a more sustainable society. The thesis at hand contributes to the scientific literature by examining the focal phenomena from a combined perspective of multivariate and set-theoretic approaches, allowing insights into sufficient as well as necessary conditions and shedding light on asymmetrical effects that are frequently overlooked.

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Introduction

1 Motivation

Recent years have witnessed the surge of sustainability as an increasingly attractive topic for both organizations and consumers, sparking a vast number of scientific studies. Despite the wide-spread usage of the term, what the term sustainability denotes has caused several debates and remains ambiguous. However, particularly in the marketing context, the notion of consumption yielding harmful environmental impacts is at the heart of its understanding (White et al., 2019). Hence, sustainability commonly relates to the avoidance of ecological damage, which is ascribed to the consumption mindset (Csikszentmihalyi, 2000). Thus, from a consumer perspective, the proposition of coordinated, mutual use-oriented consumption has occurred, indicating that not all individuals that seek to make use of a particular good are required to possess it, but may use technology to coordinate use demand and resource provision by other individuals. This structure is termed the sharing economy and has been known from B2B and B2C applications such as the shared usage of agricultural machinery and car rental (Puschmann and Alt, 2016). The notion of the sharing economy seeks to transfer this allocation mechanism to the consumer-to-consumer (C2C) context (Puschmann and Alt, 2016).

The sharing economy is a powerful concept that has been mentioned in the context of work – as the fundament of coworking spaces (CWS) (Bouncken and Reuschl, 2018) – and consumption, where its use-oriented character is suggested as an alternative to possession-oriented behavior (Armstrong et al., 2016). Within the topic of sustainability, it appears fruitful to examine the prevailing manifestations of the sharing economy, such as CWS. As the coordination of resources requires support to identify adequate resource provision, agree upon usage conditions and boundaries, and ensure the proper course of action during the sharing process, technology is a powerful enabler for the phenomenon (Hawlitschek et al., 2018). Consequently, the acceptance of technological infrastructure is an important criterion for the successful implementation of use-oriented, which is considered sustainable, consumption behavior, and requires scientific investigation to gain an understanding of individuals' perceptions, attitudes, and intentions regarding the use of such technology.

Simultaneously, the advent of ubiquitous and powerful technology favored changes and recombinations of conventional work forms. Mobile internet, smartphones, laptops, tablets, and smartwatches allow workers to effect performance with minor restrictions regarding their location. However, the increasing degree of freedom and autonomy has also brought detriments with it, with social isolation being a major drawback of location- and time-independent work. To counter these disadvantages while attaining the benefits, so-called coworking spaces (CWS) have been established and quickly gained traction as a novel and promising way of work (Bilandzic and Foth, 2013; Blagoev et al., 2019; Gerdenitsch et al., 2016). Hence, the notion of CWS has spread over the last years and led to a multiplicity of different embodiments and specializations. Commonly, four types of CWS may be distinguished: independent

CWS, open corporate, and closed corporate CWS, respectively, as well as consultancy CWS (Bouncken et al., 2018). This differentiation allows disparities in focus, such as incubation and acceleration; however, the thesis at hand relies on the independent type as it appears to embody the spirit of coworking in a more profound way than derived forms of CWS (Moriset, 2013; Waters-Lynch and Potts, 2017).

The thesis at hand seeks to shed light on the interplay between novel technology and the sustainability character in work and consumption. Workstream collaboration tools (WCT) are introduced as powerful, integrated multi-purpose applications (Gartner, 2019). These software tools allow communication, collaboration, and third-party application management from a central dashboard. Their impact on work practices is examined in Part One: Sustainability in the Work Environment. Within the consumption context, a more heterogeneous approach is needed, as studied in Part Two: Sustainability in Consumption, because technological infrastructure that seeks to coordinate resource sharing is ony one facet of consumption. Another face is that of the materials that are used to supply possession-oriented consumption. To reduce the negative impact of possession-oriented consumption, the use of sustainable materials is identified as one potential remedy to reduce adverse environmental effects (Harris et al., 2016; Wigley et al., 2012).

This concept of substituting conventional materials is examined in its two primary manifestations: clothing and groceries, where plant-based alternatives are identified as promising opportunities to reduce negative ecological impacts and advance the resource valorization that was sparked by the advent of organic food (Davies et al., 1995; Hughner et al., 2007). Here, the acceptance of substitutes for conventional goods is in the focus. Finally, to draw a bow and revert to the sharing economy, the acceptance of e-scooters for sustainable short-distance mobility is studied. Transportation is a resource-intense form of consumption, and the last decade has witnessed the advent of various alternatives such as hybrid and eletric cars, e-bikes and e-scooters, all of which seek to tackle traffic-related (i.e., transportation consumption-related) issues such as congestion and pollution (Cordera et al., 2019; Gössling, 2020). Vehicles enabling micro-mobility, such as e-scooters, have been introduced as a novel solution and are anchored in the sharing economy (McKenzie, 2020), rendering them a fruitful field of study in the context of this thesis.

2 Coworking Spaces, Technology, and Sustainability

CWS are a phenomenon of open and accessible workspaces that has gained strong momentum in the scientific field over the last years. They are often characterized by their five core values of collaboration, community, sustainability, openness, and accessibility, with accessibility sometimes being swapped for the term diversity (Merkel, 2015; Schürmann, 2013). CWS are conceptualized as one of several types of open creative labs besides fab labs and maker spaces (Schmidt and Brinks, 2017) and provide a locus between conventional workplaces and home, supporting the notion of work-life balance (Oldenburg

and Brissett, 1982; Orel, 2019). Typologies such as a differentiation between independent, open corporate, closed corporate, and consultancy CWS have been proposed (Bouncken et al., 2018). Commonly, the CWS spirit is ascribed to independent CWS (Waters-Lynch and Potts, 2017), which are the focus of the thesis at hand. This spirit circles the notion of an innovative, social atmosphere built on a community of like-minded individuals and a basic infrastructure that can be accessed flexibly by a variable fee (Brinks, 2012; Capdevila, 2014; Gandini, 2015; Garrett et al., 2017).

In general, CWS are viewed to be built on the foundations of the sharing economy, and as such, emphasize access disclosure and usage coordination of underused resources, which involves tangible as well as intangible ones (Bouncken and Reuschl, 2018; Hawlitschek et al., 2018). However, due to its open nature, the sharing economy provides a vast amount of different platforms and sharing opportunities, leading to a complex and fragmented environment for potential participants. In the context of CWS, this elicits the phenomenon that individuals interested in coworking gain the impression that CWS may serve their needs; albeit, it is unclear to them who needs to be met there (Waters-Lynch and Potts, 2017). These coordination problems commonly imply the operation of digital technology, and the sharing economy heavily relies on technological infrastructure to coordinate resource access (Belk, 2014).

As CWS need to bundle a multiplicity of functions that may be facilitated by technology usage in differing degrees, it is critical to ensure an elaborate layout for the basal infrastructure to avoid loss of information, incomplete data, obsolete duplicates, and incompatibilities that require manual effort. Additionally, the diversity of potential applications may lead to inefficiencies in resource management. Hence, against the backdrop of sustainability, technological infrastructure is a prime candidate for enabler sustainable work practices. One promising remedy that provides helpful features is the concept of WCT. WCT tie “messaging, notifications, files, bots, tools and people together to create a private, persistent and searchable digital workspace that teams can use to do their work in a transparent, effective and efficient manner” (Tien, 2018, n. pag.). Figure 1 displays their components.

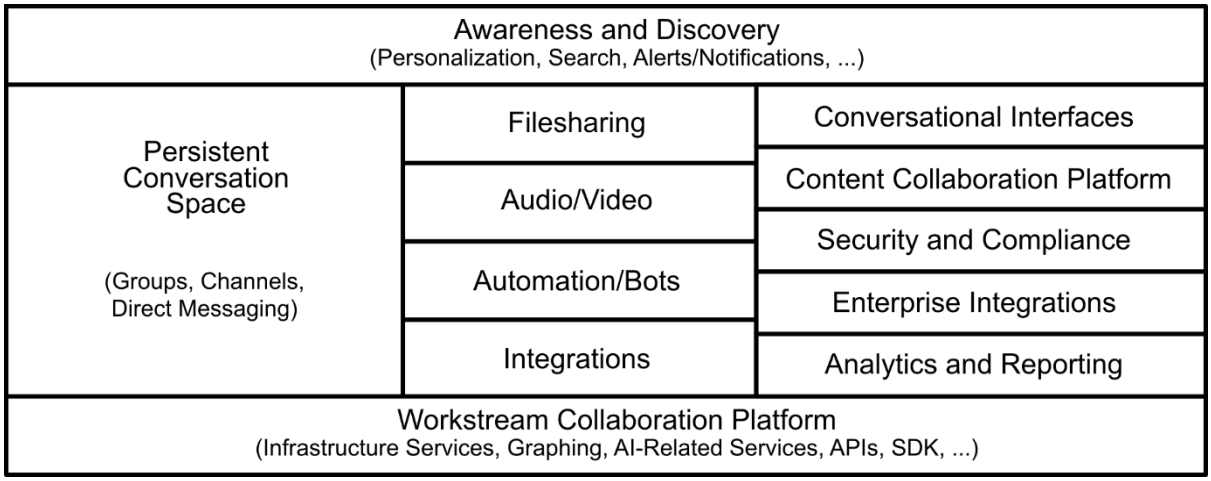

Figure 1: WCT components, based on Gartner (2019).

As the figure shows, WCT offer various functionalities ranging from communication modes such as filesharing and audio and video calls to a multiplicity of interfaces connecting to input devices such as speech recognition and output interfaces such as reporting applications. Hence, the top level of awareness and discovery is a critical condition for the successful usage of WCT. Due to the amount of accessible information, users need guidance and helpful functionalities to find meaningful and timely data. Thus, the technology acceptance of WCT is not a trivial topic, as they provide many benefits at relatively high costs in terms of learning, customization, and operation requirements.

Further, the components also allow a differentiated conceptualization of interfaces between the CWS, WCT, and sustainability. For example, multiple sharing and documentation options provide functionalities to offer access to resources and prevent waste in terms of duplication. From a social perspective, they also enable easy and comprehensible identification and acquisition of resources, improving individuals' participation opportunities. Proximate integration of enterprise applications, analytics, and reporting support monitoring activities and allow quick implementation of changes when challenges are detected, such as a waste of resources like electricity and commodities, quality defects, and poor communication. As technological infrastructure demands much power, an integrated, self-monitoring application, such as a WCT, may decrease this consumption. Hence, WCT are assumed to take the social and ecological perspectives of sustainability into account.

However, at their heart, they are built to facilitate communication and collaboration, as their name suggests (Kopplin and Baier, 2020). Consequently, their core strength is the improvement of the economic layer of sustainability. Due to their manifold interfaces, they allow gaining and exploiting customer feedback on a real-time basis. For example, design ideas may be gathered through a social media connection and tested by passing the information to a rapid prototyping application. Thus, they increase a new product's success rate. Besides, the linkages to enterprise integrations and analytics may provide detailed overviews of costs, benefits, resource consumption, estimated waste, and defective goods, total environmental impact, and other information.

3 Consumption Behavior and Sustainability

A fundamental research field considering sustainability has been the formation of consumers' attitude towards sustainable goods, the causal mechanisms leading to purchase intention, and the relationship between intention and actual behavior (Kollmuss and Agyeman, 2002; Padel and Foster, 2005; Vermeir and Verbeke, 2006). A substantial amount of studies regarding this topic observing the ecological impact of consumption, as finite resources are frequently treated as infinite (Csikszentmihalyi, 2000; Niinimäki and Hassi, 2011), and frameworks are derived to stimulate more sustainable consumer behavior (White et al., 2019). One significant class of goods under investigation is clothing (Kang et al., 2013; Morgan and Birtwistle, 2009; Wigley et al., 2012), and another critical notion, that of groceries, has evolved from examining organic foods to general green purchase behavior, which may include a variety

of different products such as plant-based alternatives to conventional goods (BIS Research, 2019; Chinnici et al., 2002; Davies et al., 1995; Hill and Lynchehaun, 2002; Jaiswal and Kant, 2018). Besides, individual mobility, such as using a car instead of walking or making use of public transportation services, yields a critical influence on the environment (Gössling, 2020; Yang et al., 2020; Zagorskas and Burinskienė, 2020). Consequently, three major aspects of consumption are clothing, nutrition, and transportation.

Fashion has become a multi-billion dollar market over the decades, and trends such as fast fashion have increased the pace of manufacturing, consumption, and the beginning of the next manufacturing cycle representing the latest line, collection, or trend, leading to a loss of perceived intrinsic value, increased purchase volume, and escalating disposal (Morgan and Birtwistle, 2009). This approach causes severe ecological damage (GFA, 2017) and is increasingly tackled by countermeasures such as slow fashion, a focus on organic materials, fair trade, and overall sustainable purchase behavior (Hustvedt and Dickson, 2009; Lundblad and Davies, 2016). A particularly interesting proposal is the notion of a use-oriented fashion consumption that relies on the sharing economy (Armstrong et al., 2016). This commonality that is shared with other resource-sharing phenomena such as CWS displays that the global shift of re-assessing and rebuilding resource use is based on a small set of underlying concepts, corroborating the fruitfulness of integrating these seemingly different fields in one thesis. As sustainability may be viewed as a trifold concept embracing economic, ecological, and social dimensions (Elkington, 1998; Milne and Gray, 2013), this notion is adequate to capture a holistic picture of consumption's adverse external effects.

Similarly, nutrition has come a long way from early organic supply towards the introduction of plant-based alternatives that may substitute conventional groceries such as dairies altogether (BIS Research, 2019; Hughner et al., 2007; van Huylenbroek et al., 2009). The increasing demand for food leads to ecologically harmful consequences such as waste of water, causing harm to animals, pollution, and immediate destruction of ecosystems for technologically advanced land use. Researchers, as well as practitioners, have examined phenomena that seek to tackle this development, such as the purchase of organic food (Chinnici et al., 2002; Lea and Worsley, 2005; Squires et al., 2001) and, what could be viewed as its more holistic successor, green purchase behavior (Chan, 2001; Joshi and Rahman, 2015; Liobikienė and Bernatonienė, 2017). This research stream fits the notion of the triple bottom line of sustainability as it includes ecological and social factors besides economic considerations.

As a third essential component of sustainable consumption, transportation is included as a field of study. Transportation, particularly in urban areas, is targeted to become more eco-friendly, compact, and lightweight (Zagorskas and Burinskienė, 2020). These primary goals tackle the challenges of congestion, noise, and pollution which mainly stem from heavy automobile use (Che et al., 2020; Gössling, 2020). Hence, alternative modes of transportation are examined (Cordera et al., 2019; Guerra, 2019; Haustein

and Jensen, 2018; Kim et al., 2017), and a major field of study is the last-mile problem (McKenzie, 2020; Moreau et al., 2020). Shared electric vehicles such as scooters are proposed as a potential solution, introducing the notion of the sharing economy to traffic (McKenzie, 2020; Pham et al., 2019). Thus, this field is also substantially influenced by the idea of use-oriented resource allocation as opposed to permanently owning a vehicle. Technologies such as e-bikes and e-scooters further ensure a high degree of flexibility due to their micro-mobility nature, corroborating the coordination demands and individual autonomy as offered by the sharing economy (Hardt and Bogenberger, 2019; Jenn et al., 2018; McKenzie, 2020; Yang et al., 2020).

4 Research Gaps

The research gap addressed by Part One of this thesis is the role of technology within CWS from the perspectives of technology acceptance and effectiveness. Both are interrelated, as technology requires usage in order to provide its benefits. Thus, the focus is on identifying technology acceptance variables and their impact in terms of necessity and sufficiency to provide insights into technology's role within the coworking context, coworkers' demands and requirements, and the influence of contextual factors on usage intention. To answer these research questions, a combined approach drawing on multivariate and set-theoretic analyses is employed. Partial least squares structural equation modeling serves as a state-of-the-art regression-based procedure, and fuzzy-set qualitative comparative analysis (fsQCA) (Ragin, 2009) and necessary condition analysis (NCA; Dul, 2016) are used for complementary perspectives. Recent work further corroborates the viability of this approach (Richter et al., 2020).

Part Two sheds light on green consumption behavior. Particularly, the gap between attitude, intention, and actual behavior has not been fully understood, and requires more investigation (Padel and Foster 2005; Vermeir and Verbeke, 2006). Further, the overall acceptance of sustainable goods is necessary to achieve a shift in consumption from conventional, ecologically harmful products towards environmentally friendly ones. Hence, Part Two makes use of technology acceptance models to examine consumers' perceptions of green transportation technology, and derives generalized acceptance frameworks to investigate the nomological nets influencing the purchase intention and behavior of sustainable clothing and plant-based food alternatives.

5 Thesis Structure and Results

Part One: Sustainability in the Work Environment

The first part of the thesis examines the role of sustainability in the work environment and focuses on CWS as a novel work phenomenon. Here, the benefits that may be gained from technology use are in the focus. Figure 2 presents an overview of Part One's structure.

Part One: Sustainability in the Work Environment
Introduction of Coworking Spaces and Coworkers‘ Collaboration Orientation Essay 1: Factors influencing members‘ knowledge sharing and creative performance in coworking spaces Methodology: Partial least squares structural equation modeling (PLS-SEM)
Introduction of the Technology Acceptance Framework and Set-Theoretic Research Methodologies Essay 2: A configurational view on technology acceptance: the example of highly integrated collaboration platforms Methodology: Fuzzy-set qualitative comparative analysis (fsQCA)
Investigation of Matchmaking Tools in Coworking Spaces as a Part of the Software Infrastructure Essay 3: Two heads are better than one: matchmaking tools in coworking spaces Methodology: Partial least squares structural equation modeling (PLS-SEM)
Advanced Investigation of Matchmaking Tools in Coworking Spaces Regarding Contextual Factors Essay 4: Acceptance of matchmaking tools in coworking spaces: an extended perspective Methodology: Partial least squares structural equation modeling (PLS-SEM) and necessary condition analysis (NCA)
Investigation of Text-Based Chatbots in Coworking Spaces as a Part of the Software Infrastructure Essay 5: Chatbots in the workplace: a technology acceptance study applying uses and gratifications in coworking spaces Methodology: Partial least squares structural equation modeling (PLS-SEM) and necessary condition analysis (NCA)
Derivation of an Updated Technology Acceptance Framework for Integrated Technologies Essay 6: A funnel perspective on technology acceptance and links to preference Methodology: Conceptual paper

Figure 2: Composition of Part One.

5.1 Factors influencing members’ knowledge sharing and creative performance in coworking spaces

CWS as open and creative hubs require knowledge sharing to realize their potential of sparking inspiration and innovation fully. A quantitative research model is compiled to investigate drivers and barriers of coworkers’ attitude towards knowledge sharing, their actual knowledge sharing behavior, and their links to creativity. A sample of 95 German coworkers is drawn and analyzed using PLS-SEM. Trust, community commitment, reciprocity, absent fear of opportunism, and perceived knowledge self-efficacy are employed as potential antecedents of attitude and actual behavior.

Absent fear of opportunism and perceived knowledge self-efficacy exhibited positive influences on attitude towards knowledge sharing. Actual behavior is substantially impacted by community commitment and coworkers’ attitude. Finally, both attitude and actual sharing behavior yield positive effects on creativity. Segmentation according to the individual level of collaboration orientation further reveals a significant difference in attitude’s impact on creativity: this relationship is significant for coworkers with a low collaboration orientation and insignificant for those with a high orientation level. Findings suggest that coworkers who are highly interested in collaboration also act out on this attitude and benefit from actual sharing behavior. In contrast, for individuals with low collaboration orientation, this gain stems from the overall CWS atmosphere offering perceptions of openness, accessibility, and community. Hence, they profit from the mere option to engage in collaboration and do not need to engage in actual exchange.

Descriptive measures further reveal that common barriers to knowledge sharing are a lack of time, low awareness of its benefits, and a lack of interaction with coworkers. Thus, potential remedies need to

enhance the visibility of knowledge and provide an efficient way of establishing connections between coworkers.

5.2 A Configurational view on Technology Acceptance: The Example of Highly Integrated Collaboration Platforms

The first essay introduces the software application class of workstream collaboration tools (WCT), which incorporate various functionalities required in daily business and may be amended with third-party integrations. The goal is to assess whether established technology acceptance notions hold for the complex and entangled context of WCT. Thus, the extended unified theory of acceptance and use of technology (UTAUT2) – combining utilitarian and hedonic perceptions – is evaluated, drawing on the set-theoretic approach of fuzzy-set qualitative comparative analysis.

One-hundred and sixteen participants were trained in using a WCT over three months. The training included both the desktop and the mobile version and covered basic and advanced functionalities. To prepare the empirical investigation, a literature review and a market analysis were conducted to define WCT and introduce them to the literature. The essay corroborates the applicability of the utilitarian-hedonic dyad present in modern technology acceptance models and reveals a strong focus on productivity-related aspects of WCT.

5.3 Two Heads are Better than one: Matchmaking Tools in Coworking Spaces

After verifying that the extant findings on technology acceptance mechanisms can be applied to the context of WCT and CWS, the second essay gains insights into the technology's capabilities of supporting coworker coordination. To do so, matchmaking tools are presented as a timely software class that seeks to identify and bring together suitable collaboration partners. Hence, matchmaking tools prototypically comprise CWS's essential communication and collaboration components and may be viewed as a critical marker of technology's role within CWS. As a result of a preceding literature review, matchmaking tools are conceptualized and exhibited as a means of identifying and bringing collaboration partners together. A prototypical layout and a normative scheme depicting the tools' functional relations with the existing infrastructure are derived.

Extending the findings from the first essay, a utility-focused technology acceptance model is applied for analysis. To capture CWS's creative atmosphere, personal innovativeness is included as a measure of coworkers intrinsic motivation to utilize novel technology. A sample of 93 German coworkers was drawn using a cluster sampling approach, showing that perceived usefulness is the major driver of behavioral intention to use. In contrast, perceived ease of use and personal innovativeness do not play critical roles. Coworkers further report that they would apply a matchmaking tool for learning purposes and identifying support for current challenges. However, most participants lack previous experience of such an application, indicating that their potential remains largely untouched.

5.4 Acceptance of Matchmaking Tools in Coworking Spaces: An Extended Perspective

The third essay extends the findings from the second one and emphasizes CWS's social environment by incorporating coworkers' evaluation of social events, their sense of community, and the perceived relevance of a matchmaking tool for their professional performance. In sum, the model employed in the second essay is advanced to incorporate hedonic next to utilitarian perceptions and includes coworking-specific social aspects as moderating variables. For empirical verification, a sample of 92 German coworkers is drawn using a cluster sampling approach.

The findings corroborate the essential role of utilitarian, productivity-related aspects, as performance expectancy yields the most substantial impact on behavioral intention to use. Again, the effort required to use the application does not impact individuals' behavioral intention to use, thus corroborating the results from the second essay. However, personal innovativeness yields a significant positive effect, contrasting previous findings. Hence, its role is not quite clear and requires further elaboration. However, its small effect size suggests that its effect may have gone unnoticed in the analysis of the second essay due to limits in statistical power.

Regarding the CWS-specific context factors, coworkers' satisfaction with online activities does not impair their willingness to use a matchmaking tool. Perceived relevance, i.e., the intersection of the application's capabilities and a coworker's demands within the CWS, has substantial positive impacts on performance and effort expectancy as well as on hedonic motivation. Finally, sense of community yields a positive moderating effect on the influence of performance expectancy and a negative impact on the relationship of hedonic motivation and behavioral intention to use.

A complementary assessment of necessary conditions shows that effort expectancy imposes large constraints on the dependent variable, revealing that while in terms of sufficiency, it does not play any role, it is a requirement for coworkers' technology acceptance. Medium effects were found for performance expectancy and hedonic motivation, indicating that matchmaking tools are prototypical dual-purpose information systems that fulfill utilitarian as well as hedonic needs. Consistent with the previous results, coworkers responded that they would use the application for learning purposes, to find support for challenges, and to get in touch with fellow coworkers in general.

5.5 Chatbots in the Workplace: A Technology Acceptance Study Applying Uses and Gratifications in Coworking Spaces

The fourth essay follows the notion of technology supporting communication and collaboration, albeit from an intra-individual rather than an inter-individual perspective. Here, the interface between coworkers and WCTs is examined, considering text-based chatbots as a non-intrusive, intuitive operation mode for software applications. The uses-and-gratifications approach is employed to identify the relevant

drivers of individuals' intention to use office-related chatbots. Instrumental and non-instrumental gratifications are combined with social norm, reflecting insights from the Theory of Reasoned Action and providing a link between technology acceptance research and the uses-and-gratifications approach.

A sample of 101 German coworkers is drawn using a cluster sampling approach. Instrumental and non-instrumental gratifications are modeled as higher-order latent variables formed by perceived productivity enhancement and information quality, and perceived enjoyment and personal innovativeness, respectively. Gender, age, and privacy concerns are analyzed for their moderating roles, finding no significant effects. While the substantial effect of instrumental gratifications corroborates extant findings revealing variables such as perceived usefulness and performance expectancy as major drivers of technology acceptance, non-instrumental gratifications yield the weakest effects after social norm. Hence, within CWS, social norms appears to play a more critical role than hedonic qualities, indicating that CWS's innovative atmosphere may, to some extent, put pressure on the individual coworker to keep up to date in terms of employed technology. These results shed light on sufficient influences. An analysis of necessary conditions reveals that social norm is not necessary, while both instrumental and non-instrumental gratifications impose constraints on behavioral intention to use.

5.6 A Funnel Perspective on Technology Acceptance and Links to Preference

Concluding from the previous findings, the fifth essay proposes a process model for technology acceptance to capture the complex interaction of users and technology better. Drawing on the extant literature on consumer behavior, a funnel is constructed that describes different forms of technology acceptance and integrates notions of adoption, continuance and discontinuance behavior, and preference. Technology acceptance is proposed to be viewed as the erection of an equilibrium state, which may be disturbed by an external shock, leading to an individual's reassessment of the available alternatives. Preference is characterized as the final step within a usage funnel and is the most immediate antecedent of actual usage behavior.

Concluding from the funnel perspective, technology adoption, acceptance, continuance, and discontinuance behavior are described in terms of movements between different sets of alternatives. The funnel also suggests that after discontinuance, an additional concept of re-adoption may be depicted. Further, technologies are presented as bundles of partitions, describing sets of features perceived as distinct components by the user. Funnel movements may differ between partitions, allowing a more detailed description of technology acceptance. Thus, a terminology of relevant acceptance types is derived.

Part Two: Sustainability in Consumption

The second part of the thesis studies the role of sustainability in consumption. To grasp this vast research field, a segmentation into the essential groups of fashion, transportation, and nutrition is carried out. Figure 3 displays Part Two's structure.

Part Two: Sustainability in Consumption
Investigation of Fashion-Related Consumer Sustainability Essay 7: Bridge the gap: consumers‘ purchase intention and behavior regarding sustainable clothing Methodology: Partial least squares structural equation modeling (PLS-SEM)
Introduction of a Methodological Plurality in the Field of Fashion-Related Consumer Sustainability Essay 8: Equifinal causes of sustainable clothing purchase behavior: an fsQCA analysis among Generation Y Methodology: Fuzzy-set qualitative comparative analysis (fsQCA) and necessary condition analysis (NCA)
Investigation of Transportation-Related Consumer Sustainability Essay 9: Consumer acceptance of shared e-scooters for urban and short-distance mobility Methodology: Partial least squares structural equation modeling (PLS-SEM)
Investigation of Nutrition-Related Consumer Sustainability Essay 10: Above and beyond meat: the role of consumers‘ dietary behavior for the purchase of plant-based food substitutes Methodology: Partial least squares structural equation modeling (PLS-SEM), fuzzy-set qualitative comparative analysis (fsQCA), and necessary condition analysis (NCA)

Figure 3: Composition of Part Two.

5.7 Bridge the Gap: Consumers’ Purchase Intention and Behavior Regarding Sustainable Clothing

The seventh essay seeks to shed light on purchase intention and actual purchase behavior of sustainable clothing. The extant literature on sustainability has corroborated the notion of an intention-behavior gap: consumers may yield a positive attitude towards sustainable clothing, and thus, form a purchase intention. However, translating this intention into action is frequently hampered. The essay draws on the Theory of Reasoned Action to lay out the structural mechanisms leading to intention formation and concentrates on the relationship between behavioral intention and actual behavior. Two moderating variables are introduced that are hypothesized to prevent intentions from turning into actions: perceived aesthetic risk and perceived economic risk. Further, greenwashing concerns are postulated to inhibit the intention formation process by decreasing the impact of environmentally friendly perceptions and, consequently, consumers’ attitude towards sustainable clothing.

Four-hundred and sixty-four complete responses were collected across social media channels. Findings suggest that greenwashing concerns indeed moderate the influence of attitude on intention negatively. Subjective norm, on the other hand, does not play a critical role. Purchase intention yields a significant and positive impact on purchase behavior; however, this relationship is negatively moderated by perceived aesthetic risk. No evidence for an effect of perceived economic risk could be found.

5.8 Equifinal Causes of Sustainable Clothing Purchase Behavior: an fsQCA Analysis Among Generation Y

The topic of sustainable purchase behavior is advanced by employing a methodological perspective of fsQCA and NCA, thus complementing the prevalent results stemming from multivariate statistics. Purchase intention is selected as the outcome, and environmental concern, self-expressiveness, visibility,

social influence, and price value are hypothesized to be conditions. As Generation Y is a critical consumer segment regarding sustainable goods, a cluster sampling approach was conducted among German universities. Eighty-one complete questionnaires were collected and used for analysis.

Overall, fsQCA and NCA reveal that environmental concern may be considered a necessary condition for forming a purchase intention. NCA further suggests that significant constraints are imposed by self-expressiveness, social influence, and price value, rendering them necessary in degree. A configurational assessment allows for more detailed insights. For most consumers, visibility is required to be absent; i.e., they react adversely to sustainable clothing's high visibility. Further, gender-specific differences were found. For women, environmental concern appears to be a substantial motivator and may elicit purchase intention on its own. For men, the sole presence of environmental concern leads to the absence of purchase intention.

As fsQCA seeks to balance general insights and case-wise examination, more granular segmentations were applied to gain more insights into the matter. Differences were found between consumers that prefer brick-and-mortar stores and those that use mixed channels. Also, evidence was found that experience might play a role: consumers that have purchased sustainable clothing before show different results than those who have not. Particularly, they consider visibility unacceptable. Further segmentations establish evidence for distinguishing consumers spending a high budget on clothing from those that do not and fashion-interested individuals from uninterested ones.

The results reveal that the topic of sustainable clothing needs to be treated considering heterogeneous consumer segments. The assumption that sustainability claims are sufficient to elicit purchase intention needs to be questioned; however, there are consumer groups that focus on this aspect. Still, regarding the overall market segment of Generation Y, different consumer demands require distinguished marketing measures.

5.9 Consumer Acceptance of Shared E-Scooters for Urban and Short-Distance Mobility

E-scooters are light-weight electric vehicles assumed to tackle transportation-related challenges such as environmental pollution, congestion, and lack of space while offering a convenient locomotion mode. The ninth essay investigates consumer acceptance of e-scooters, focusing on urban areas where they may yield the highest advantage. A technology acceptance model is compiled considering UTAUT2 factors performance expectancy, effort expectancy, hedonic motivation, social influence, and sustainable transportation-specific variables perceived safety and environmental concerns.

Seven-hundred and forty-nine questionnaires were collected. A major difference in assumed advantages of e-scooters was found between owners and consumers that rent vehicles, indicating that owners yield more favorable perceptions than non-owners. In total (i.e., considering the total sample), consumers

appear to be rather indifferent. PLS-SEM results show that intention to use and actual use yield a substantial positive relationship, which may be considered symmetrical. Performance expectancy and environmental concerns are the main drivers, followed by social influence and hedonic motivation. Perceived safety has a weak but significant negative moderating influence on hedonic motivation's effect.

Altogether, consumers are fairly heterogeneous in their perceptions of e-scooters. While they are generally accepted as means of transportation, some segments show substantial retention. Consumers on the overall level view e-scooters' environmental impact fairly differently and even fear an increased risk of accidents.

5.10 Above and beyond meat: the role of consumers' dietary behavior for the purchase of plant-based food substitutes

The final essay explores consumer attitude, purchase intention, and purchase behavior regarding plant-based groceries to replace animal products and the influence of individual dietary choice. A combined approach of PLS-SEM, fsQCA, and NCA allows insights into sufficient and necessary conditions. The Theory of Reasoned Action serves as the baseline for research model compilation. Context-specific variables are included in the form of environmental concerns, animal welfare concerns, health consciousness, and perceived consumer effectiveness. As the latter may be viewed as a proxy for perceived behavioral control, the model incorporates the Theory of Planned Behavior's benefits and applies them to the consumer context.

A sample of 1,447 consumers was gathered on social media platforms. PLS-SEM results display that attitude and purchase intention are substantially positively linked, indicating a symmetric relationship. Subjective norm is found to yield a weak but positive influence on purchase intention; however, the main impact is exerted by attitude and its antecedents. Perceived consumer effectiveness has the strongest positive effect, followed by dietary behavior and environmental concerns. A fairly curious finding is that neither health consciousness nor animal welfare concerns exhibit a significant influence on consumers' attitude towards plant-based food substitutes.

Set-theoretic analyses of sufficiency and necessity reveal environmental concerns and animal welfare concerns to be candidates for necessary conditions for a positive attitude towards plant-based goods. A specific dietary behavior, such as focusing on restricted meat intake, is not a necessary condition for a favorable attitude. In total, the study could draw a holistic picture of attitude and intention formation by providing analyses of different methodology and scope, finding that relevant variables interact and yield asymmetrical effects in most cases, while a symmetric effect of attitude on purchase intention could be detected.

Appendix: Other publications

Besides the essays that became my thesis, I had the chance to learn and develop my skills on other occasions, many of which led to successful publications. The following table presents this work.

Table 1: Other works and publications.

Reference	Title	Outlet
Kopplin, C.S.; Baier, D.	How to Construct an Ideal Collaboration Tool for Coworking Spaces: An SP-CBC Application	Archives of Data Science Series A
Kopplin, C.S.	Communication tools in new product development: startup companies' preferences over time	Journal of Small Business Strategy
Kopplin, C.S.	Slack in Collaboration: Managing Highly Integrated Digital Platforms	Under review
Kopplin, C.S.	Technostress and its Impact on User Perception of Technology in the Organizational Context	Under review
Kopplin, C.S.	The Impact of Technostress on IS Usage: An Analysis of Necessary and Sufficient Conditions	Under review
Rausch, T.M.; Kopplin, C.S.	Are you sure you want to leave? On the determinants of online shopping cart abandonment	Under review
Rausch, T.M.; Kopplin, C.S.	Listen to Your Hearth: Consumers' purchase behavior of plant-based food substitutes	Under review
Brand, B.; Kopplin, C.S.; Rausch, T.M.	Cultural Differences in Processing Online Customer Reviews: Holistic Versus Analytic Thinkers	Under review
Brand, B.; Kopplin, C.S.	Effective Return Prevention Measurements in the Post-Purchase Stage: A Best-Worst Scaling Approach Among Consumers of Generation Y	Under review
Kopplin C.S.; Rosenthal, L.	The positive effects of combined breathing techniques and cold exposure on perceived stress: a randomised trial	Under review
Kopplin, C.S.; Baier, D.	Constructing an Ideal Workstream Collaboration Tools for Coworking Spaces Using Single-Product Choice-Based Conjoint Measurement	ECDA2019
Brand, B.; Kopplin, C.S.	Examining Best-Worst Scaling's Validity and Reliability: Worth a try?	2nd Meeting of AG Marketing

Part One: Sustainability in the Work Environment

Essay 1: Factors influencing members' knowledge sharing and creative performance in coworking spaces

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Abstract

Coworking spaces (CWS) are a globally increasing phenomenon of new shared work environments used by freelancers, entrepreneurs and small companies that often work in information technology and creative industries. The purpose of this study is to examine coworkers' knowledge sharing (KS), focusing on attitude, behavior and individual creativity. Several theoretical perspectives are deployed for factors influencing KS. A research model is developed and tested, relying on a sample of 95 German coworkers using a structural equation modeling approach. The attitude towards knowledge sharing and actual sharing behavior in CWS improve coworkers' creativity. Behavior and attitude differ in positive impact depending on the level of collaboration orientation. Despite the presence of an agreeable atmosphere, lower collaborative orientation results in KS being rated lower. The authors provide initial empirical insights into the relationship between KS and creativity in CWS. Core coworking values are shown not to form a uniform block but rather "collaboration" is acting as a discriminator. Community commitment showed the highest positive impact on KS behavior. For community development, CWS will have to take differences in the KS behavior of their coworker clientbase into account to foster creativity.

1 Introduction

More than 1.8 million people are working in 26,300 coworking spaces (CWS) around the globe in 2020 (Statista, 2019a, 2019b), and this is expected to rise to about 49,500 by 2022 (Global Coworking Unconference Conference, 2019). This development mirrors changes concerning workplaces and work life, with new office models entering the market (Leclercq-Vandelannoitte and Isaac, 2016). In particular, the start-up boom leads to individuals and small teams seeking affordable workspace, which requires corporate real estate to cater for new needs (Moriset, 2013; Rus and Orel, 2015). CWS promote the core values of openness, community, accessibility, sustainability and collaboration (Bianchiet al., 2018; Garrett et al., 2017; Schmidt and Brinks, 2017), fitting the overall evolution of work which is increasingly grounded on cooperation, collaboration, knowledge and creativity (Constantinescu and Devisch, 2018; Zammuto et al., 2007). However, up to now, it has not been confirmed whether the genuine claim of a positive interplay between core CWS values, knowledge sharing (KS) and creative performance stands the test, and CWS offer a creative benefit to their coworkers.

KS within and outside organizations and at different levels (e.g., between individuals, teams, business units) has gained attention in research and business practice (Chan and Husted,2010; Ipe, 2003; Renzl, 2008; Riege, 2005; Scuotto et al., 2020). The dissemination of specific knowledge, e.g., about customers, triggers organizational learning processes (Ipe, 2003; Kogut and Zander, 1996; Riege, 2005), new ideas and enhances product and technological development, which strengthens individual and organizational innovative capacities (Cummings, 2004; Hung et al., 2011a; Hung et al., 2011b; Renzl, 2008; Riege, 2005; Tsai, 2001). Hence, research is interested in KS' impact on creativity (Son et al., 2017; Tang, 2016; Wang and Noe, 2010).

Despite the growing significance of knowledge, KS in CWS has hardly been investigated. Parrino (2015) analyzed networkers' ties and knowledge flows in two different CWS types based on Social Network Analysis. Bouncken and Reuschl (2018) conceptually highlighted the importance of antecedents, such as social interaction for knowledge transfer and learning, which are proposed to affect creativity and work performance positively. Based on qualitative data, Bouncken and Aslam (2019, p. 2067) identified crucial facets of "spatial colocation" and "institutionalization of knowledge management services" in CWS.

Because KS is regarded as a "learning process for the sharer" (Wang and Noe, 2010, p. 124), creativity is identified as deserving further attention. The objects of research regarding KS have primarily been organizational settings (Corvino et al., 2019; Chen et al., 2014; Chow and Chan, 2008; Wang et al., 2014) including networks (Fait et al., 2019; Scuotto et al., 2020; Singh et al., 2019) and virtual communities (Chai et al., 2011; Chang et al., 2015; Chen and Hung, 2010). This study aims to provide insights for CWS and their proposed "culture of sharing" (Brinks, 2012, p. 129) with a particular focus on barriers and coworkers' creative performance. To do so, the Theory of Reasoned Action (TRA, Fishbeinand Ajzen, 1975) is used, providing established links between individuals' attitudes and behaviors. The results of other frameworks such as Social Capital Theory (SCT, Bandura, 1997), Social Cognitive Theory (Bandura, 1986, 1994), and meta-analyses provide important antecedent factors.

Thus, the study seeks to contribute to the streams of CWS literature related to KS between coworkers (Bouncken and Aslam, 2019). We shed light on the interplay of coworking values, KS, creative performance, against the background of the KS literature (Tangarajaet al., 2016). A particular focus is on CWS members' drivers and barriers (Riege, 2005), potential heterogeneity among coworkers and the effects on creativity. To capture KS, individual coworkers' "belief structures" (i.e., attitude, Bock et al., 2005, p. 89) as well as their behavior (i.e., behavioral intention) are considered. Drawing on a sample of 95 users of 24 German CWS, the results contribute to knowledge on CWS and KS and add insights to the impacts on creativity (Perry-Smith, 2006; Zakaria et al., 2004).

The paper is structured as follows. In Section 2, the theoretical background surrounding KS and coworking is highlighted, and research hypotheses are developed. The methodology and data analysis are presented in Section 3, followed by the results in Section 4. Section 5 comprises a discussion and theoretical and managerial implications for CWS providers. In Section 6, a conclusion and implications for further research are provided.

2 Literature review and hypotheses development

2.1 Coworking spaces as knowledge sharing places

CWS have been described as "open spatial settings" (Schmidt and Brinks, 2017, p. 292), stressing not only their structural layout, but also the social setting (Bouncken and Reuschl, 2018; Capdevila, 2013; Garrett et al., 2017). Users flexibly rent workspace and access infrastructure at variable fees (Brinks, 2012; Gandini, 2015; Garrett et al., 2017). As interaction space, the free flow of online and offline resources is fostered, which "facilitates the spirit of collaboration and sharing" (Fuzi, 2015, p. 464). Cohendet et al. (2014) emphasize knowledge creation by connecting formerly distant users, leading Capdevila (2015, p. 21) to define CWS as "specialized innovation communities".

Networking and social exchange are central elements of CWS, rendering them places for sharing intangible resources such as time, skills, knowledge and experience (Botsman and Rogers, 2010; Milanova and Maas, 2017). The benefits from the community-like environment cannot be obtained by mere rent but are based on user interaction in everyday coworking; hence, Brinks (2012, p. 131) uses the term "interactive non-material level". At the material level, elements such as open settings, meeting rooms, lounge areas, technical equipment, and furniture are combined (Garrett et al., 2017). Social events and training enhance not only individual productivity but also the sense of community (Bouncken et al., 2018a; Garrett et al., 2017). Overall, CWS intend to provide office facilities for daily work and a network of KS, innovation and education (Gandini, 2015). The literature proposes that CWS foster creativity (Bouncken and Reuschl, 2018; Fuzi et al., 2014) by enabling "people to meet, explore, experience, learn and teach and share and discuss topics around creative practices in various areas" (Bilandzic and Foth, 2013, p. 255). Capdevila (2013, p. 3) mentions coworkers' openness "to share their knowledge with the rest of the (coworking) community". Users are not only freelancers, self-employed persons, entrepreneurs and consultants but also employees preferring flexible workspaces because of their workstyle (Bouncken and Aslam, 2019; Bouncken and Reuschl, 2018; Foertsch, 2017). Coworkers are commonly rooted in information technology (IT), design, marketing, journalism and consulting, working in creative industries and new media (Gandini, 2015).

2.2 Knowledge sharing as a community phenomenon

KS research uses a pragmatic definition of knowledge that makes the differences between knowledge and information negligible (Wang and Noe, 2010). Knowledge is considered "information processed

by individuals, including ideas, facts, expertise and judgments relevant for individual, team and organizational performance" (Wang and Noe, 2010, p. 117). Thus, reflection and experience are necessary to acquire knowledge (Nonaka and Konno, 1998), which, therefore, "resides within individuals" (Bock et al., 2005, p. 88).

Regarding the common distinction of explicit (words, numbers) and tacit knowledge (subjective insights, intuitions, ideas, Akhavan and Mahdi Hosseini, 2015; Chang and Chuang, 2011; Nonaka and Konno, 1998), the focus is on the latter. Tacit KS requires interpersonal exchange, with knowledge being reconstructed by the receiver (Hendriks, 1999). Ryu et al. (2003, p. 364) thus describe KS as a "people-to-people process". In a work-related environment, the provision and receipt of knowledge not only include "task information, know-how and feedback regarding a product or procedure" but also coordinating expertise about knowledge distribution (Cummings, 2004, p. 352).

Tacit KS is tied to individuals and their motivation to share (Bock et al., 2005; Chang and Chuang, 2011; Wasko and Faraj, 2000; Yu et al., 2010). The literature distinguishes differen motivations for KS, such as individual and collective benefits (Bock et al., 2005) and economic (i.e., extrinsic) and non-economic (i.e., intrinsic) forces (Constant et al., 1994; Wasko and Faraj, 2000). For innovation, altruistic and pro-social behavior, not seeking tangible rewards such as an increase in salary or promotion is considered necessary (Constant et al., 1994; Wasko and Faraj, 2000). Intangible KS rewards include a gain in reputation and reciprocity in a community (Constant et al., 1994; Hendriks, 1999; Hung et al., 2011b; Tampoe, 1993; Wasko and Faraj, 2000). Interest in KS within a community is based on a moral obligation or interest in the community as a whole, resulting in increased personal identification, fairness and openness (Constant et al., 1994; Yu et al., 2010). However, the sharing process is afflicted with individual, organizational and technological barriers (Hendriks, 1999; Riege, 2005).

2.3 Research hypotheses

Topics on KS have primarily related to organizational settings, networks and virtual communities. Different approaches have been used for characterization, e.g., SCT (Bandura, 1997) describing resources from the relationship network according to social, relational or cognitive dimensions. The latter has been related to intellectual capital and its facets (Nahapiet and Ghoshal, 1998).

Social Cognitive Theory (Bandura, 1986, 1994) is used to explain individual motivations and environmental/organizational factors. Other frequently used frameworks are the Social Exchange Theory (SET, Blau, 1964; Cropanzano and Mitchell, 2005) and the TRA (Fishbein and Ajzen, 1975). However, Wang and Noe (2010) concluded that part of the studies (over 20%) are not based on any theory.

The TRA relates beliefs and expectations (i.e., attitude) toward any behavior, e.g., KS, to behavioral intention and actual behavior. The meta-analysis of Witherspoon et al. (2013) has identified three ante-

cedents of KS, including intentions and attitudes (Table 1). The TRA is used here to provide the theoretical foundation to predict KS and creativity from knowledge sharing attitude (KS-ATT) and its antecedents of coworkers in CWS. Concerning significant influencing factors, we refer to those used in the conceptual model developed by Bouncken and Reuschl (2018) for the coworking context: trust, community commitment, perceived knowledge self-efficacy and (absent fear of) opportunism. For example, perceived self efficacy is considered essential for coworkers as it supports entrepreneurial actions (Bouncken and Reuschl, 2018; Gerdenitsch et al., 2016).

Table 1: Reference studies in the CWS context and meta-analyses investigating knowledge sharing.

Author(s) (Year)	**Methodology**	**Influencing Factors**	**Dependent Variable**
Bouncken and Reuschl (2018)	Conceptual study in the coworking context	Opportunism, trust, community, self-efficacy	Learning (mediator), performance
Akhavan and Hosseini (2015)	Meta-Analysis on KS and the social capital perspective	**Trust** (mentioned in 60% of the studies), social network ties (40%), **reciprocity** (25%), shared language (21%), identification (21%), **shared vision** (21%), social interaction (19%), tie strength (15%), norms (17%), **commitment** (12%)	KS
Liu et al. (2011)	Meta-Analysis on KS and the Social exchange theory	*Individual factors*: intrinsic motivation, organizational **commitment**; interpersonal factors: social interaction, **trust**, *Environmental factors:* organizational support, reward system; Moderator: IT Facilitation	KS behavior
Wang and Noe (2012)	Narrative literature review on different theoretical KS perspectives	*Environmental factors* (organizational context, interpersonal and team characteristics, cultural characteristics, e.g. **in-group/out-group**); *Individual characteristics* (e.g. **self-efficacy**); *Motivational factors* (e.g. **trust, team level trust and cohesiveness**)	KS intention, intention to encourage KS, KS behavior
Witherspoon, Bergner, Cockrell and Stone (2013)	Meta-Analysis on different theoretical KS perspectives	*Intentions and attitudes* (**KS intention, KS attitude, knowledge self-efficacy**, intrinsic KS motivation); *Organizational culture* (communication, participation, subjective norm, **social trust**, **organizational commitment**, social network, support for KS, shared goals, KS resources & technology); *Rewards to KS* (Anticipated pay increase/promotion, anticipated **reciprocal relationships**, reputation building)	KS

Because of attitudes being formed for a particular context, the different theoretical KS perspectives, e.g., SCT and Social Cognitive Theory, confirm most of these factors (Table 1), and are used to determine other factors that impact KS-ATT and KS. The risk of knowledge leakage has been sometimes mentioned in the SCT perspective, as exchange relationships often suffer from opportunistic behavior (Hsu and Chang, 2014; Liang et al., 2005). Because reciprocity was mentioned in two of the meta-analyses as a crucial determinant, this factor is additionally considered as an antecedent of KS (Table 1).

2.3.1 Trust

Trust is one of the most frequently considered factors in KS (Chai et al., 2011; Chang and Chuang, 2011; Hsu and Chang, 2014; Lin, 2007). A high degree of trust between individuals or group members elicits openness to provide knowledge and benefit from mutual learning (Chang and Chuang, 2011; Chow and Chan, 2008). Individuals assess the value and reliability of others' knowledge, depending on how much they trust them (McNeish and Mann, 2010). A lack of trust leads to a reluctance in behavior, rendering acquisition more difficult (Chai et al., 2011; Hashim and Tan, 2015). According to Renzl (2008), trust positively affects KS-ATT.

Research has established a positive relationship between trust and KS in contexts such as organizations (Hsu and Chang, 2014) or blogs (Chai et al., 2011). For CWS, trust is a central value for the concept of community (Fuzi et al., 2014; Merkel, 2015; Rus and Orel, 2015). The primary reasons to join a CWS are a CWS' community, interaction with other coworkers and finding mutual support (Fuzi et al., 2014). Rus and Orel (2015, p. 1024) highlight the importance of trust "for sharing information, knowledge and advice among members". This leads to our first hypothesis:

H1. The higher trust a) the higher KS-ATT; b) the more likely KS is to occur.

2.3.2 Community commitment

The literature proposes a close social relationship to acommunity as eliciting identification. We use the term "community commitment" referring to members' attitudes regarding community (Hur et al., 2011), comprising affective commitment, togetherness, attachment and belonging (Chiu et al., 2006; Sánchez-Franco and Roldán, 2015). Based on SCT, it can be described as a result of individual cognition and part of a person's beliefs and expectations (Chiu et al., 2006). Identification positively correlates with citizenship behaviors such as altruism, conscientiousness and courtesy (Bergami and Bagozzi, 2000; Meyer et al., 2002). According to Nahapiet and Ghoshal (1998), identification may increase perceived KS opportunities and actual cooperation. They stress the ties with a shared language and common understanding, which positively influences communication efficiency and KS behavior (Chai et al., 2011; Lin, 2007; Nahapiet and Ghoshal, 1998).

For CWS, community and its maintenance are elemental (Bouncken and Reuschl, 2018; Capdevila, 2013). Rus and Orel (2015, p. 1025) describe community commitment as an organizational device that "provides assurances to the self-employed members that the group in which they are investing themselves will have permanence and would not yield to free riding and opportunism". The definition of a collaborative community in coworking highlights values such as "contribution, concern, honesty, collegiality" (Spinuzzi et al., 2019, p. 120). This basis of trust results in benefits when coworkers contribute to knowledge creation (Spinuzzi et al., 2019, p. 122). We thus hypothesize:

H2. The higher a coworker's community commitment a) the higher KS-ATT b) the more likely KS is to occur.

2.3.3 Reciprocity

In the context of KS, reciprocity is considered an extrinsically motivating factor (Kankanhalli et al., 2005; Zhao et al., 2016). Reciprocity is defined as an "individual perception of fairness to share content mutually" (Wasko and Faraj, 2000, p. 162) and of "mutual indebtedness" (Wasko and Faraj, 2005, p. 43). Drawing on concepts such as procedural justice (Kim and Mauborgne, 1991), the literature argues that an individual will exhibit corresponding behavior, e.g., share knowledge, if the expected return equals or exceeds the own contribution (Bock et al., 2005; Chai et al., 2011; Chang and Chuang, 2011; Chiu et al., 2006; Hendriks, 1999; Kankanhalli et al., 2005; Schulz, 2001; Wasko and Faraj, 2000). If this expectation yields a negative value, the motivation for KS decreases (Hendriks, 1999). If others' skills and knowledge are considered inadequate, concerns about not benefitting from the exchange arise (Hsu and Chang, 2014; Zhao et al., 2016). Reciprocity is also found to be a community feature in the CWS context (Rus and Orel, 2015), because coworking is based on collaboration and sharing knowledge (Brinks, 2012; Fuzi et al., 2014). This leads to the following hypotheses:

H3. The more likely it is for a coworker to receive a trade-off for sharing knowledge a) the higher KS-ATT b) the more likely KS is to occur.

2.3.4 Absent fear of opportunism

Exchange of valuable resources such as knowledge comes with a risk of opportunistic behavior (Becerra et al., 2008; Bergen et al., 1992; Jap and Anderson, 2003). Knowledge drain in an open exchange is difficult to control (Becerra et al., 2008; Langfield-Smith, 2008). Hence, the fear of opportunism evolves: knowledge seekers might take advantage of others' knowledge to pursue their interests but return little or nothing themselves (Hsu and Chang, 2014). The fear of losing knowledge is highly related to an increased perception of uncertainty and thus negatively affecting KS-ATT and KS itself (Hsu and Chang, 2014; Liang et al., 2005). In the CWS context, Bouncken and Reuschl (2018, p. 328) discuss opportunism as "misuse of knowledge or contacts" negatively affecting trust within and the sense of community, hampering learning and collaborative processes. CWS support shared values and community development within formal rules and member management, trying to select the appropriate coworkers (Capdevila, 2013). Thus, we propose the following hypotheses:

H4. The more absent a coworker's fear of opportunism a) the higher KS-ATT b) the more likely the KS is to occur.

2.3.5 Perceived knowledge self-efficacy

On the individual level, self-efficacy is considered an essential intrinsic motivational factor for KS (Gist and Mitchell, 1992; Kankanhalli et al., 2005; Wasko and Faraj, 2000). Self-efficacy refers to "the belief that one has the capability to perform a particular behavior" (Compeau and Higgins, 1995, p. 189). Individuals "feel competent and proud of their knowledge" (Zhao et al., 2016, p. 74) and believe that their specific knowledge can contribute to problem-solving (Lin, 2007). Successfully solving complex tasks increases perceived self-efficacy and the intrinsic motivation for KS (Zhao et al., 2016), termed "knowledge self-efficacy" (Kankanhalli et al., 2005; Lin, 2007). Empirical studies support a positive impact of perceived self-efficacy on KS-ATT and, in turn, on KS intention or behavior (Lin, 2007; Tohidinia and Mosakhani, 2010; Zhao et al., 2016). Because CWS are based on collaboration, the research proposes that a supportive and non-hierarchical environment fosters self-efficacy and the willingness to share knowledge (Bouncken and Reuschl, 2018; Gerdenitsch et al., 2016). We thus formulate the following hypotheses:

H5. The higher a coworker's perceived knowledge self-efficacy a) the higher KS-ATT b) the more likely KS is to occur.

2.3.6 KS-ATT

KS-ATT is understood as a "degree of one's positive feelings about sharing one's knowledge" (Bock et al., 2005, p. 91) and is conceptualized as containing affective and cognitive components (Davis, 1986). The former considers motivational-emotional aspects. Regarding CWS, interaction processes with other coworkers can be highly interesting, stimulating, satisfying, exciting or pleasant (Hsu and Lin, 2008; Nambisan and Baron, 2009), e.g., "enjoyable in [their] own right" (Pai and Tsai, 2016, p. 41), which is one of the reasons for coworkers to pick a coworking space (Abe and Uda, 2016). Research provides evidence that pleasurable experiences from past interaction processes can lead to affective memory traces which positively influence future interactions (Cohen and Areni, 1991; Nambisan and Baron, 2009). Further, Social Exchange Theory proposes that the reciprocity of hedonic benefits in interaction "lead[s] members to feel more obligated to reciprocate beneficial resources for their […] communities" (Pai and Tsai, 2016, p. 41).

The cognitive component considers the comparison of costs and benefits, e.g., the sharer's subjective perception that KS will improve work efficiency or yield further economic benefits (Davis, 1989; Yu et al., 2010). Coworkers join CWS for individual business interests, exchange ideas and exploit synergies with other coworkers (Spinuzzi et al., 2019). We therefore propose the following hypotheses:

H6. The higher a coworker's KS-ATT the more likely the KS is to occur.

H7. The higher a coworker's KS-ATT the higher the (perceived) creativity.

2.3.7 Outcome variable: creativity

Creativity has been defined as an "individual-level construct" (Perry-Smith, 2006, p. 86). It describes both an individual's participation behavior and activities that are meant to produce novel ideas (Amabile, 1983; Amabile et al., 1996). To generate innovative ideas in the creative process, different knowledge elements are combined (Wang et al., 2014). Expertise is listed as one of the individual's "raw materials" besides creative thinking skills and motivation to constitute individual creativity (Amabile, 1998, p. 79). Some studies of the KS literature have investigated and established a positive role of KS increasing creativity (Lin, 2007; Mura et al., 2013; Tsai and Ghoshal, 1998; Wang and Wang, 2012).

Defining CWS, the stimulation of creativity is mentioned as a key benefit by Bilandzic and Foth (2013) and Fuzi et al. (2014). The positive effect was confirmed first in case study research (Brown, 2017). Several creative activities such as "collaboration, inspiration, thinking, sharing and exploration" (Fuzi et al., 2014, p. 7) are highlighted. The importance of KS in terms of ideas is reflected by "openness" which is one of coworking's core values (Fuzi et al., 2014). Capdevila (2013) suggests heterogeneity in coworkers' knowledge base, offering different mindsets.

CWS support interaction between coworkers and possibilities for KS with interior design creating a stimulating work atmosphere (Bouncken and Aslam, 2019; Bouncken and Reuschl, 2018). Open spaces and a "café-like environment" (Spinuzzi, 2012, p. 413) invite coworkers "to feel comfortable, creative and productive" (Fuzi et al., 2014, p. 3). The CWS literature proposes KS as an effective means for performance improvement, particularly creativity (Bouncken and Reuschl, 2018; Clifton et al., 2019). Thus, our hypothesis is as follows:

H8. The more knowledge is shared between coworkers in CWS the higher the (perceived) creativity.

Figure 1 displays our research model. From a methodological point of view, partial least squares structural equation modeling (PLS-SEM) is used. PLS-SEM is particularly useful for producing robust estimations for structural models and gaining insights on causal relations among latent variables, providing high statistical power rendering it adequate for exploratory research and theory development (Hair et al., 2019). Current research in the field of knowledge management has adopted PLS-SEM and achieved valuable findings, such as the exploitation of shared knowledge and its mediating effect on creative behavior (Kim, 2019), environmental turbulence affecting the impact of different knowledge sources on frugal innovation (Dost et al., 2019), effects of technological uncertainty and dynamic capabilities on collaborative innovation (Jiao et al., 2019) and the generation of performance measures for knowledge management ventures (Oufkir and Kassou, 2019).

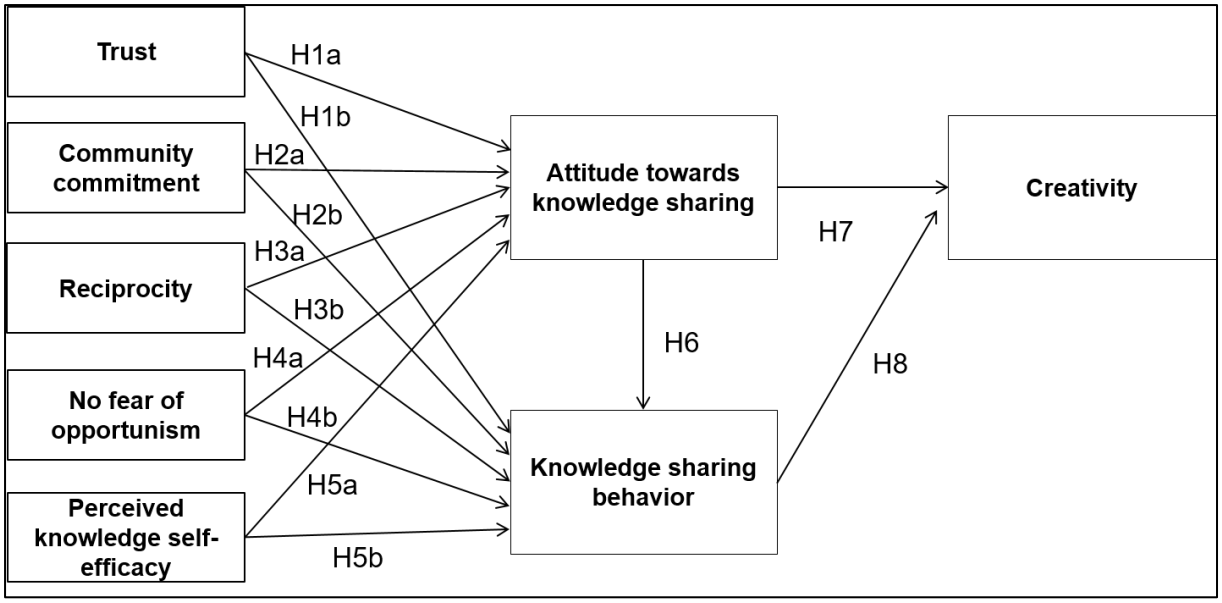

Figure 1: Research model.

2.3.8 Coworking spaces value orientation regarding collaboration

The third – cognitive – dimension of social capital corresponds to norms and values (Chiu et al., 2006; Tsai and Ghoshal, 1998). Common values and shared vision are seen as antecedents of "trusting relationships" (Tsai and Ghoshal, 1998). We argue that they increase KS probability by reducing miscommunication, friction and uncovering the value of knowledge.

In 2011, the core value set of community, collaboration, openness, diversity and sustainability was introduced by CitizenSpace coworking in San Francisco (Holienka and Racek, 2015) and had since been included in other CWS' manifestos (Rus and Orel, 2015). They are proposed to serve as a "normative cultural model" (Merkel, 2015, p. 124) or "shared mental space" (Castilho and Quandt, 2017, p. 34). Formal and informal rules introduced by CWS are necessary but cannot guarantee the "emergence of a knowledge community" (Capdevila, 2013, p. 6). Coworking values are used to explain individual motivation for sharing behavior (Castilho and Quandt, 2017).

CWS provide configurations corresponding to the notion of ba as proposed by Nonaka and Toyama (2005) in terms of a dynamic contextual setting shaped by coworkers and their interactions. Actors exhibiting high-value orientation take an essential role in constructing and maintaining ba in the CWS, which in turn yields knowledge and inspiration. Additionally, multiple separate bas are likely to exist (Nonaka and Toyama, 2005); hence, connection and integration become important tasks. Coworkers that identify with coworking's values naturally act in this manner by promoting social relations, transparency, and coordination. This allows constructive dialogue to be elicited, integrating mutual understanding and influence (Tsoukas, 2009). Furthermore, low-value orientation implies less dialogue and actions, yielding a more detached position and thus, less KS. This leads to the following hypotheses:

H9. The higher the individual orientation to CWS values the more likely the KS is to occur.

3 Research design

3.1 Data collection and questionnaire design

Since the first official CWS was established with the "Hat Factory" in San Francisco in 2005 (Parrino, 2015) and the betahaus in Berlin in 2009 (Bouncken et al., 2018b), CWS have experienced exponential growth around the world (Mariotti et al., 2017). For Europe, Germany has been described as "an attractive market for coworking providers alongside France and the UK" (BNP Paribas Real Estate, 2019). In particular, the 7 A-cities, Berlin, Cologne, Dusseldorf, Frankfurt, Hamburg, Stuttgart and Munich, are interesting for coworking providers because of a high supply of offices.

In a first step, we searched the Web for and identified active CWS in Germany. The resulting 360 were located in 91 cities, which corresponds to the number Pink (2018) identified of about 350 CWS at that time. The sample selection concentrated on the large cities since, according to Pink (2018), CWS are located in the 7 A-cities in 75% up to 90% of all cases. Besides, we added two metropolitan cities from East Germany, Dresden and Leipzig (Table 2). A sample of 118 CWS in Germany was generated using cluster sampling. While in the population sample, more than half of the CWS (58.9%) were located in the selected cities, the percentage for the sample was 78.0%. Regarding the distribution across Germany, in the population sample, 4.4% of the CWS were in the East and 32.8% in the South, for the sample, this was 6.8% and 23.3%.

Table 2: Population and sample selection.

	CWS population (n=360)	CWS sample (n=118)
Berlin	23.9%	43.2%
Cologne	4.2%	851%
Dresden	0.8%	2.5%
Dusseldorf	2.2%	2.5%
Frankfurt	3.9%	3.4%
Hamburg	9.7%	5.1%
Leipzig	2.2%	4.2%
Munich	9.2%	4.2%
Stuttgart	2.8%	4.2%

Data collection was conducted over four weeks in February and March 2018. The online survey resulted in 73 total and 38 completed questionnaires of 18 CWS ("online sample"). Four CWS were newly included as a result of the questionnaire's distribution. In addition, face-to-face interviews took place in selected CWS. A total of 57 questionnaires were generated by personal interviews at 7 CWS places ("offline sample"), with one CWS newly added. One CWS is present in both samples resulting in 24 CWS taking part in the survey (response rate: 19.5%). The number of questionnaires per CWS ranged between 1 and 18 (average: 3.96, std: 4.486), with 11 CWS providing one questionnaire and 4 CWS 10

questionnaires and more. Before merging online and offline samples, response bias was tested by comparing all research-related constructs using a Mann–Whitney U-Test. No significant differences were found at the 0.05 level. The same holds for the comparison of the two groups, including CWS with exactly one answer (n = 11) and with more than one answer (n = 84). Non-response bias was tracked with a Chi-Square test, assessing whether responding CWS were different in terms of location in Germany (East, South) or city size compared to the population of 365 CWS, which was not the case.

Item scales were based on the KS literature (Table 3) and answered on a seven-point Likert scale (1 = "strongly disagree", 7 = "strongly agree"). Trust was measured using five items that describe the individual coworker's perception of integrity, benevolence, nonopportunism and behavior consistency of other coworkers (Chang et al., 2015; Chiu et al., 2006; Sánchez-Franco and Roláan, 2015). The five items measuring community commitment focused on affective commitment and belonging (Hashim and Tan, 2015; Sánchez-Franco and Roldán, 2015). The item scale measuring reciprocity was based on five items that indicate coworkers' perception of knowledge exchange as fair with equivalent compensation among coworkers and emphasized mutual understanding and support (Chen and Hung, 2010; Hoppner et al., 2015; Pai and Tsai, 2016; Sánchez-Franco and Roldán, 2015). To measure absent fear of opportunism, five items were used reflecting the absence of opportunistic and dishonest behavior regarding the use of information and knowledge (Dickson et al., 2006; Jiang et al., 2013). The item scale for perceived knowledge self-efficacy dealt with individual coworkers' perception that they can provide and share valuable knowledge with other coworkers for problem-solving or performance improvement (Lin, 2007; Tohidinia and Mosakhani, 2010). KS-ATT consisted of nine items that include utilitarian and hedonistic feelings regarding KS (Bock et al., 2005; Hsu and Lin, 2008; Pai and Tsai, 2016; Tohidinia and Mosakhani, 2010). To measure KS, we used a bidirectional perspective consisting of the donation and collection of knowledge in the CWS. Both layers of the proposed second-order formative construct were conceptualized as occurring voluntarily (Tangaraja et al., 2016). Finally, the eight-item scale of the dependent variable creativity reflected several facets of idea generation and performance improvement (Chen et al., 2015; Tang, 2016).

Table 3: Descriptive of constructs and items. Scale: 1 = 'strongly disagree' to 7 = 'strongly agree'.

	Mean value (Std.)	VIF	Loading	Factor loading
Trust (Chang et al., 2015; Chiu et al., 2006; Sánchez-Franco and Roldán, 2015)				
In my CWS…				
… all members are honest and sincere dealing with me about knowledge.	5.91 (1.092)	2.075	0.823	0.818
...nobody takes advantage of my knowledge.	6.10 (1.006)	2.721	0.861	0.878
...all members deal constructively and carefully with my information.	5.80 (1.146)	3.311	0.885	0.890
...the information I receive is accurate at all times.	5.75 (0.997)	2.479	0.843	0.843
...all members always keep their promises to me.	5.84 (1.137)	2.082	0.803	0.817

Community commitment (Hashim and Tan 2015; Sánchez-Franco and Roldán 2015)				
In my CWS				
…I have many friendly relationships.	5.30 (1.625)	2.343	0.849	0.835
…I have a strong sense of belonging to the CWS.	5.54 (1.390)	3.211	0.856	0.860
…I identify strongly with my CWS.	5.15 (1.631)	3.107	0.832	0.841
…my opinion is highly valued in the CWS.	5.07 (1.469)	2.176	0.822	0.855
…I have an emotional attachment to the other members of the CWS.	5.16 (1.568)	2.499	0.826	0.867
Reciprocity (Chen and Hung 2010; Hoppner et al. 2015; Pai and Tsai 2016; Sánchez-Franco and Roldán 2015)				
If a coworker helps me, I'll try to offer him / her comparable help. (dropped)				
When I receive help in my coworking space, it is only right to help the others as well.	6.34 (9.922)	1.328	0.609	0.812
Members in my coworking space would help me if I needed it.	6.21 (0.971)	1.233	0.593	0.744
I feel an obligation to help members in the CWS if they need my help. (dropped)				
Solidarity between members is a high priority in my coworking space.	5.97 (1.238)	1.161	0.907	0.698
Absent fear of opportunism (Dickson et al. 2006; Jiang et al. 2013)				
In my CWS…				
...others do not make my knowledge their own. (dropped)				
...facts are presented by others in objective terms and not in such a way as to make them look good. (dropped)				
...others are honest about sharing knowledge.	5.82 (1.227)	2.534	0.931	0.924
...others are not taking advantage of my knowledge.	5.74 (1.409)	2.027	0.815	0.864
...I receive a fair return for sharing my knowledge.	5.39 (1.345)	1.918	0.868	0.883
Perceived knowledge self-efficacy (Lin 2007; Tohidinia and Mosakhani 2010)				
I have a lot of valuable information that is interesting for my coworking space.	5.11 (1.320)	1.604	0.750	0.749
I have the expertise required to provide valuable knowledge in my coworking space. (dropped)				
My knowledge has already brought about new business ideas in my coworking space.	3.50 (2.013)	1.761	0.770	0.815
My knowledge has already helped others in my coworking space to solve problems.	4.93 (1.791)	2.755	0.880	0.877
My knowledge has increased the productivity of others in my coworking space.	4.79 (1.578)	2.504	0.854	0.849
Attitude (Bock et al. 2005; Hsu and Lin 2008; Pai and Tsai 2016; Tohidinia and Mosakhani 2010)				
Knowledge sharing in the coworking space (is)…				
…an enjoyable experience.	6.24 (0.826)	2.721	0.817	0.831
…pleasant.	6.19 (0.798)	3.311	0.841	0.840
…fun.	6.20 (0.867)	2.516	0.776	0.784
…feels good.	6.22 (0.875)	2.607	0.779	0.788
...useful.	6.10 (1.139)	2.764	0.772	0.770
...beneficial. (dropped)				
...helpful. (dropped)				
...resourceful and creative.	6.09 (1.041)	2.989	0.781	0.781
...valuable	6.18 (0.820)	2.456	0.789	0.791

Knowledge sharing behavior (bidirectional) (Chang et al. 2015; Lin 2007; Tangaraja et al. 2016; Tohidinia und Mosakhani 2010)				
In my coworking space… (**knowledge donating**)				
...I frequently share my knowledge with others.	5.11 (1.710)	4.008	0.857	0.859
...I regularly tell others what I am doing.	4.92 (1.667)	3.516	0.835	0.846
...I know what the others are doing.	4.57 (1.478)	3.446	0.873	0.882
...I immediately tell others about it, when I learn something new.	4.11 (1.916)	3.117	0.809	0.802
...I try to answer others' questions immediately. (dropped)				
...I immediately offer my help when others have a problem. (dropped)				
In my coworking space… (**knowledge collecting**)				
...others frequently share knowledge with me.	4.94 (1.552)	4.186	0.863	0.861
...others regularly tell me what they are doing.	4.77 (1.446)	3.896	0.836	0.846
...others know what I am doing.	4.73 (1.497)	2.941	0.813	0.822
...others immediately tell me about it, when they learn something new.	4.03 (1.751)	2.595	0.791	0.795
...others try to answer my questions immediately. (dropped)				
...others immediately offer their help when I have a problem. (dropped)				
Creativity (Chen et al. 2015; Tang 2016)				
Knowledge sharing in my coworking space…				
…is a good source of new creative ideas for me.	5.80 (1.247)	3.122	0.810	0.860
...increases the number of my creative ideas.	5.41 (1.522)	3.473	0.864	0.897
...increases the originality of my work.	5.12 (1.499)	2.498	0.821	0.838
…suggests completely new working methods to me.	5.42 (1.638)	2.600	0.807	0.804
…helps me to newly interpret my already existing ideas. (dropped)				
...gives me insight into ideas and concepts from others that are useful for my work.	5.45 (1.352)	2.538	0.835	0.816
...enables me to find the optimal solution for a particular problem.	5.07 (1.666)	2.479	0.854	0.850
...enables me to solve work-related problems creatively. (dropped)				

In addition, questions regarding the current CWS (size, period of use), the way of working (alone, in a team) and KS in the space (frequency, quality, reasons, barriers) were sampled. A pretest with five participants having basic CWS knowledge was conducted to check grammar, spelling and comprehensibility as well as the estimated completion time. Because of coworking's international nature, an English version of the questionnaire was also launched.

3.2 Measure validation

Following suggestions by Tangaraja et al. (2016), KS was modeled as a higher-order reflective-formative construct consisting of knowledge collecting and knowledge donating behaviors. All (lower order) constructs used reflective indicators. However, measurement model evaluation revealed issues with discriminant validity. Cross-loadings and the heterotrait–monotrait ratio (HTMT) indicated a lack of empirical distinction (HTMT = 0.933, 95% confidence interval approaches 1). Hence, both lower-order constructs were integrated into a single construct KS behavior.

Measurement quality in terms of reliability, validity and unidimensionality was tested using a confirmatory framework (Segars, 1997). For most of the constructs, one or two indicator(s) had to be removed (marked as "dropped" in Table 3) because of indicator loadings below 0.7 or variance inflation factors (VIFs) above 5 (Hair et al., 2011). Overall, the results of exploratory and confirmatory factor analysis

were satisfactory in terms of unidimensionality. All constructs exceeded threshold values for internal consistency reliability (composite reliability) and convergent reliability (average variance extracted) (Table 4).

Table 4: Measure quality. CA: Cronbach's Alpha; CR: composite reliability; AVE: average variance extracted; VIF: variance inflation factor.

Construct	(Original) number of items	Mean (Std.)	Variance extracted > 50%	CA > 0.7	CR > 0.7	AVE > 0.5	VIF < 5*
Trust	5	5.897 (0.909)	72.222	0.898	0.925	0.711	1.366
Community commitment	5	5.220 (1.327)	72.571	0.894	0.921	0.701	1.822
Reciprocity	(5) 3	6.176 (0.786)	56.667	0.609	0.754	0.515	1.601
Absent fear of opportunism	(5) 3	5.620 (1.198)	79.318	0.848	0.905	0.762	1.765
Perceived knowledge self-efficacy	(5) 4	4.550 (1.441)	67.878	0.832	0.888	0.665	1.888
Attitude	(9) 7	6.167 (0.722)	63.718	0.902	0.923	0.630	1.433
KS behavior	12 (8)	4.083 (1.201)	70.501	0.938	0.948	0.697	1.331
Creativity	(8)6	5.355 (1.265)	71.358	0.911	0.931	0.692	—

Discriminant validity was assessed using both the Fornell–Larcker criterion and the HTMT (Henseler et al., 2015), yielding satisfactory results (Table 5). The HTMT did not exceed 0.85, and the value 1 did not appear in the 5,000 samples bootstrapped confidence intervals. Outer and inner VIF were in a range below the threshold of 5, indicating the absence of collinearity problems (Table 3). Regarding common method bias, all constructs served once as dependent variables, with the remaining constructs being directly connected. In all cases, the VIFs remained below the threshold value 3.3, finding no common method bias problem (Kock, 2015). After calculating construct scales, the mean value of reciprocity was highest at 6.176, followed by KS-ATT at 6.167, while KS behavior itself displayed the lowest mean value at 4.115 (Table 4).

Table 5: Discriminant validity (Fornell-Larcker criterion, Heterotrait-Monotrait ratio criterion). In bold: square root of average variance extracted estimates.

Fornell-Larcker criterion (Heterotrait – Monotrait ratio criterion)		1	2	3	4	5	6	7	8
1	Trust	**0.843**							
2	Community Commitment	0.382 (0.429)	**0.837**						
3	Reciprocity	0.274 (0.358)	0.412 (0.453)	**0.718**					
4	Absent Fear of Opportunism	0.469 (0.539)	0.424 (0.459)	0.487 (0.716)	**0.873**				
5	Perceived Knowledge Self-Efficacy	0.189 (0.205)	0.571 (0.645)	0.459 (0.565)	0.200 (0.236)	**0.815**			
6	Attitude	0.290 (0.318)	0.356 (0.374)	0.355 (0.456)	0.393 (.422)	0.446 (0.492)	**0.794**		
7	KS Behavior	0.332 (0.360)	0.696 (0.744)	0.402 (0.396)	0.315 (0.338)	0.575 (0.648)	0.499 (0.534)	**0.835**	
8	Creativity	0.216 (0.235)	0.549 (0.598)	0.195 (0.256)	0.280 (0.278)	0.503 (0.580)	0.461 (0.497)	0.494 (0.521)	**0.832**

4 Results

4.1 Descriptive statistics

The coworkers were balanced in terms of gender and rather young (over 80% are below 40 years). Approximately 10% of the coworkers have an international background. The respondents were predominantly academics with a bachelor's or master's degree, fitting earlier findings (Bouncken and Reuschl, 2018). The majority of coworkers work alone, and for those in a team, the average team size was 4 people. The average CWS membership time within the current site and total CWS use were rather short. In teams, coworkers preferred large CWS (>100) (21.1% vs 4.1%, p = 0.041) over small CWS (<10) (5.3% vs 10.2%). Most coworkers rented office space in small CWS (< 50 coworkers) in large German cities such as Berlin, Dusseldorf or Leipzig. Regarding CWS values, openness and accessibility were appreciated, while collaboration yielded the lowest rating (Table 6). Collaboration was evaluated higher by coworkers who worked in a team (5.76 vs 4.82, p, T = 2.913, p = 0.005).

Table 6: Coworker and CWS characteristics. * Scale: 1 = 'strongly disagree' to 7 = 'strongly agree'.

Gender	• Females: 50.5% • Males: 49.5%
Age	• 33.43 years (SD: 7.584) • 30 up to 39: 49.5% • 20 up to 29: 32.6%
Nationality	• German: 91.6% • Other: 8.4%
Family status	• Single: 80.9%
Education	• PhD: 1.1% • Diploma, Magister, state exams: 17.2% • Master degree: 35.2% • Bachelor degree: 34.4%
Profession	• Web development / IT: 23.1% • Consulting: 12.1% • Marketing: 17.6%
Occupation group	• Freelancer: 30.9% • Entrepreneur: 16.0% • Enterprise with up to 5 employees: 20.2% • Enterprise with 6 up to 99 employees: 17.0% • Enterprise with > 100 employees: 11.7%
Way of working	• Working in a team: 44.2% • Team size: 3.83 (2.758) • Duration of collaboration (months): 14.57 (15.00)
Size of coworking-space	• < 10 coworkers: 7.4% • < 50 coworkers: 73.7% • > 100 coworkers: 10.5% • Do not know: 8.4%
Location of CWS	• Berlin: 43.2% • Düsseldorf: 12.6% • Leipzig: 10.5%
Period of use (in months)	• In general: 25.71 (28.80) • This CWS: 17.51 (17.60)
Importance of core coworking values*	• Collaboration: 5.23 (1.568) • Community: 6.00 (1.255) • Sustainability: 5.34 (1.422) • Openness: 6.47 (0.888) • Accessibility: 6.40 (0.713)

Coworkers share knowledge on a weekly basis (mean value: 4.13, std: 1.71). No striking differences regarding gender or workstyle were found. The KS frequency tends to decrease with CWS size (<10: 4.71, <50: 4.00, >100: 3.50, $F = 1.122$, $p = 0.331$). Exchange is dominated by experience and professional knowledge (Table 7). In teams, coworkers more frequently mention cooperative activities, e.g., cooperative individual steps (47.6% vs 17.0%, $p = 0.02$) and reciprocal cooperation (64.3% vs 35.8%, $p = 0.07$). KS reasons are access to knowledge, ideas, and new work stimuli. The latter, in particular, applies to coworkers in teams (85.7% vs 66.0%, $p = 0.35$). By far, the most frequently stated barrier was lack of time, which was particularly mentioned by team members (83.3% vs 67.9%, $p = 0.101$).

However, coworkers working alone more often lacked trust in the value and benefits of other coworkers' knowledge (34.0% vs 16.7%, p = 0.065).

Table 7: CWS and KS characteristics.

	Sample
Frequency of KS	
• Several times a day (1)	7.5%
• Daily (2)	7.5%
• Several times a week (3)	15.1%
• Weekly (4)	43.0%
• Several times a month (5)	4.3%
• Monthly (6)	8.6%
• Rarely (7)	11.8%
• Not at all (8)	2.2%
Quality of KS (Lin 2007; Merkel 2015)	
In my co-working space frequently the following are …	
• …specific professional knowledge exchanged.	75.8%
• …product and business ideas exchanged.	43.2%
• …work-related approaches, ideas and support exchanged.	48.4%
• …individual work steps carried out in cooperation with others.	30.5%
• …reciprocal (mutual) cooperation activities carried out.	48.4%
• …experiences exchanged.	81.1%
Own reasons (Ardichvili et al. 2003; Capdevilla 2013, Chang et al. 2015; Chen et al. 2014; Fuzi 2014; Lin 2007)	
I share my knowledge in my coworking space because I hope to get the following out of it:	
• access to knowledge and ideas of others	77.9%
• new stimuli for my work	74.7%
• set up of professional partnerships	53.7%
• increased productivity	40.0%
• faster progress for my work	31.6%
• stronger connections into the coworking space	44.2%
• access to specific skills	52.6%
• approaches for solving problems in my work	45.3%
• faster work-related integration	12.6%
• time saving	16.8%
• more pleasant way of working	55.8%
Barriers / problems (Riege 2005)	
The exchange of knowledge in my coworking space is made difficult due to:	
• Lack of time	74.4%
• Lack of trust in coworkers	3.2%
• Low awareness of the value of sharing	26.3%
• Protection of own knowledge	7.4%
• Differences in experience and education	11.6%
• Cultural differences	5.3%
• Poor communication skills	7.4%
• Lack of interaction with coworker	23.3%
• Lack of trust in the value and benefit of other coworkers' knowledge	5.3%
• Lack of space to collaborate	8.4%
• No existing reward system / recognition	4.2%
• Lack of social network	12.6%
• Poor layout of work areas restricting KS	2.1%
• Lack of an organizational culture of KS	8.4%
• Strong competitiveness between coworkers	9.5%
• Lack of supporting IT infrastructure	6.3%
• Lack of tools to support communication processes and communication problems	3.2%

4.2 Hypotheses testing

Evaluating the structural model, the path coefficients and effect sizes (f^2) show that the perceived knowledge self-efficacy (0.367, 0.114) and, to some extent, absent fear of opportunism (0.265, 0.060) positively affect coworkers' KS-ATT. Evidence for H5a and, to some extent, for H4a was found. Regarding KS behavior, this only holds for H2b and community commitment (0.509, 0.340). Trust and reciprocity did not display an impact on either KS-ATT or KS. Both KS-ATT (0.286, 0.088) and KS (0.367, 0.114) showed the proposed positive effects on creativity (H7, H8). Moreover, evidence was found for the mediating effect (H6) of KS-ATT on KS (0.243, 0.099). However, the effects can be characterized as rather weak with f^2 values between 0.02 and 0.15. Only the effect of community commitment displayed a medium, nearly a strong level slightly below 0.35 (Henseler et al., 2009). When assessing bias-corrected confidence intervals, which should not include a zero value (Ringle et al., 2018), all significant path coefficients except for the absent fear of opportunism (H4a) were corroborated (Table 8).

Table 8: Hypotheses testing.

			Path coefficients (Effect size - f^2)	T statistics (p-value)	Bias-corrected confidence interval (95%)
Trust	→	KS-ATT	0.092 (0.009)	0.832 (0.405)	[-0.124, 0.319]
Community Commitment	→	KS-ATT	-0.017 (0.000)	0.135 (0.893)	[-0.264, 0.242]
Reciprocity	→	KS-ATT	0.040 (0.001)	0.314 (0.754)	[-0.189, 0.301]
Absent Fear of Opportunism	→	KS-ATT	0.265 (0.060)	2.119 (0.034)	[-0.002, 0.501]
Perceived Knowledge Self-Efficacy	→	KS-ATT	0.367 (0.114)	2.906 (0.004)	[0.116, 0.609]
Trust	→	KS Behavior	0.062 (0.007)	0.737 (0.461)	[-0.113, 0.217]
Community Commitment	→	KS Behavior	0.509 (0.340)	4.695 (0.000)	[0.268, 0.690]
Reciprocity	→	KS Behavior	0.060 (0.005)	0.540 (0.589)	[-0,169, 0.266]
Absent Fear of Opportunism	→	KS Behavior	-0.085 (0.010)	0.827 (0.408)	[-0.260, 0.141]
Perceived Knowledge Self-Efficacy	→	KS Behavior	0.154 (0.030)	1.532 (0.126)	[-0.050, 0.340]
KS-ATT	→	KS Behavior	0.243 (0.099)	2.686 (0.007)	[0.063, 0.415]
KS-ATT	→	Creativity	0.286 (0.088)	2.267 (0.023)	[0.062, 0.552]
KS Behavior	→	Creativity	0.352 (0.134)	2.536 (0.011)	[0.056, 0.599]

R^2 values are moderate regarding KS behavior being larger than 0.33 and weak in the case of KS-ATT behavior and creativity exceeding 0.19 (Henseler et al., 2009). Predictive relevance is shown as all endogenous latent variables exhibit Q^2 values above zero (Table 9).

Table 9: Inner model evaluation.

R^2, R^2 adjusted (Q^2)	Overall model	Coworkers with high value level regarding collaboration (n=44)	Coworkers with low value level regarding collaboration (n=51)	$\|R^2$ diff.$\|$	t-value (p-value)
KS-ATT	0.302, 0.263 (0.181)	0.265, 0.168	0.392, 0.325	0.127	0.798 (0.427)
KS behavior	0.582, 0.553 (0.389)	0.648, 0.591	0.535, 0.471	0.114	0.932 (0.354)
Creativity	0.306, 0.291 (0.182)	0.367, 0.336	0.369, 0.343	0.002	0.014 (0.989)

Multi-group analysis was used to compare coworkers with low- and high-value levels regarding collaboration (Sarstedt et al., 2011). The R^2 values demonstrate by tendency that KS-ATT is better explained for coworkers with a low-value level (0.392 vs 0.265). Vice versa, this is the case for KS behavior and coworkers with a high-value level (0.648 vs 0.582). Overall, the R^2 differences are not significant (Table 8). However, a Mann-Whitney-U-Test showed the mean value of KS behavior was lower for coworkers with low collaborative orientation (3.78 vs 4.44, $p = 0.05$). This holds both for knowledge donation (3.23 vs 4.01, $p = 0.001$) and knowledge collection behavior (4.38 vs 4.90, $p = 0.023$). For coworkers with a low-value level, the absent fear of opportunism (0.407, $p = 0.012$) and perceived knowledge self-efficacy (0.390, $p = 0.022$) have the most substantial positive effects on KS-ATT. For coworkers with a high-value level, it is reciprocity (0.369, $p = 0.120$). Both groups share community commitment as an important factor positively influencing KS. For coworkers with a low-value level, KS-ATT has a stronger impact on creativity, while for a high-value level, it is KS. The path coefficient of KS-ATT on creativity is the only one that is different ($p = 0.017$). Path coefficients are mutually exclusive concerning the segments' confidence intervals (Sarstedt et al., 2011, Table 10).

Table 10: Hypotheses testing segmented by collaboration value level.

			Coworkers with high value level regarding collaboration (n=44)			Coworkers with low value level regarding collaboration (n=51)				
			Path coefficients (Effect size - f^2)	T statistics (p-value	Bias-corrected confidence interval (95%)	Path coefficients (Effect size - f^2)	T statistics (p-value	Bias-corrected confidence interval (95%)	Path coefficient differences	T statistics (p-value)
Trust	→	KS-ATT	-0.005 (0.000)	0.022 (0.982)	[-0.459, 0.395]	0.217 (0.057)	1.498 (0.134)	[-0.099, 0.473]	0.222	0.878 (0.382)
Community Commitment	→	KS-ATT	-0.133 (0.012)	0.685 (0.494)	[-0.488, 0.286]	-0.037 (0.001)	0.211 (0.833)	[-0.376, 0.310]	0.096	0.369 (0.713)
Reciprocity	→	KS-ATT	0.369 (0.115)	1.555 (0.120)	[-0.177, 0.778]	-0.139 (0.018)	0.769 (0.442)	[-0.463, 0.225]	0.507	1.748 (0.084)
Absent Fear of Opportunism	→	KS-ATT	0.131 (0.013)	0.674 (0.500)	[-0.308, 0.480]	0.407 (0.142)	2.500 (0.012)	[0.103, 0.737]	0.276	1.106 (0.271)
Perceived Knowledge Self-Efficacy	→	KS-ATT	0.222 (0.033)	1.081 (0.280)	[-0.254, 0.581]	0.390 (0.145)	2.292 (0.022)	[0.043, 0.713]	0.167	0.639 (0.524)

Trust	→	KS Behavior	0.034 (0.002)	0.228 (0.820)	[-0.242, 0.361]	-0.003 (0.000)	0.021 (0.984)	[-0.267, 0.243]	0.037	0.187 (0.852)
Community Commitment	→	KS Behavior	0.556 (0.445)	2,777 (0.006)	[0.068, 0.838]	0.484 (0.285)	3,039 (0.002)	0.184, 0.798]	0.072	0.289 (0.774)
Reciprocity	→	KS Behavior	0.081 (0.010)	0.446 (0.656)	[-0.370, 0.366]	0.135 (0.022)	0.711 (0.477)	[-0,347, 0.422]	0.054	0.207 (0.837)
Absent Fear of Opportunism	→	KS Behavior	0.059 (0.005)	0.399 (0.690)	-0.289, 0.302]	-0.177 (0.031)	0.878 (0.380)	[-0.642, 0.174]	0.235	0.928 (0.356)
Perceived Knowledge Self-Efficacy	→	KS Behavior	0.135 (0.025)	0.967 (0.333)	-0.139, 0.413]	0.148 (0.024)	0.813 (0.416)	[-0.253, 0.461]	0.013	0.055 (0.956)
KS-ATT	→	KS Behavior	0.172 (0.062)	1.560 (0.119)	[-0.053, 0.378]	0.280 (0.102)	1.791 (0.073)	[-0.086, 0.550]	0.108	0.552 (0.582)
KS-ATT	→	Creativity	-0.088 (0.010)	0.446 (0.655)	[-0.438, 0.329]	0.484 (0.283)	3.426 (0.001)	[0.177, 0.738]	0.572	2.428 (0.017)
KS Behavior	→	Creativity	0.637 (0.533)	3.028 (0.002)	[-0.057, 0.858]	0.200 (0.048)	1.226 (0.220)	[-0.142, 0.500]	0.437	1.680 (0.096)

5 Discussion

The findings indicate a typical coworking environment featuring diverse backgrounds and high educational standards (Bouncken and Reuschl, 2018; Foertsch, 2017). The literature considers creative performance a valuable asset as workers from creative industries particularly appreciate CWS membership (Bouncken and Reuschl, 2018; Fuzi et al., 2014; Gandini, 2015). The reasons most often stated for KS are access to ideas (77.9%) and new work stimuli (74.7%), indicating a vibrant social atmosphere as pictured in the literature (Brinks, 2012; Gandini, 2015; Garrett et al., 2017). Lack of time is the most common barrier to knowledge exchange (74.4%), which adds to the overall picture of a lively, busy atmosphere. This finding is particularly interesting as it is not a subjective aversion but rather a factual obstacle.

Consequently, instruments that facilitate contacting other coworkers, such as member directories and central communication channels administered by the CWS, may yield significant improvement because of their collocating function. This notion is consistent with barriers that rank second and third, which are a lack of interaction with coworkers (23.3%) and a lack of a social network in general (12.6%). However, it is important to note that the CWS provider needs to actively guide and shape interaction, as coworkers indicate that a mere lack of IT infrastructure is rare (6.3% report this issue as a barrier).

Evaluating our path model, KS indeed influences coworkers' creativity. Different theoretical approaches such as Social Cognitive Theory and TRA were used to identify motivators (i.e., benefit factors, such as trust) as well as inhibitors (i.e., cost factors, such as fear of opportunism, Kankanhalli et al., 2005). Advancing earlier work, KS was conceptualized as both attitude and actual behavior (Bock et al., 2005; Chow and Chan, 2008; Hsu and Lin, 2008). Collaboration as one of the core CWS values (Castilho and Quandt, 2017; Merkel, 2015; Rus and Orel, 2015) was used for multi-group analysis.

Perceived knowledge self-efficacy, as well as the absent fear of opportunism, had positive effects on KS-ATT; this was also the case for the community commitment's influence on KS behavior. Both KS-

ATT and KS behavior displayed the proposed positive effects on creativity. Multi-group analysis showed that in cases of low collaborative value levels, the effect of KS-ATT was strong, whereas in cases of high value levels, this holds for KS. Positive group benefits (Bock et al., 2005), such as community commitment and reciprocity, are related to KS behavior. For KS-ATT, not only individual motivators such as self-efficacy but also the absence of negative group effects play a role. Community commitment was shown to be important for both groups indicating the importance of community in CWS (Spinuzzi et al., 2019). Our findings contribute to the emerging field of CWS research and KS literature. In particular, the relationship between KS-ATT and KS and underlying motivators is highlighted (Bock et al., 2005), with mainly individual factors influencing the KS-ATT and group factors influencing KS.

5.1 Implications for theory

Our results contribute, on the one hand, to the CWS literature. KS in the CWS was generally perceived as a pleasant experience by our participants, and an absence of fear of opportunistic behavior was established. Findings thus corroborate earlier work on CWS' social atmosphere (Capdevila, 2013; Gandini, 2015; Garrett et al., 2017). However, differences in CWS value orientation verify member heterogeneity (Bouncken and Reuschl, 2018) and the difficulty of capturing a CWS' community as a single entity (Spinuzzi et al., 2019). This value orientation was found to affect KS and, subsequently, creative performance, which indicates that KS is hampered, and creative potential remains unused in many cases. From a theoretical point of view, it is necessary to understand what drives the KS behavior of members with a low-value orientation. Drawing on coworker typologies such as the one provided by Bouncken and Reuschl (2018), low interest in collaborative activities corresponds to the utilizer type who seeks technological infrastructure for daily work rather than a community to interact with. However, for them, community commitment is most important for KS.

On the other hand, the results contribute to the KS literature and, in particular, to research relying on the TRA. For the CWS context, it could be established that KS-ATT, as well as KS behavior, both influence creativity positively. That is, not only actual interaction improves creative performance but also a positive assessment of KS. In this vein, it is important to observe that mere exchange in terms of reciprocity, i.e., expecting a return for a favor, has a fairly weak impact on both KS-ATT and KS. At the same time, socially oriented influences, namely, community commitment and perceived knowledge self-efficacy, yield the most substantial positive effects. This finding is consistent with extant work that emphasizes the individual perception of an environment's innovative capacity, i.e., the context of creativity (Amabile et al., 1996). These results can be merged with those on barriers mentioned by coworkers, and create a picture of a very social, community-oriented setting that coworkers with a strong commitment benefit the most from. As a result, our work indicates that creative models such as the componential model consisting of a general attitude toward creativity and innovation, availability of resources

and management practices in terms of autonomy as basic elements (Amabile, 1983) can be meaningfully integrated with the knowledge-based notion of ba (Nonaka and Toyama, 2005) to describe CWS' innovative capacities. Coworkers may be freelancers or work in teams. As such, they provide different nodes and social network densities across the CWS, consequently yielding a high likelihood of evoking several bas that correspond to differences in social relations and resources. Coworkers' collaborative orientation further influences this cluster of bas, as it determines whether a specific knowledge sphere is permeable (in the case of high value orientation) or not (in the case of low value orientation). Indeed, our empirical findings indicate that for coworkers exhibiting less interest in collaboration, absent fear of opportunism and perceived knowledge self-efficacy play an important role, whereas for collaborative-oriented individuals, these factors are rather viewed as negligible. Differences in the impact of KS-ATT on creativity further suggest that some coworkers (those with a low collaborative orientation) may feel inspired by the CWS environment without actually interacting with it, thus staying in their original knowledge sphere. In contrast, others (those with a high collaborative orientation) indeed operate on a give-and-take basis, and as such, experience a substantial impact of KS behavior on their creative performance.

5.2 Implications for practice

While we confirm the importance of community commitment in the CWS context, results also demonstrate the importance of different community types, one of which a CWS has to select (Spinuzzi et al., 2019). Creating an agreeable atmosphere is a necessary, but not sufficient condition, and depends on coworkers. CWS should integrate formats increasing coworkers' awareness of KS and offer an infrastructure to increase coworker visibility and touchpoints for interaction. As coworkers were found to be rather evenly distributed across team and work-alone settings, providers may seek to carefully select a portfolio of both digital and physical instruments to provide social platforms, such as breakfasts, pitch sessions, afterwork events and formal training. While this may seem trivial, a variety of formats have been described in the literature (Schopfel et al., 2015; Spinuzzi, 2012). Members of a particular CWS may be a rather heterogeneous population as described in the typology provided by Bouncken and Reuschl (2018), exhibiting different sets of needs and demands: the economic use of the infrastructure (utilizers), coming together and finding acknowledgment (socializers) and acquisition of knowledge (learners), For providers, it is thus an important insight that varying identification with CWS values is linked to varying KS behavior.

6 Conclusion

While KS has been intensively investigated (Chan and Husted, 2010; Ipe, 2003; Renzl, 2008; Riege, 2005), research focusing on CWS is in its infancy and at a conceptual (Bouncken and Reuschl, 2018) or qualitative level (Bouncken and Aslam, 2019). Our study investigates several motivators and relates KS to creativity. We contribute a quantitative model that links KS and creative performance, showing

a significant positive relationship. Variables used in existing studies on KS could be verified for the CWS context, and the TRA has proven to be a valuable framework in CWS settings. Absent fear of opportunism and perceived knowledge self-efficacy were found to be the major predictors of KS-ATT. For actual KS behavior, community commitment, KS-ATT, and perceived knowledge self-efficacy are the main drivers. Hence, the social atmosphere in CWS indeed influences KS and, subsequently, the creative performance of coworkers.

6.1 Limitations and future research

The sample size is rather small, consisting of 95 German coworkers. Although we draw on general coworking insights and our results seem plausible for the CWS field, they may only reflect German spaces. Quantitative insights from a larger and international sample would be helpful to verify our findings. Furthermore, the sample might include biases regarding CWS and respondent selection. Most responses were collected in large cities, which often host several CWS, such as Berlin, Leipzig and Munich. Findings could be mirrored outside urban regions in the countryside.

Second, improved creative performance might be more valuable for some branches than for others; according to Capdevila (2013, p. 8), there are also CWS that "have an explicit interest and professional focus". While coworkers from creative industries often appreciate membership in CWS (Bouncken and Reuschl, 2018; Fuzi et al., 2014; Gandini, 2015), research on different occupational groups regarding KS would be interesting.

Third, we showed that coworking has the capacity to enhance creativity. CWS providers, however, need guidelines on how to foster community commitment. Case study research already confirms several types of communities in CWS, and more research is needed regarding the emergence, development and characteristics of these "knowledge production sites" (Spinuzzi et al., 2019, p. 134). The elements of CWS enabling encounters such as not only lounges or cafés but also software should be analyzed in more detail regarding their ability to support community development. Furthermore, the effects of knowledge management services, e.g., learning programs, on coworkers' creative performance might be studied (Bouncken and Aslam, 2019).

Fourth, other elements, such as motivational/individual dimensions (Nguyen et al., 2019), should be integrated into the model. This also holds for creativity antecedents or other individual performance measures as dependent variables. Concerning the fruitfulness of a ba-oriented approach (Nonaka and Toyama, 2005), the question arises on how different ba spheres can be detected and managed. This corroborates an in-depth analysis of communities as initiated by Spinuzzi et al. (2019), and the interplay between coworkers and their environment. Coworkers' professional networks inside and outside the CWS and their impact on KS (Keszey, 2018) might be investigated. Finally, knowledge assets inside and outside the CWS (Oliveira et al., 2020; Ramadan et al., 2017) and options for protection should be studied (Bouncken and Aslam, 2019).

References

Abe, T., & Uda, T. (2016). Current Status and Issues of Coworking Spaces in Japan. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3249390

Akhavan, P., & Mahdi Hosseini, S. (2015). Determinants of KS in Knowledge Networks: A Social Capital Perspective. IUP Journal of Knowledge Management, 13(1), 7–24.

Amabile, T. M. (1983). The social psychology of creativity: A componential conceptualization. Journal of Personality and Social Psychology, 45(2), 357–376.

Amabile, T. M., Conti, R., Coon, H., Lazenby, J., & Herron, M. (1996). Assessing the work environment for creativity. Academy of Management Journal, 39(5), 1154–1184.

Amabile, T. M. (1998). How to kill creativity (Vol. 87). Boston, MA: Harvard Business School Publishing.

Ardichvili, A., Page, V., & Wentling, T. (2003). Motivation and barriers to participation in virtual knowledge-sharing communities of practice. Journal of Knowledge Management, 7(1), 64–77.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York, NY: Freeman.

Bandura, A. (1994). Social cognitive theory and exercise of control over HIV infection. In: DiClemente R.J., Peterson J.L. (eds) Preventing AIDS. AIDS Prevention and Mental Health (pp. 25–59). Springer, Boston, MA.

Bandura, A. (1986). Social Foundations of Thought and Action: A Social Cognitive Theory, Englewood Cliffs, NJ: Prentice Hall.

Becerra, M., Lunnan, R., & Huemer, L. (2008). Trustworthiness, risk, and the transfer of tacit and explicit knowledge between alliance partners. Journal of Management Studies, 45(4), 691– 713.

Bergami, M., & Bagozzi, R. P. (2000). Self-categorization, affective commitment and group self-esteem as distinct aspects of social identity in the organization. British Journal of Social Psychology, 39(4), 555–577.

Bergen, M., Dutta, S., & Walker Jr, O. C. (1992). Agency relationships in marketing: A review of the implications and applications of agency and related theories. Journal of Marketing, 56(3), 1–24.

Bianchi, F., Casnici, N., & Squazzoni, F. (2018). Solidarity as a byproduct of professional collaboration: social support and trust in a coworking space. Social Networks, 54, 61–72.

Bilandzic, M., & Foth, M. (2013). Libraries as coworking spaces: Understanding user motivations and perceived barriers to social learning. Library Hi Tech, 31(2), 254–273.

Blau, P. M. (1964). Exchange and Power in Social Life. New York: John Wiley.

BNP Paribas Real Estate (2019). At a glance coworking spaces in Germany development and outlook. Available at: ttps://www.realestate.bnpparibas.com/sites/default/files/2019-07/Coworking%20in%20Germany%2019-07-04%20ENG%20Final%20II.pdf

Bock, G. W., Zmud, R. W., Kim, Y. G., & Lee, J. N. (2005). Behavioral intention formation in KS: Examining the roles of extrinsic motivators, social-psychological factors, and organizational climate. MIS Quarterly, 29(1), 87–111.

Bouncken, R.B., & Aslam, M. (2019). Understanding knowledge exchange processes among diverse users of coworking-spaces. Journal of Knowledge Management, 23(10), 2067–2085.

Bouncken, R. B., Aslam, M. M., & Reuschl, A. J. (2018a). The dark side of entrepreneurship in coworking-spaces. In: Tur Porcar A., Ribeiro Soriano D. (eds.). Inside the Mind of the Entrepreneur. Contributions to Management Science (pp. 135–147). Springer, Cham.

Bouncken, R. B., Laudien, S. M., Fredrich, V., & Görmar, L. (2018b). Coopetition in coworking-spaces: value creation and appropriation tensions in an entrepreneurial space. Review of Managerial Science, 12(2), 385–410.

Bouncken, R. B., & Reuschl, A. J. (2018). Coworking-spaces: how a phenomenon of the sharing economy builds a novel trend for the workplace and for entrepreneurship. Review of Managerial Science, 12(1), 317–334.

Botsman, R.; Rogers, R. (2010). What's mine is yours. The rise of collaborative consumption. 1. ed., New York, NY: Harper Business.

Brinks, V. (2012). Netzwerke(n) und Nestwärme im Coworking Space – Arbeiten zwischen Digitalisierung und Re-Lokalisierung. Geographische Zeitschrift, 100(3), 129–145.

Brown, J. (2017). Curating the "Third Place"? Coworking and the mediation of creativity. Geoforum, 82, 112–126.

Capdevila, I. (2015). Coworking spaces and the localised dynamics of innovation in Barcelona. International Journal of Innovation Management, 19(3), 1540004.

Capdevila, I. (2013). Knowledge dynamics in localized communities: Coworking spaces as microclusters. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2414121

Castilho, M. F., & Quandt, C. O. (2017). Collaborative capability in coworking spaces: convenience sharing or community building?. Technology Innovation Management Review, 7(12), 32–42.

Chai, S., Das, S., & Rao, H. R. (2011). Factors affecting bloggers' KS: An investigation across gender. Journal of Management Information Systems, 28(3), 309–342.

Chan, J., & Husted, K. (2010). Dual allegiance and KS in open source software firms. Creativity and Innovation Management, 19(3), 314–326.

Chang, H. H., & Chuang, S. S. (2011). Social capital and individual motivations on KS: Participant involvement as a moderator. Information & Management, 48(1), 9–18.

Chang, C. M., Hsu, M. H., & Lee, Y. J. (2015). Factors influencing knowledge-sharing behavior in virtual communities: a longitudinal investigation. Information Systems Management, 32(4), 331–340.

Chen, C. J., & Hung, S. W. (2010). To give or to receive? Factors influencing members' KS and community promotion in professional virtual communities. Information & Management, 47(4), 226–236.

Chen, Y. H., Lin, T. P., & Yen, D. C. (2014). How to facilitate inter-organizational KS: The impact of trust. Information & Management, 51(5), 568–578.

Chen, M. H., Chang, Y. Y., & Chang, Y. C. (2015). Entrepreneurial orientation, social networks, and creative performance: middle managers as corporate entrepreneurs. Creativity and Innovation Management, 24(3), 493–507.

Chiu, C. M., Hsu, M. H., & Wang, E. T. (2006). Understanding KS in virtual communities: An integration of social capital and social cognitive theories. Decision Support Systems, 42(3), 1872–1888.

Chow, W. S., & Chan, L. S. (2008). Social network, social trust and shared goals in organizational KS. Information & Management, 45(7), 458–465.

Clifton, N., Füzi, A., & Loudon, G. (2019). Coworking in the digital economy: Context, motivations, and outcomes. Futures, 102439.

Cohen, J. B., & Areni, C. S. (1991). Affect and consumer behavior. In T. S. Robertson & H. H. Kassarjian (Eds.), Handbook of Consumer Behavior (pp. 188–240). Englewood Cliffs, N.J: Prentice-Hall.

Cohendet, P., Grandadam, D., Simon, L., & Capdevila, I. (2014). Epistemic communities, localization and the dynamics of knowledge creation. Journal of Economic Geography, 14(5), 929–954.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. MIS Quarterly, 19(2), 189–211.

Constant, D., Kiesler, S., & Sproull, L. (1994). What's mine is ours, or is it? A study of attitudes about information sharing. Information Systems Research, 5(4), 400–421.

Constantinescu, T. I., & Devisch, O. (2018). Portraits of work: mapping emerging coworking dynamics. Information, Communication & Society, 21(9), 1263–1278.

Corvino, A., Caputo, F., Pironti, M., Doni, F., & Martini, S. B. (2019). The moderating effect of firm size on relational capital and firm performance. Journal of Intellectual Capital. 20(4), 510–532.

Cropanzano, R., & Mitchell, M. S. (2005). Social exchange theory: An interdisciplinary review. Journal of Management, 31(6), 874–900.

Cummings, J. N. (2004). Work groups, structural diversity, and KS in a global organization. Management Science, 50(3), 352–364.

Davis, F. D. (1986). A technology acceptance model for empirically testing new end-user information systems. Thesis (Ph. D.) Massachusetts Institute of Technology, Sloan School of Management, Cambridge, MA.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology, MIS Quarterly, 13(3), 1989, 319–340.

Dickson, P. H., Weaver, K. M., & Hoy, F. (2006). Opportunism in the R&D alliances of SMES: The roles of the institutional environment and SME size. Journal of Business Venturing, 21(4), 487–513.

Dost, M., Pahi, M. H., Magsi, H. B., & Umrani, W. A. (2019). Effects of sources of knowledge on frugal innovation: moderating role of environmental turbulence. Journal of Knowledge Management, 23(7), 1245–1259.

Fait, M., Scorrano, P., Mastroleo, G., Cillo, V., & Scuotto, V. (2019). A novel view on knowledge sharing in the agrifood sector. Journal of Knowledge Management, 23(5), 953–974.

Fishbein, M., & Ajzen, I. (1975). Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research, Addison-Wesley, Reading MA.

Foertsch, C. (2017). The Members: Who Works in Coworking Spaces?. Available at http://www.deskmag.com/en/members-of-coworking-spaces-demographics-statistics-global-survey-coworkers-research-2017.

Fuzi, A. (2015). Coworking spaces for promoting entrepreneurship in sparse regions: the case of South Wales. Regional studies, regional science, 2(1), 462–469.

Fuzi, A., Clifton, N., & Loudon, G. (2014). New in-house organizational spaces that support creativity and innovation: the co-working space. R&D Management Conference 2014, 3-6 June, Stuttgart. Available at: https://repository.cardiffmet.ac.uk/bitstream/handle/10369/7725/AF-NC-GL%20R%26D%20Mgmt%20final.pdf?sequence=2&isAllowed=y

Gandini, A. (2015). The rise of coworking spaces: A literature review. Ephemera, 15(1), 193–205.

Garrett, L. E., Spreitzer, G. M., & Bacevice, P. A. (2017). Co-constructing a sense of community at work: The emergence of community in coworking spaces. Organization Studies, 38(6), 821–842.

Gerdenitsch, C., Scheel, T. E., Andorfer, J., & Korunka, C. (2016). Coworking spaces: A source of social support for independent professionals. Frontiers in Psychology, 7, 581.

Gcuc (Global Coworking Unconference Conference) (2019). What does the flexible workspace industry look like today & where will it go tomorrow? 2019 – 2022 forecast.

Gist, M. E., & Mitchell, T. R. (1992). Self-efficacy: A theoretical analysis of its determinants and malleability. Academy of Management Review, 17(2), 183–211.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. Journal of Marketing Theory and Practice, 19(2), 139–152.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24.

Hashim, K. F., & Tan, F. B. (2015). The mediating role of trust and commitment on members' continuous KS intention: A commitment-trust theory perspective. International Journal of Information Management, 35(2), 145–151.

Hendriks, P. (1999). Why share knowledge? The influence of ICT on the motivation for KS. Knowledge and Process Management, 6(2), 91–100.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In Sinkovics, R.R.; Ghauri, P. N. (ed.) New challenges to international marketing (pp. 277–319). Emerald Group Publishing Limited.

Holienka, M., & Racek, F. (2015). Coworking spaces in Slovakia. Management Review, 9(2), 29–43.

Hoppner, J. J., Griffith, D. A., & White, R. C. (2015). Reciprocity in relationship marketing: A cross-cultural examination of the effects of equivalence and immediacy on relationship quality and satisfaction with performance. Journal of International Marketing, 23(4), 64–83.

Hsu, C. L., & Lin, J. C. C. (2008). Acceptance of blog usage: The roles of technology acceptance, social influence and KS motivation. Information & Management, 45(1), 65–74.

Hsu, M. H., & Chang, C. M. (2014). Examining interpersonal trust as a facilitator and uncertainty as an inhibitor of intra-organisational KS. Information Systems Journal, 24(2), 119–142.

Hung, S. Y., Durcikova, A., Lai, H. M., & Lin, W. M. (2011a). The influence of intrinsic and extrinsic motivation on individuals' KS behavior. International Journal of Human-Computer Studies, 69(6), 415–427.

Hung, S. Y., Lai, H. M., & Chang, W. W. (2011b). Knowledge-sharing motivations affecting R&D employees' acceptance of electronic knowledge repository. Behaviour & Information Technology, 30(2), 213–230.

Hur, W. M., Ahn, K. H., & Kim, M. (2011). Building brand loyalty through managing brand community commitment. Management Decision, 49(7), 1194–1213.

Ipe, M. (2003). KS in Organizations: A Conceptual Framework. Human Resource Development Review, 2(4), 337–359.

Jap, S. D., & Anderson, E. (2003). Safeguarding interorganizational performance and continuity under ex post opportunism. Management Science, 49(12), 1684–1701.

Jiang, X., Li, M., Gao, S., Bao, Y., & Jiang, F. (2013). Managing knowledge leakage in strategic alliances: The effects of trust and formal contracts. Industrial Marketing Management, 42(6), 983–991.

Jiao, H., Yang, J., Zhou, J., & Li, J. (2019). Commercial partnerships and collaborative innovation in China: the moderating effect of technological uncertainty and dynamic capabilities. Journal of Knowledge Management 23 (7), 1429–1454.

Kankanhalli, A., Tan, B. C., & Wei, K. K. (2005). Contributing knowledge to electronic knowledge repositories: An empirical investigation. MIS Quarterly, 29(1), 113–143.

Keszey, T. (2018). Boundary spanners' knowledge sharing for innovation success in turbulent times. Journal of Knowledge Management. 22(5), 1061–1081.

Kim, W. C., & Mauborgne, R. A. (1991). Implementing global strategies: The role of procedural justice. Strategic Management Journal, 12(S1), 125–143.

Kim, S. S. (2019). Exploitation of shared knowledge and creative behavior: the role of social context. Journal of Knowledge Management, 24(2), 279–300.

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of e-Collaboration, 11(4), 1–10.

Kogut, B., & Zander, U. (1996). What firms do? Coordination, identity, and learning. Organization Science, 7(5), 502–518.

Langfield-Smith, K. (2008). The relations between transactional characteristics, trust and risk in the start-up phase of a collaborative alliance. Management Accounting Research, 19(4), 344–364.

Leclercq-Vandelannoitte, A., & Isaac, H. (2016). The new office: how coworking changes the work concept. Journal of Business Strategy, 37(6), 3–9.

Liang, H., Xue, Y., Laosethakul, K., & Lloyd, S. (2005) Information systems and health care -I: trust, uncertainty, and online prescription filling. Communications of the Association for Information Systems, 15, 41–60.

Lin, C. P. (2007). To share or not to share: Modeling tacit KS, its mediators and antecedents. Journal of Business Ethics, 70(4), 411–428.

Liu, C. C., Liang, T. P., Rajagopalan, B., Sambamurthy, V., & Wu, J. C. H. (2011). Knowledge sharing as social exchange: evidence from a meta-analysis. Pacific Asia Journal of the Association for Information Systems, 3(4), 21–47.

McNeish, J., & Mann, I. J. S. (2010). KS and trust in organizations. IUP Journal of Knowledge Management, 8(1/2), 18–30.

Merkel, J. (2015). Coworking in the city. Ephemera, 15(2), 121–139.

Meyer, J. P., Stanley, D. J., Herscovitch, L., & Topolnytsky, L. (2002). Affective, continuance, and normative commitment to the organization: A meta-analysis of antecedents, correlates, and consequences. Journal of Vocational Behavior, 61(1), 20–52.

Milanova, V., & Maas, P. (2017). Sharing intangibles: Uncovering individual motives for engagement in a sharing service setting. Journal of Business Research, 75, 159–171.

Moriset, B. (2013). Building new places of the creative economy. The rise of coworking spaces. Available at: https://halshs.archives-ouvertes.fr/halshs-00914075

Mura, M., Lettieri, E., Radaelli, G., & Spiller, N. (2013). Promoting professionals' innovative behaviour through knowledge sharing: the moderating role of social capital. Journal of Knowledge Management, 17(4), 527–544.

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. Academy of Management Review, 23(2), 242–266.

Nambisan, S., & Baron, R. A. (2009). Virtual customer environments: testing a model of voluntary participation in value co-creation activities. Journal of Product Innovation Management, 26(4), 388–406.

Nguyen, T. M., Nham, T. P., Froese, F. J., & Malik, A. (2019). Motivation and knowledge sharing: a meta-analysis of main and moderating effects. Journal of Knowledge Management. 23(5), 998–1016.

Nonaka, I., & Konno, N. (1998). The concept of "Ba": Building a foundation for knowledge creation. California Management Review, 40(3), 40–54.

Nonaka, I., Toyama, R. (2005). The theory of the knowledge-creating firm: subjectivity, objectivity and synthesis. Industrial and Corporate Change 14(3), 419–436.

Oufkir, L., & Kassou, I. (2019). Performance measurement for knowledge management project: model development and empirical validation. Journal of Knowledge Management, 23(7), 1403–1428.

Oliveira, M., Curado, C., Balle, A. R., & Kianto, A. (2020). Knowledge sharing, intellectual capital and organizational results in SMES: are they related?. Journal of Intellectual Capital, 21(6), 898–911.

Pai, P., & Tsai, H. T. (2016). Reciprocity norms and information-sharing behavior in online consumption communities: An empirical investigation of antecedents and moderators. Information & Management, 53(1), 38–52.

Parrino, L. (2015). Coworking: assessing the role of proximity in knowledge exchange. Knowledge Management Research & Practice, 13(3), 261–271.

Perry-Smith, J. E. (2006). Social yet creative: The role of social relationships in facilitating individual creativity. Academy of Management Journal, 49(1), 85–101.

Pink, M. (2018). Flexible Workspaces in Deutschland: Eine Bestandsaufnahme. Savills Research Deutschland (Flexible workspaces in Germany: review of the current situation). Available at: https://pdf.euro.savills.co.uk/germany-research/ger-ger-2018/flexible-workspaces-in-deutschland---eine-bestandsaufnahme.pdf

Ramadan, B. M., Dahiyat, S. E., Bontis, N., & Al-Dalahmeh, M. A. (2017). Intellectual capital, knowledge management and social capital within the ICT sector in Jordan. Journal of Intellectual Capital, 18(2), 437–462.

Renzl, B. (2008). Trust in management and KS: The mediating effects of fear and knowledge documentation. Omega, 36(2), 206–220.

Riege, A. (2005). Three-dozen knowledge-sharing barriers managers must consider. Journal of Knowledge Management, 9(3), 18–35.

Ringle, C. M., Sarstedt, M., Mitchell, R., & Gudergan, S. P. (2020). Partial least squares structural equation modeling in HRM research. The International Journal of Human Resource Management, 31(12), 1617–1643.

Rus, A., & Orel, M. (2015). Coworking: a community of work. Teorija in Praksa, 52(6), 1017–1038.

Ryu, S., Ho, S. H., & Han, I. (2003). KS behavior of physicians in hospitals. Expert Systems with Applications, 25(1), 113–122.

Sánchez-Franco, M. J., & Roldán, J. L. (2015). The influence of familiarity, trust and norms of reciprocity on an experienced sense of community: an empirical analysis based on social online services. Behaviour & Information Technology, 34(4), 392–412.

Sarstedt, M., Henseler, J., & Ringle, C. M. (2011). Multi-Group Analysis in Partial Least Squares (PLS) Path Modeling: Alternative Methods and Empirical Results,". Advances in International Marketing, 22, 195–218.

Schmidt, S., & Brinks, V. (2017). Open creative labs: Spatial settings at the intersection of communities and organizations. Creativity and Innovation Management, 26(3), 291–299.

Schopfel, J., Roche, J., & Hubert, G. (2015). Coworking and innovation: new concepts for academic libraries and learning centres. New Library World, 116 (1/2), 67–78.

Schulz, M. (2001). The uncertain relevance of newness: Organizational learning and knowledge flows. Academy of Management Journal, 44(4), 661–681.

Scuotto, V., Beatrice, O., Valentina, C., Nicotra, M., Di Gioia, L., & Briamonte, M. F. (2020). Uncovering the micro-foundations of knowledge sharing in open innovation partnerships: An intention-based perspective of technology transfer. Technological Forecasting and Social Change, 152, 119906.

Segars, A. H. (1997). Assessing the unidimensionality of measurement: A paradigm and illustration within the context of information systems research. Omega, 25(1), 107–121.

Singh, S. K., Gupta, S., Busso, D., & Kamboj, S. (2019). Top management knowledge value, knowledge sharing practices, open innovation and organizational performance. Journal of Business Research (In Press).

Son, S. Y., Cho, D. H., & Kang, S. W. (2017). The impact of close monitoring on creativity and KS: The mediating role of leader-member exchange. Creativity and Innovation Management, 26(3), 256–265.

Spinuzzi, C. (2012). Working alone together: Coworking as emergent collaborative activity. Journal of Business and Technical Communication, 26(4), 399–441.

Spinuzzi, C., Bodrožić, Z., Scaratti, G., & Ivaldi, S. (2019). "Coworking Is About Community": But What Is "Community" in Coworking?. Journal of Business and Technical Communication, 33(2), 112–140.

statista (2019a). Number of coworking spaces worldwide from 2005 to 2020 Available at: https://www.statista.com/statistics/554273/number-of-coworking-spaces-worldwide/

statista (2019b). Number of people working in coworking spaces worldwide from 2010 to 2020. Available at: https://www.statista.com/statistics/554315/number-of-people-working-in-coworking-spaces-worldwide/.

Tampoe, M. (1993). Motivating knowledge workers—the challenge for the 1990s. Long Range Planning, 26(3), 49–55.

Tang, C. (2016). Accessed external knowledge, centrality of intra-team knowledge networks, and R & D employee creativity. R&D Management, 46(S3), 992–1005.

Tangaraja, G., Mohd Rasdi, R., Abu Samah, B., & Ismail, M. (2016). KS is knowledge transfer: a misconception in the literature. Journal of Knowledge Management, 20(4), 653–670.

Tohidinia, Z., & Mosakhani, M. (2010). KS behaviour and its predictors. Industrial Management & Data Systems, 110(4), 611–631.

Tsai, W. (2001). Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance. Academy of Management Journal, 44(5), 996–1004.

Tsai, W., & Ghoshal, S. (1998). Social capital and value creation: The role of intrafirm networks. Academy of Management Journal, 41(4), 464–476.

Tsoukas, H. (2009). A Dialogical Approach to the Creation of New Knowledge in Organizations. Organization Science, 20(6), 941–957.

Wang, S., & Noe, R. A. (2010). KS: A review and directions for future research. Human Resource Management Review, 20(2), 115–131.

Wang, C., Rodan, S., Fruin, M., & Xu, X. (2014). Knowledge networks, collaboration networks, and exploratory innovation. Academy of Management Journal, 57(2), 484–514.

Wang, Z., & Wang, N. (2012). Knowledge sharing, innovation and firm performance. Expert Systems with Applications, 39(10), 8899–8908.

Wang, Z., Wang, N., & Liang, H. (2014). Knowledge sharing, intellectual capital and firm performance. Management Decision, 52(2), 230–258.

Wasko, M. M., & Faraj, S. (2000). “It is what one does”: why people participate and help others in electronic communities of practice. The Journal of Strategic Information Systems, 9(2-3), 155–173.

Wasko, M. M., & Faraj, S. (2005). Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. MIS Quarterly, 29(1), 35–57.

Witherspoon, C. L., Bergner, J., Cockrell, C., & Stone, D. N. (2013). Antecedents of organizational knowledge sharing: a meta-analysis and critique. Journal of Knowledge Management, 17(2), 250–277.

Yu, T. K., Lu, L. C., & Liu, T. F. (2010). Exploring factors that influence KS behavior via weblogs. Computers in Human Behavior, 26(1), 32–41.

Zakaria, N., Amelinckx, A., & Wilemon, D. (2004). Working together apart? Building a knowledge-sharing culture for global virtual teams. Creativity and Innovation Management, 13(1), 15–29.

Zammuto, R. F., Griffith, T. L., Majchrzak, A., Dougherty, D. J., & Faraj, S. (2007). Information technology and the changing fabric of organization. Organization Science, 18(5), 749–762.

Zhao, L., Detlor, B., & Connelly, C. E. (2016). Sharing knowledge in social Q&A sites: the unintended consequences of extrinsic motivation. Journal of Management Information Systems, 33(1), 70–100.

Essay 2: A Configurational view on Technology Acceptance: The Example of Highly Integrated Collaboration Platforms

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Abstract

Highly integrated software environments for a variety of both routine and non-routine tasks provide convenient support but also pose a threat of eliciting high levels of stress. A combined perspective of sufficient and necessary conditions is used to examine the phenomenon, advancing technology acceptance examinations from a multivariate perspective to a more holistic view. One hundred thirty participants were trained in using Slack for three months. 116 usable questionnaires were collected. Following the training period, configurational analysis using fsQCA and NCA based on a UTAUT framework, including hedonic motivation, is conducted. The novel perspective on the established model shows that facilitating conditions and effort expectancy most substantially constrain an individual's intention to use. UTAUT's variable choice is confirmed, with social influence being a sufficient condition, while performance expectancy, effort expectancy, facilitating conditions, and the added hedonic motivation are necessary conditions of varying impact. Further, postulated gender differences could be corroborated using the novel perspective.

Keywords Workstream collaboration; technology acceptance; collaboration software; fsQCA; NCA

1 Introduction

Workstream collaboration tools (WCT) are a novel type of application that seeks to change the way we interact at work and, as such, are part of an individual's information and communications technologies (ICT) environment. They target improving communication and collaboration, enabling automation such as embedding artificial intelligence and allowing deep integration of third-party tools (Gartner, 2018; Reynolds, 2018). As WCT support remote work, they are predestined for dispersed, virtual communication. Hence, adequate areas of application comprise modern environments such as agile or spatially distributed teams (Paluch et al., 2019), startups that need to establish infrastructure and organizational processes, or novel work forms such as coworking spaces, as their social atmosphere of collaboration and innovation both fosters and requires the adoption of helpful tools (Bouncken, & Reuschl, 2016). Major characteristics include endorsement of third-party integrations to allow a substantial degree of tool customization and grouping of different communication channels enhanced by automation features (Gartner, 2018; Reynolds, 2018). WCT thus provide an extensive set of functionalities and are inherently designed for multi-purpose application. Predominant applications are Slack, which offers features that range from mere scheduling and file sharing to operating external software tools, and Microsoft

Teams, which recently surpassed Slack in numbers of users and is now in the first place regarding size (Microsoft, 2020; Novet, 2019; Slack, 2020).

As organizational applications grow in complexity, it is vital to understand the drivers of technology usage. However, the extant research primarily focused on multivariate analyses, which provide an impression of average relations and only show part of the picture (Dul, 2016b; Dul et al., 2010). Notably, they are limited due to their assumption of symmetrical effects (Woodside, 2013) and are severely affected by collinearity. Due to their notion of 'net effects', even small correlations between independent variables constrict each factor's impact corridor, i.e., the addition of independent variables commonly yields reduced effect estimates for the factors due to mathematical reasons (Ragin, 1987). While multivariate methods rightly occupy a prominent position in research due to their formality and sophisticated test instruments, it is essential to engage different perspectives to understand a focal phenomenon fully. For this purpose, fsQCA and NCA have been proposed as complements (Dul, 2016b; Ragin, 1987) to create a more holistic picture. Thus, the study at hand seeks to shed light on the technology acceptance of WCT from a configurational point of view. To provide consistency with previous findings in the field, the unified theory of acceptance and use of technology (UTAUT, Venkatesh et al., 2003) is employed as a guiding framework. Hedonic motivation is added to take the notion of dual-purpose information systems (IS) into account (Wu and Lu, 2013). Thus, the study at hand contributes to advancing technology acceptance research by providing a novel perspective on established theoretical assumptions.

Drawing on set-theoretic considerations, necessary conditions are identified using fsQCA (Ragin, 2009) and NCA (Dul, 2016b), and combinations sufficient for WCT usage intention are analyzed with fsQCA. For this purpose, 130 participants were trained in using Slack for three months and subsequently answered a UTAUT-based questionnaire. Insights into actual usage behavior are gained through observations of installed integrations, exchanged messages, and dedicated survey questions. The paper seeks to contribute to our understanding of factors driving technology acceptance and provides an insight into highly integrated collaboration platforms and how users perceive and handle them.

The remainder of the paper is structured as follows: Section 2 provides an overview of the literature. The research model is constituted in section 3, followed by results in section 4, and a discussion in section 5. The last two sections conclude the study's findings, addresses its limitations, and propose paths for future research.

2 Related work

2.1 Workstream collaboration tools

Communication and collaboration are central and interconnected elements of organizations and yield multiple impacts on subjects such as work efficiency (Tjosvold and Tsao, 1989), problem-solving (Gray, 1985), information and knowledge sharing (Cabrera and Cabrera, 2002; Hendriks, 1999; Inkpen,

1996), and innovation (Cooper, 2019; Cooper and Kleinschmidt, 1987). In fact, communication may be the underlying factor creating and sustaining organizations (Schoeneborn et al., 2019). Since the introduction of information technology, organizations have employed several cycles of software applications that seek to facilitate exchange among employees (Bloom et al., 2014; Hinds and Kiesler, 1995; Nunamaker et al., 1991).

Recent developments are characterized by the integration of instant messaging, primarily consisting of text-chat functionality and presence information, and voice-based communications, and increasingly comprise additional channels (Riemer and Frößler, 2007). The demand for such highly integrated tools is fuelled by a number of workplace developments, such as the rising importance of virtual, locally dispersed teams that are composed according to knowledge and skills rather than place (Tuma, 1998). Attempts to provide communication in real-time date back to the 1990s (Riemer and Frößler, 2007), and has become ubiquity due to the omnipresence of online-compatible devices such as laptops, tablets, and smartphones (Ladd et al., 2010). The advent of mobile and inter-device computing with its specific requirements regarding input and output modes has also influenced organizational IS through consumerization (Harris et al., 2012; Jarrahi et al., 2017). A significant precondition for multiplexed platforms is the convergence of infrastructure and "interoperable applications and services on an integrated machine" (Riemer and Frößler, 2007, p. 286). These characteristics have sparked a multiplicity of denominations, such as real-time communication and real-time collaboration systems (Riemer and Frößler, 2007), enterprise communication and collaboration (Kryvinska et al., 2009), unified communications and collaboration (Alias et al., 2017; Chung and Shin, 2011), unified communications (Riemer and Taing, 2009), and unified messaging (Lai et al., 2002), which share many commonalities and are often used interchangeably.

WCT are referred to as the next development stage of integrated communication and collaboration platforms (Gartner, 2018). They gained traction when global player Microsoft entered the market in 2017 and presented an own platform solution called Teams (Unify Square, 2019). Other well-established companies contributed their respective applications, such as IBM, Cisco, or Google (Gartner, 2018). Figure 1 gives an overview of a prototypical application. Reynolds (2018, n. pag.) puts their functionality in a nutshell: they bring "messaging, notifications, files, bots, tools and people together to create a private, persistent and searchable digital workspace that teams can use to do their work in a transparent, effective and efficient manner".

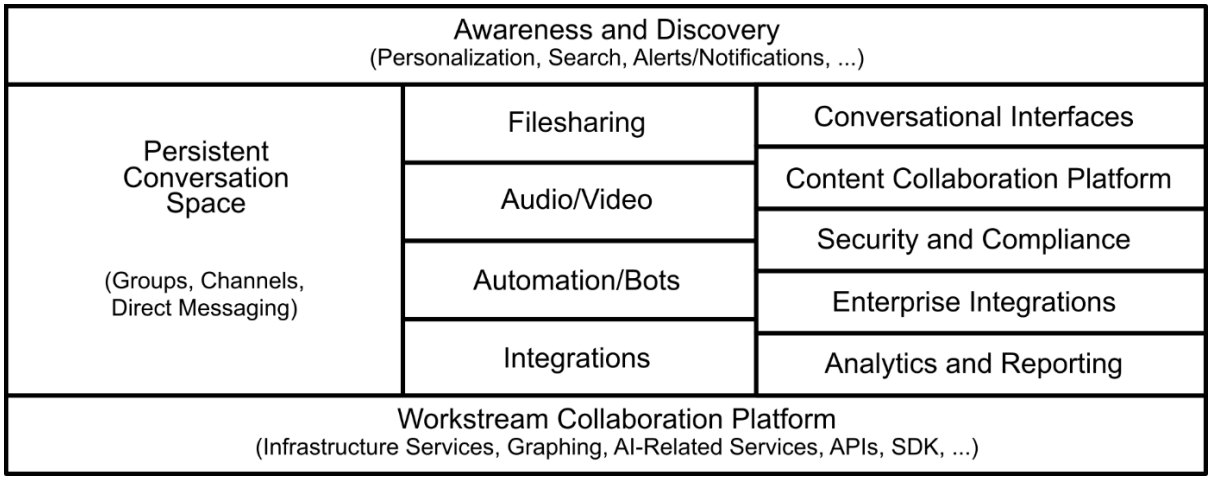


Figure 1: Scope of WCT, based on Gartner (2018).

In essence, WCT combine popular features such as text messaging both in group and direct channels with novel instruments such as chatbots and automation, which allows faster and more efficient execution of tasks. However, their real excellence is achieved by a strong focus on facilitating third-party integrations. In this vein, the workflow using bots and automation can be transferred to existing tools such as project management in Trello and Asana or social media curation on Twitter and Facebook. Taken together, what differentiates WCT from predecessors is their substantial support of non-routine tasks, adding to daily business routines that could already be handled by existing tools (Reynolds, 2018). Regarding device compatibility, WCT focus on a combination of laptop and smartphone/tablet support (Microsoft, 2020; Slack, 2020) but also cover recent technological advancements such as smartwatches (Circuit, 2020) and in-vehicle information systems via Android Auto and Apple CarPlay (Unify, 2020). Table 1 provides an overview of relevant WCT for an impression of the segment's development.

Table 1: WCT market overview. TD = top-down, BU = bottom-up.

Application	Vendor	Launch	Segment
Azendoo	Azendoo	2012	BU, new player
Chanty	Chanty	2017	BU, new player
Circuit	Unify Software and Solutions	2014	BU, new player
Flock	Flock	2014	BU, new player
CA Flowdock	CA Technologies	2010	BU, new player
eXo Platform	eXo platform	2014	BU, new player
Fuze	Fuze	2016	BU, new player
Glip	RingCentral	2015	BU, new player
Hive	Hive	2016	BU, new player
Jandi	Toss Lab	2015	BU, new player
Jostle	Jostle Corporation	2011	BU, new player
Keybase Teams	Keybase	2017	BU, new player
Mattermost	Mattermost	2015	BU, new player
Microsoft Teams	Microsoft	2017	TD, incumbent
Moxtra	Moxtra	2013	BU, new player
Rocket.Chat	Rocket.Chat	2018	BU, new player
Ryver	Ryver	2015	BU, new player

Application	Vendor	Launch	Segment
Samepage	Samepage Labs	2013	BU, new player
Symphony	Symphony Communication Services	2015	BU, new player
Slack	Slack	2013	BU, new player
Stackfield	Stackfield	2014	BU, new player
Twist	Doist	2017	BU, new player
Webex Teams	Cisco WebEx	2018 (rebrand of Spark, 2014)	BU, new player
Wickr Pro	Wickr	2016	BU, new player
Wimi	Wimi	2011	BU, new player
Workplace by Facebook	Facebook	2016	TD, incumbent
Quip	Salesforce (acquisition)	2013	TD, incumbent
Zoho Cliq	Zoho Corporation	2017	BU, new player
Zulip	Dropbox (acquisition)	2015	TD, incumbent

As the application and vendor columns indicate, the market is split into two segments: major companies from originally different backgrounds, such as Microsoft and Cisco, and specialized single-product companies. Two main business models prevail: dissemination of proprietary software (e.g., Chanty, Circuit, Slack, Teams), and provision of open source applications (e.g., eXo Platform, Mattermost, Rocket.Chat, Zulip). The backgrounds of single-product companies share many commonalities: in many cases, internal communication solutions were needed while working on a different project, so a solution was created in-house (Mattermost, 2015; Slack, 2019). In essence, two approaches to the market can be observed: a bottom-up approach driven by client needs, frequently realized through startup foundation, and a top-down approach that is propelled by market growth, which is a strategy preferably employed by incumbents.

2.2 Unified theory of acceptance and use of technology

As a theoretical foundation for the study, the unified theory of acceptance and use of technology (UTAUT, Venkatesh et al., 2003) is used, integrating eight established technology acceptance models. UTAUT is based on the Theory of Reasoned Action (TRA, Fishbein and Ajzen, 1975) and its successor, the Theory of Planned Behavior (TPB, Ajzen, 1991), and incorporates the factors performance expectancy, effort expectancy, social influence, and facilitating conditions to explain individuals' behavioral intention to use a particular technology. Drawing on TRA and TPB, this intention serves as a predictor for actual use behavior (Fishbein and Ajzen, 1975; Venkatesh et al., 2003). Table 2 provides an overview of the UTAUT factors and their conceptualizations. Besides, moderating effects of age, gender, experience with the technology, and voluntariness of use are postulated (Venkatesh et al., 2003).

Table 2: UTAUT factors.

Factor	Conceptualization	Adapted from
Performance expectancy	Individuals' beliefs that the technology will help to increase work-related performance	Perceived usefulness, extrinsic motivation, job-fit, relative advantage, outcome expectations
Effort expectancy	Individual's beliefs of a technology's operability effort	Perceived ease of use, complexity, ease of use
Social influence	Individuals' beliefs that other persons would like them to use the technology	Subjective norm, social factors, image
Facilitating conditions	Individuals' beliefs that technical and organizational support is provided	Perceived behavioral control, facilitating conditions, compatibility

TRA and TPB postulate that before an individual carries out a particular behavior, an intention to act is formed (Ajzen, 1991; Fishbein and Ajzen, 1975). This intention is influenced by beliefs about likely outcomes of the action and normative factors (Fishbein and Ajzen, 1975). Hence, an individual is expected to integrate his or her perceptions about a particular technology's properties to generate a behavioral intention, which may be measured to predict consecutive behavior (Venkatesh et al., 2003). While UTAUT has been established for the organizational context, its successor, UTAUT2, generalizes insights from technology acceptance research to the consumer context (Venkatesh et al., 2012). Due to WCT's strong influences from consumerization, it is deemed reasonable to include notions of hedonic motivation instead of restricting the research model to a purely utilitarian view, as UTAUT suggests. Besides, the extant literature on user perception of IS reveals that a strict separation of utilitarian and hedonic systems fails to replicate real-world settings; instead, technologies may serve both purposes simultaneously (Wu and Lu, 2013).

3 Research Design

3.1 Conceptual model and hypotheses

UTAUT is employed as a guiding framework. Hedonic motivation is included in addition to incorporate the notion of consumerization (Gewald et al., 2017; Harris et al., 2012; Jarrahi et al., 2017), which postulates current organizational technology is heavily influenced by mechanisms and devices that employees already know from the consumer context. In this vein, communication technology and, as such, WCT, need to be considered dual-purpose systems that fulfill both utilitarian and hedonic needs (Wu and Lu, 2013). UTAUT is widely used in current research, drawing on performance expectancy, effort expectancy, social influence, and facilitating conditions to explain acceptance (i.e., positive influences are hypothesized), which is understood as the intention to use the technology under investigation in this context (Davis et al., 1989; Hsu, & Lin, 2008; Venkatesh et al., 2012). Items were measured on a 5-point Likert-type scale and are attached in Appendix A. Figure 2 displays the final framework.

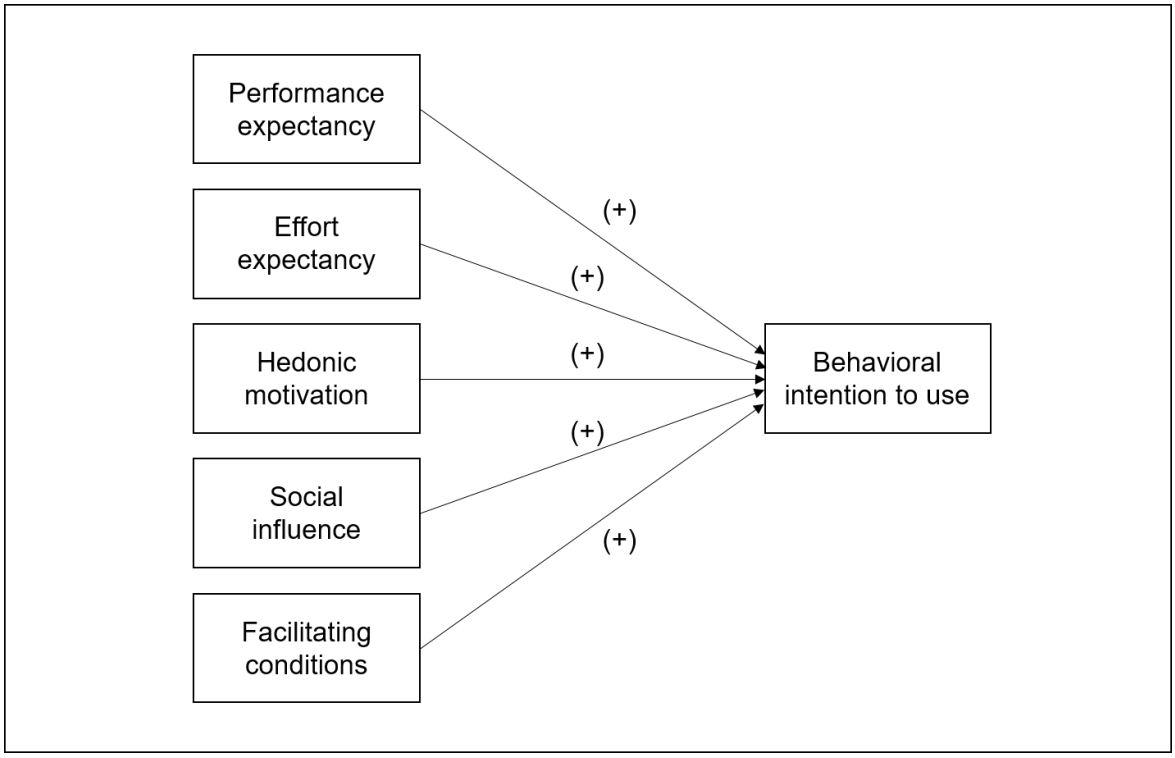


Figure 2: Adapted UTAUT framework based on Venkatesh et al. (2003).

Further, age, gender, experience, and voluntariness of use are included as moderator variables in UTAUT (Venkatesh et al., 2003). As individuals are trained for a limited amount of time, experience cannot be measured reasonably. Besides, participation was voluntary; hence voluntariness of use cannot be adequately depicted as it would be the case in a real-world organizational setting. Regarding the study's layout, which targets training Master students (who will become young professionals in the near future) using a WCT, it is expected that the age variable spans a relatively small range. In UTAUT, the age range is much broader. Hence, it is deemed adequate to drop age, as the span of values is assumed to be narrow, and moderating effects are challenging to interpret and may be rather treated as artifacts. The reason behind this decision is that students ranging from about 18 to 30 belong to similar spheres of experience regarding technology. Consequently, dividing the sample into young and old would be an artificial choice that does not reflect the high degree of similarity. Thus, the study focuses on gender and examines its interplay with the factors. In the following, names of latent variables are abbreviated as follows: performance expectancy PE, effort expectancy EE, social influence SI, facilitating conditions FC, hedonic motivation HM, overload OL, invasion IN, technostress TS, and behavioral intention to use BI.

3.2 Sample strategy and training

Over three months, 130 participants were trained in operating Slack. After familiarizing with the tool's essential features, more advanced techniques such as using chatbot automation were rehearsed. At the end of the three-month period, a survey was scheduled for all 130 users. Training in software usage was

designed to cover all relevant aspects of daily operation in business. This approach is consistent with the literature, which seeks to explain and predict acceptance "after a brief period of interaction with the systems" (Szajna, 1996, p. 85). Two exercise sheets were composed, drawing on literature on software utilization in office environments, WCT vendor sites, and blogs dealing with the topic, as well as informal interviews with experienced Slack users for task definition.

At the beginning of the training period, all participants received e-mails with invitations to a dedicated Slack workspace. Two channels were set up, one for posting answers to the exercise sheets and one for general usage. After all participants had joined the workspace, an introductory face-to-face presentation was given, briefly explaining the application and the study's course. Two weeks were scheduled for informal tool exploration to get familiar with its user interface and basic functionality. Participants were asked to use the desktop version. At the end of this period, the first exercise sheet was presented in a second lecture. Tasks comprised using 'slash commands' (commands beginning with a forward slash, which is Slack's standard syntax) and interacting with Slackbot, a pre-installed chatbot in every workspace. Three weeks later, the second sheet was introduced in the same manner. Participants had been using the application for about a month, giving insights into everyday operations. Exercises from the second sheet covered the personalization of channels and the workspace as a whole, focusing on customizing information flow and embedding third-party integration. After having been familiarized with the application's desktop version, the smartphone app was introduced to take flexibility in workplace selection into account. All tasks were completed using the app as well. The final survey was launched at the end of the three months. In the questionnaire, respondents were shown a list of prototypical business tasks and asked to indicate which of these Slack is deemed an adequate solution for. Tasks were selected drawing on literature in the field, practitioner blogs and websites, vendor information on WCT, and subsequent focus group evaluation (N = 8), on the lines of material construction for substitution-in-use as carried out in Ratneshwar and Shocker (1991).

4 Results

4.1 Descriptive statistics

The training period was set from June to August 2019. In total, 116 questionnaires were collected. 14 participants dropped out at the end of the training period. The sample size satisfies recommendations for the condition/case proportion, which should range below 0.20 for five conditions in a medium- to large-N setting (Maggetti and Levi-Faur, 2013; Marx, 2010). Respondents were between 22 and 29 years old (mean 24.34, median 24, SD 1.50). Male and female respondents were balanced, yielding 58 participants in each group. Respondents were asked if they were willing to initiate an introduction of Slack in their workplace, given that no alternative application is already in use. 66.4 % answered yes, while 33.6 % negated. They were also asked for preferences in implementation: 83.6 % favor automation, such as Slackbot. 32.8 % like to see an augmented reality version, allowing integrating the digital

and the physical realm through smart glasses. Virtual reality, implemented through headsets that fade out an individual's environment, is labeled desirable by 28.4 %. Eventually, respondents were asked for experience with Slack. Unsurprisingly, most respondents stated the training period (mean 3.33, median 2, SD 4.94, values in months). One respondent was treated as an outlier and excluded from analysis as he indicated 36 months, which was over half a year more than the next highest value. Assessment of BI resulted in a mean of 2.56 (SD = 1.01), exhibiting a relatively low disposition to use the technology.

Participants also indicated whether they prefer the desktop or the mobile version of Slack, yielding a surprisingly clear majority for the desktop version (96 %). Scanning and trying out integrations were also part of the training. Table 3 gives an overview of the top integrations that were stated to be helpful. Although one of WSCs' inherent features is providing a persistent space for files and conversation, four cloud storage solutions can be found among the top eight implementations.

Table 3: Most popular Slack integrations.

Implementation	Mentions (%)	Top Integrations	Field	Mentions (%)
Desktop	96	Google Drive	Cloud storage	58.5
App	4	Dropbox	Cloud storage	40.6
		Skype	Communications	31.1
		Trello	Project management	29.2
		Google Calendar	Calendar	15.1
		GitHub	Cloud storage	7.5
		WeTransfer	File sharing	7.5
		Microsoft OneDrive	Cloud storage	6.6

4.2 Measurement evaluation

Membership calibration is a critical step in fsQCA. Hence, an assessment of the employed measures is carried out beforehand. Internal consistency is checked using factor analysis, Cronbach's α, and the average variance extracted (AVE). Sufficient values are above 0.50 for AVE and above 0.70 for CR and Cronbach's α (Hair et al., 2019). For one item (FC4), the loading was very low (0.577), and it was removed from further analysis. A summary of all latent variables is provided in Appendix C. Table 4 summarizes the measurement evaluation results.

Table 4: Measurement assessment. SD = standard deviance, AVE = average variance extracted.

Variable	Indicators	Mean (SD)	Cronbach's Alpha	AVE
PE	4	2.67 (0.84)	0.855	0.701
EE	4	3.97 (0.74)	0.893	0.761
HM	3	3.09 (0.82)	0.873	0.807
SI	4	2.07 (0.95)	0.881	0.745
FC	4 (3)	4.05 (0.65)	0.672	0.608
BI	3	2.56 (1.09)	0.935	0.887

For assessment of discriminant validity, a triad of the Fornell-Larcker criterion (Fornell, & Larcker, 1981), an examination of cross-loadings (Hair et al., 2019a), and the heterotrait-monotrait ratio (Henseler et al. 2015) is used. Appendices C and D exhibit tables for Fornell-Larcker and HTMT, indicating discriminant validity. $HTMT_{inference}$ is calculated, corroborating discriminant validity as the null value of 1 is excluded from the 95 percent and 99 percent confidence intervals, respectively (Henseler, Ringle, & Sarstedt, 2015). For cross-loadings, all indicators load highest on their respective variable, corroborating discriminant validity.

4.3 fsQCA

For data analysis, fsQCA is used (Ragin, 2009). In contrast to its predecessor, which was denoted crisp-set QCA or csQCA for differentiation, non-dichotomized membership scores ranging between 0 and 1 are employed (Mendel and Korjani, 2012; Ragin, 2009; Schneider and Wagemann, 2010). Due to its foundations in set theory and fuzzy logic, the method allows the identification of interactions between conditions (which roughly correspond to factors in multivariate analysis) and explicitly stresses the configurational nature of phenomena, i.e., the existence of multiple different condition combinations leading to equivalent outcomes is expected (Ragin, 2009, 1987). The UTAUT model serves as a theoretical baseline for condition identification in the study's context; hence, the next step requires the calibration of each condition's measures into fuzzy sets (Schneider and Wagemann, 2010).

The calibration procedure is crucial for the results of any fsQCA applications, and several methods for the calculation of membership scores have been proposed. As all conditions were measured on a five-point Likert-type scale, the value 3 may naturally serve as the point of maximum ambiguity (i.e., cross-over), while 1 is employed as the threshold for full non-membership, and 5 is used for full membership (see also Ordanini et al., 2014). Empirical calibration methods exist, such as employing the median as the cross-over point and the 5 % and 95 % quantiles as thresholds for full non-membership and full membership, respectively (Woodside, 2013). However, due to the (quasi-)symmetrical nature of Likert-type scales, a theoretical calibration using the scale points as anchors is deemed more representative of the measures.

In contrast to multivariate methods, fsQCA does not make assumptions of symmetrical effects (Woodside, 2013). Instead, two separate analyses are conducted for the absence and the presence of the outcome variable, respectively (Ragin, 1987). Consequently, differences in condition interactions eliciting the outcome and the negation of the outcome are identified.

Necessary conditions analysis using fsQCA

In the first step, XY plots are used to get an overview of the conditions, and a necessary condition analysis is performed. A condition is necessary when (1) the absence of the condition corresponds to the absence of the outcome, and (2) the presence of the outcome corresponds to the presence of the

condition (Braumoeller and Goertz, 2000; Dul, 2016a). In contrary to a sufficient condition, the presence of a necessary condition may occur when the outcome is absent (Vis and Dul, 2018). To assess the pool of conditions for necessity, each condition is analyzed for its degree to which it constitutes a superset of the outcome (i.e., consistency). The coverage values imply the empirical relevance of the relation and help to identify conditions that are necessary but irrelevant (Ragin, 2006). Table 5 summarizes the findings. Note that in all cases, BI is the outcome (i.e., Y), and high values correspond to consistency, while the lower values can be interpreted as coverage (Ragin, 2009).

Table 5: Necessary condition analysis in kind using fsQCA. *The consistency/coverage interpretation is reversed for SI.

Condition (X)	Consistency X ← Y (Coverage)	Consistency X → Y (Consistency)
PE	0.676	0.905
EE	0.469	0.974
HM	0.646	0.922
SI*	0.825	0.583
FC	0.455	0.978

Following the logic of fuzzy sets, a condition is necessary when membership scores in the outcome are lower or equal to membership scores in the condition (Dul, 2016a; Schneider and Wagemann, 2010; Vis and Dul, 2018). This subset relation can be observed using XY plots, depicting membership in the condition on the horizontal axis and membership in the outcome on the vertical axis. In the complementary case, i.e., when membership scores for the outcome are higher than membership scores for the condition, indications for a sufficient condition have been found. The ideal XY plot then shows a triangular case distribution (Braumoeller, 2017; Ragin, 2006). The graphical displays provide a more detailed picture of the summary in Table 5; however, scores from the table give an impression of the set relations: for PE, EE, HM, and FC, consistency scores pass the recommended threshold of 0.90 (Dul, 2016a; Schneider and Wagemann, 2012). However, an even more conservative value of 0.95 has been proposed, particularly for settings that aim at hypothesis testing (see, e.g., Maggetti and Levi-Faur, 2013). As UTAUT and its respective path relations is an established model, the strict threshold is employed for the study at hand, revealing EE and FC as necessary conditions *in kind*.

Consequently, empirical evidence for EE and FC being necessary conditions could be established (see also the XY plots in Appendix E, where most cases are below the linear slope). Assessment of their empirical relevance, i.e., their coverage scores, yields particularly high values, accounting for about two-thirds of each case. Consequently, EE and FC are identified to be necessary and empirically relevant (Ragin, 2006). All graphs are also plotted for the inverse cases of the conditions being absent and the outcome being absent. Figure 3 illustrates both variants for FC, displaying substantial evidence for FC being a necessary condition for BI (left-hand plot) and ~FC being a sufficient condition for ~BI (right-hand plot).

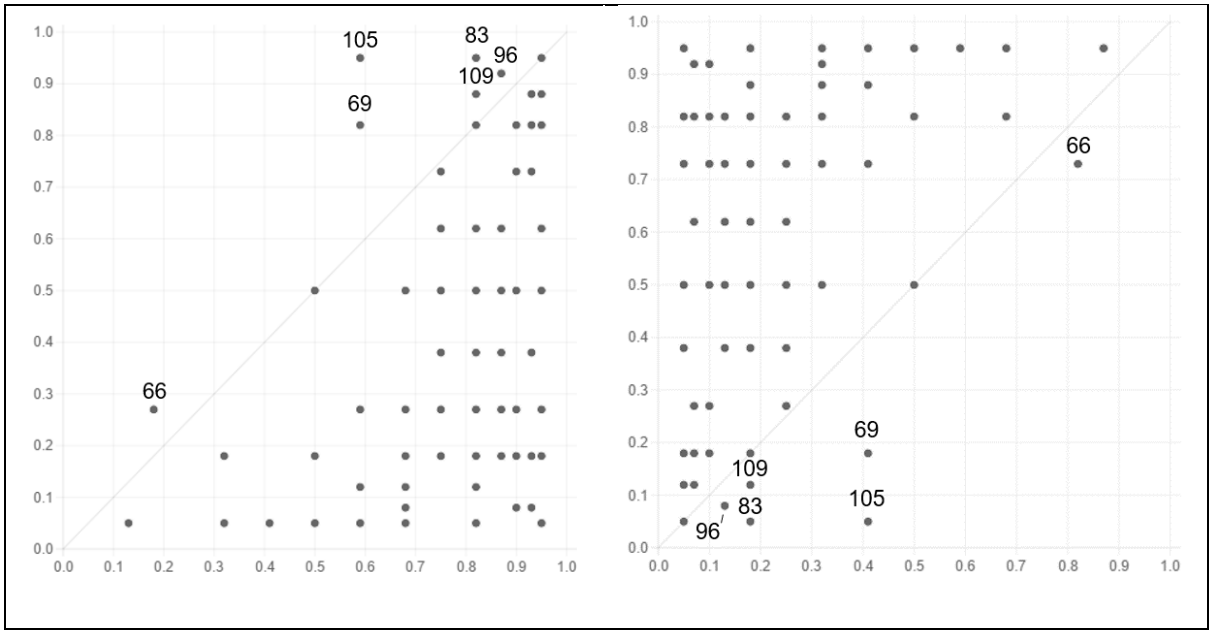


Figure 3: XY plots for FC and BI, and ~FC and ~BI. Values indicate case IDs.

In the case of SI, however, yields an inverse result: as can be observed from the XY plots, the majority of cases are located above the linear slope. Hence, strong evidence for a sufficient condition was found, i.e., SI → BI. The consistency score is 0.825, and the corresponding coverage is 0.583, indicating substantial empirical relevance. In consequence, SI appears to be a sufficient condition for BI. Analyses of sufficiency will be conducted in more detail after the complementing NCA.

Necessary condition analysis using NCA

Although fsQCA provides guidance on the identification of necessary conditions, its primary aim is to detect sufficient conditions (Bol and Luppi, 2013). Consequently, a second approach, namely NCA, is employed for analysis. A ceiling regression with free disposal hull (CR-FDH) is used (Dul, 2016b). The idea of NCA is that necessary conditions put constraints on the outcome so that a certain level of the necessary condition is required to elicit the outcome's presence. Drawing on XY plots (with the horizontal axis corresponding to the condition and the vertical axis depicting the outcome), the ceiling line ascertained by NCA separates the 'full' space of observations from the 'empty' space in the upper left corner. The larger this empty space is, the stronger the constraint that is put on the outcome. The results are summarized in Table 6. A bootstrapping procedure drawing 10,000 subsamples was used to assess statistical significance. All conditions were found to exhibit significant effects on a 0.05 level. Following recommendations by Dul (2016b), the effect size of SI can be considered small, the effects of PE, EE, and HM are medium, and FC yields a large effect. NCA provides substantial evidence for the necessity of all five conditions. Thus, in the next step, a more fine-grained evaluation is conducted.

Table 6: NCA results. Note: Observations refer to cases that are located above the ceiling line. d = effect size, p = p-value derived from a bootstrapping procedure with 10,000 draws.

Condition (X)	Ceiling zone	Observations	Accuracy	d	p
PE	0.184	2	0.983	0.227	< 0.001
EE	0.164	1	0.991	0.236	0.018
HM	0.216	3	0.974	0.267	< 0.001
SI	0.012	2	0.983	0.015	0.003
FC	0.232	3	0.974	0.314	0.045

For this purpose, a bottleneck table was crafted (Table 7). A can be seen, a very low level of the outcome (10 %) already requires small values of HM and FC. Considering that a relatively high level of BI needs to be achieved to elicit a regular usage pattern for WCT, four out of the five conditions need to be taken into account (PE, EE, HM, and FC; considering the range of the outcome up to 90 %). The observation that for low outcome levels, most (or even all) conditions are not necessary, but become critical for higher levels of Y, is a typical finding for necessary conditions (Dul, 2016b). For the data at hand, the most substantial constraint emanates from FC. Altogether, findings from fsQCA (i.e., necessity *in kind*) and NCA (i.e., necessity *in degree*) are asymptotically equivalent, as Table 7 shows. For the full range of Y, EE and FC exhibit the highest requirements, and fsQCA identified EE and FC as necessary. Also, SI was not detected as necessary *in kind*, and necessity *in degree* yields a minimal effect (d = 0.015). Table 7 displays that SI, for most target values of Y, does not exhibit constraints. We may, hence, conclude that in this case, fsQCA and NCA both agree on the minor role of SI. However, it becomes also apparent that a mere analysis of *kind* would have neglected important insights provided by NCA.

Table 7: Bottleneck for NCA. Note: Y is stated in percent of the observed values; e.g., Y = 100 corresponds to the highest empirical outcome.

Y	PE	EE	HM	SI	FC
0	NN	NN	NN	NN	NN
10	NN	NN	3.2	NN	3.2
20	NN	NN	9.0	NN	10.3
30	3.3	3.1	14.9	NN	17.3
40	11.6	11.9	20.8	NN	24.3
50	19.9	20.6	26.6	NN	31.3
60	28.2	29.3	32.5	NN	38.3
70	36.6	38.1	38.4	NN	45.4
80	44.9	46.8	44.2	NN	52.4
90	53.2	55.5	50.1	NN	59.4
100	61.5	64.3	55.9	38.2	66.4

Truth table construction and minimization

A truth table is constructed (Ragin, 2009, 1987; Schneider and Wagemann, 2010). Before collapsing it to receive solution terms, thresholds for consistency and frequency (i.e., the minimum number of cases) need to be specified (Krogslund et al., 2015). Although there is a surprising lack of recommendations regarding the frequency threshold, Maggetti and Levi-Faur (2013) suggest a variable-oriented approach

for large-N studies, proposing a minimum of 0.05 in correspondence to the standard level of significance. Considering the dataset comprises 116 observations, the frequency threshold is $5.8 \approx 6$.

The truth table is collapsed, drawing on the Quine-McCluskey algorithm. Minimization results in the 'complex' solution, which means that besides empirical data, no substantive knowledge has been used to make simplifying assumptions, and the solution maintains a conservative perspective (Ragin, 1987; Schneider and Wagemann, 2013). The introduction of simplifying assumptions allows to find a balance between complexity and parsimony and is commonly carried out in two steps: usage of all possible assumptions leads to the parsimonious solution, while a third, intermediate one ranges in between those ends (Schneider and Wagemann, 2013; Thomann and Maggetti, 2020). This analysis procedure is termed the 'Standard Analysis' (Ragin, 1987). Drawing on the extant literature employing UTAUT, all conditions are expected to affect the outcome positively, i.e., the presence of each condition is supposed to contribute to the presence of BI for the derivation of the intermediate solution.

Table 8: fsQCA solutions. Consistency threshold = 0.80, frequency threshold = 6. Simplifying assumptions for the intermediate solutions: the presence of PE, EE, SI, HM, and FC should contribute to BI. Note that the complex and the intermediate solution are the same.

Outcome: BI	Consistency	Raw coverage	Unique coverage
Complex solution			
M1 PE*EE*SI*HM*FC	0.863	0.564	0.564
Intermediate solution			
M2 PE*EE*SI*HM*FC	0.863	0.564	0.564
Parsimonious solution			
M3 SI	0.825	0.583	0.583

A fundamental value of any crafted model is its consistency, indicating the proportion of cases for a particular combination of conditions that agree in the outcome, which should be at least 0.75 to assume the existence of a subset relation (Ragin, 2006). However, a more strict threshold of 0.80 has been established as a standard (Cooper and Glaesser, 2016) and will be used for the study at hand. Commonly deviating from the perfect value of 1.0, consistency is interpreted as the approximation of a subset relation (Maggetti and Levi-Faur, 2013; Veri, 2018). Coverage indicates the empirical relevance of a consistent subset, i.e., only consistent subsets can be meaningfully interpreted. As Table 8 shows, the complex solution and the intermediate solution yield identical results. Both reveal the relevance of all five conditions. The parsimonious solution corroborates the strong impact of SI, which is consistent with fsQCA's necessity analysis results that observed an inverse role of SI (i.e., the evidence suggested that SI may be a sufficient condition). Regarding its XY plot, the pattern is indeed a good example of a sufficient condition. However, considering the results from necessity analyses, the parsimonious solution omits critical information; hence the intermediate solution is considered the final result. In conclusion, fsQCA corroborates NCA findings that each condition bears a significant contribution yet different in degree (Dul, 2016b).

4.4 Inclusion of gender

In line with the UTAUT framework, the effect of gender is assessed. The dataset is split into subgroups for men and women, i.e., no dummy coding was used but separate datasets. For an overview, fsQCA is used to identify necessary conditions *in kind*. Table 9 summarizes the results. On a qualitative level, both subgroups yield similar results. For men and women, SI exhibits properties of a sufficient condition. Employing the conservative threshold of 0.95 for consistency, PE, EE, HM, and FC are identified as necessary *in kind* for the female segment, while EE and FC are detected for the male segment. In the case of FC, the female subgroup yields a striking consistency of 1.000. Consequently, a perfect subset relation was found. Interestingly, a switch from the 0.95 consistency threshold to the initially suggested value of 0.90 would not lead to different results, although HM's consistency is reasonably close for the male subgroup (0.894). The findings, thus, are treated as reliable.

Table 9: Necessary condition analysis in kind using fsQCA. *The consistency/coverage interpretation is reversed for SI.

Condition (X)	Consistency X ← Y (Coverage)		Consistency X → Y (Consistency)	
	Men	Women	Men	Women
PE	0.694	0.657	0.863	0.954
EE	0.484	0.452	0.971	0.978
HM	0.683	0.609	0.894	0.955
SI*	0.804	0.846	0.524	0.652
FC	0.468	0.441	0.960	1.000

NCA is employed to gain insights into a necessity *in degree*. For the female subgroup, significant constraints could be found for all conditions. However, consistent with the overall dataset, SI's effect size appears negligible (d = 0.070). For the male segment, PE, HM, and SI exhibit significant effects. Again, SI's influence is minimal (d = 0.025) and may be neglected. Compared side to side, the most striking difference is found for FC: while for women, the condition yields a large effect, men are not affected at all (p = 0.597). In the case of PE, a large effect is found for women, while for men, it is medium. HM's results are equivalent. EE has a large effect for women but no convincing influence for men (p = 0.073). Table 10 shows the results.

Table 10: NCA results. Note: Observations refer to cases that are located above the ceiling line. d = effect size, p = p-value derived from a bootstrapping procedure with 10,000 draws.

Condition (X)	Ceiling zone	Observations	Accuracy	d	p
Subgroup: women					
PE	0.270	2	0.966	0.361	< 0.001
EE	0.258	3	0.948	0.372	0.009
HM	0.302	3	0.948	0.385	< 0.001
SI	0.052	1	0.983	0.070	0.028
FC	0.373	4	0.931	0.506	0.002

Subgroup: men					
PE	0.184	1	0.983	0.227	< 0.001
EE	0.230	3	0.948	0.332	0.073
HM	0.189	2	0.966	0.234	0.001
SI	0.020	1	0.983	0.025	0.003
FC	0.139	0	1.000	0.201	0.597

For a more detailed picture of the segmentation, the bottleneck technique is used, as displayed in Table 11. Starting with SI, the condition does not impose constraints for the most part for both segments. While in the female subgroup, effects become apparent for moderate values of Y (i.e., 70 %), the male subgroup does not show restrictions until the full range of the outcome (i.e., 100 %). However, this constraint is twice as large as for the women. In the cases of PE and FC, restrictions become visible earlier for women than for men; however, in contrast to SI, they are also higher than for men. For FC, the differences are striking: depending on the desired level of the outcome, the female subgroup requirements are about twice as high in total, considering favorable outcome levels above 50 %. Below this point, the disparities are more extreme. For PE, the factor is about 1.3 for high outcome values and considerably larger for low levels. EE shows similar patterns for both segments, albeit the constraints are somewhat divergent for the highest outcome levels. Demands put on HM are higher for females than for males: while for men, moderate values are satisfactory to achieve the full outcome range (about 50 % of HM), fairly desirable outcome levels may only be achieved through above-average condition values for women (i.e., more than 50 % of HM).

Table 11: Bottleneck for NCA. Note: Y is stated in percent of the observed values; e.g., Y = 100 corresponds to the highest empirical outcome.

Y	PE		EE		HM		SI		FC	
	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men
0	NN	NN	NN	NN	NN	NN	NN	NN	2.3	NN
10	4.5	NN	NN	NN	NN	2.5	NN	NN	12.0	NN
20	12.4	NN	0.2	3.8	6.3	7.7	NN	NN	21.6	NN
30	20.3	3.3	11.7	13.2	16.7	12.9	NN	NN	31.3	3.9
40	28.2	11.6	23.3	22.6	27.1	18.1	NN	NN	40.9	11.0
50	36.1	19.9	34.9	32.0	37.5	23.3	NN	NN	50.6	18.0
60	44.0	28.2	46.5	41.4	47.9	28.5	NN	NN	60.2	25.1
70	51.8	36.6	58.1	50.8	58.3	33.7	7.9	NN	69.9	32.1
80	59.7	44.9	69.7	60.3	68.7	38.9	17.5	NN	79.5	39.2
90	67.6	53.2	81.3	69.7	79.1	44.1	27.1	NN	89.2	46.2
100	75.5	61.5	92.9	79.1	89.5	49.3	36.7	71.4	98.8	53.2

For truth table minimization, the specifications used for the full dataset are slightly changed. Previously, a consistency threshold of 0.80 and a frequency threshold of 6 were employed. As the subsets yield 58 observations each, the frequency threshold is reduced for fine-grained assessment (Maggetti and Levi-Faur, 2013). Using a threshold of 2 cases, both segments' results are equivalent to the full dataset solutions. Table 10 summarizes the results. All solutions yield satisfying consistencies. Consistency and coverage values are higher for the female segment than for males; still, all measures indicate empirical relevance. In contrast to necessity *in kind*, the sufficiency examination could not find striking differences considering gender. Nevertheless, the variation in coverage implies that the solution terms' empirical relevance is higher for women than men.

Table 12: Inclusion of gender. Both subgroups comprise 58 observations. Simplifying assumptions for the intermediate solutions: the presence of PE, EE, SI, HM, and FC should contribute to BI.

Subgroup: women	Consistency	Raw coverage	Unique coverage
Complex solution	0.882	0.639	0.639
M4 PE*EE*SI*HM*FC	0.882	0.639	0.639
Intermediate solution	0.882	0.639	0.639
M5 PE*EE*SI*HM*FC	0.882	0.639	0.639
Parsimonious solution	0.846	0.652	0.652
M6 SI	0.846	0.652	0.652
Subgroup: men	Consistency	Raw coverage	Unique coverage
Complex solution	0.844	0.501	0.501
M7 PE*EE*SI*HM*FC	0.844	0.501	0.501
Intermediate solution	0.844	0.501	0.501
M8 PE*EE*SI*HM*FC	0.844	0.501	0.501
Parsimonious solution	0.804	0.524	0.524
M9 PE*EE*SI*HM*FC	0.804	0.524	0.524

4.5 Use behavior

Participants were asked about their actual usage behavior besides the mandatory exercise sheets. A six-item ordinal scale was used, ranging from 'I do not use Slack' to 'I use Slack several times a day'. 69.0% do not use Slack while 31.0% do. Next, participants were shown 18 use scenarios. They were asked to indicate which of the following are part of their consideration set (not using the specific term) for each of the tasks: Slack, a dedicated, stand-alone application, or an "offline" tool (such as a phone). Table 13 summarizes the results.

Table 13: Use scenario evaluation. Values in %. °Slack is preferred for this use scenario.

Use Scenario	Slack	Stand-Alone	Offline	χ^2	p (df = 2)
1 Meet for lunch / coffee breaks	27.6	33.6	38.8	2.190	0.335
2 Create polls°	66.4	31.0	2.6	71.086	< 0.001
3 Read email	8.6	88.8	2.6	161.190	< 0.001
4 Send email	7.8	89.7	2.6	166.052	< 0.001
5 Read social media	5.2	87.9	6.9	155.655	< 0.001
6 Write social media	3.4	90.5	6.0	170.810	< 0.001
7 Share files°	62.9	34.5	2.6	63.431	< 0.001
8 Phone colleagues	12.9	32.8	54.3	29.810	< 0.001
9 Phone externals	3.4	38.8	57.8	52.879	< 0.001
10 Hold meetings°	44.8	25.9	29.3	7.103	0.029
11 Take quick notes°	44.0	31.0	25.0	6.534	0.038
12 Manage calendar	28.4	62.1	9.5	49.362	< 0.001
13 Support customers	25.0	66.4	8.6	61.672	< 0.001
14 Analyze website statistics	26.7	71.6	1.7	87.121	< 0.001
15 Socialize (in-house)°	57.8	15.5	26.7	33.328	< 0.001
16 Find support for current challenges°	56.0	24.1	19.8	27.224	< 0.001
17 Track and manage projects°	49.1	45.7	5.2	41.603	< 0.001
18 Manage documentation	26.7	67.2	6.0	67.466	< 0.001

The first two columns of Table 10 can also be thought of as a transposed partition-by-use matrix, with two data rows (one for the data headers and one for Slack evaluated over all known partitions) and 18 columns indicating use scenarios, i.e., intended purposes. One-sample χ^2-testing could not find evidence to reject the null hypothesis (i.e., all responses are equally likely) for use scenarios 1, 10, and 11. Overall, evaluations follow a pattern, indicating the presence of preferences.

5 Discussion

Technology acceptance research is advanced from a focus on multivariate statistics towards a more holistic framework using the practically relevant example of WCT. Two approaches were used to identify necessary and sufficient conditions: an fsQCA procedure and NCA. While, at first glance, results appear contradictory, it is important to note that the consistency thresholds for fsQCA were set to a very high value (0.95). A more liberal threshold of 0.90 may have been used (Dul, 2016a; Schneider and Wagemann, 2012). In this case, fsQCA and NCA yield equivalent results: PE, EE, HM, and FC pass the fsQCA threshold and are identified as necessary, while SI exhibits properties of a sufficient condition. Correspondingly, NCA finds large ceiling zones for PE, EE, HM, and FC, and a very small one for SI. Still, asymptotically, fsQCA and NCA agree on EE and FC being most substantial. Hence, the results are not contradictory but complementary, examining necessity *in kind* and *in degree*. Due to the

ceiling zones being directly related to the effect sizes, PE, EE, HM, and FC yield medium and large effects, while SI exhibits a small effect (0.015) that may be considered negligible. Particularly as evidence was found that SI is a sufficient condition, practitioners may be interested in taking SI into account in any case; hence its potential role as a weak necessary condition may not play a major role in practice. Overall, the study at hand could show that a configurational approach reveals insights into established technology acceptance frameworks that have been discounted due to the primary choice of multivariate methods.

Consistent with the underlying UTAUT framework, the effect of gender was examined. While for the female subset, more conditions were necessary *in kind* – namely, PE and HM, whereas for the males, only EE and FC were necessary – the solution terms of the subgroups were equivalent to the total sample's minimization. That is, differences in gender were found, but the absolute relevance of these discrepancies may be neglected in terms of sufficient conditions. Concerning the parsimonious solution, the exceptional position of SI is highlighted. While PE, EE, HM, and FC are necessary, differing in degree, SI's XY plot displays a pattern typical of sufficient conditions. This insight is corroborated by consistency and coverage measures (Table 5). Altogether, the role of SI is quite surprising. Research examining other novel technologies, such as smartwatches and voice assistants, report positive impacts of visibility (i.e., the usage of a particular technology is apparent to others) and image-related factors (Chuah et al., 2016; McLean and Osei-Frimpong, 2019). As WCT have experienced rapid dissemination across organizations, they may yield an image of innovation and timeliness.

Compared to extant research drawing on UTAUT, PE was found to play a relatively less critical role. For example, it was not necessary for the male subset. Commonly, multivariate analyses identify PE as a major factor (Im et al., 2011; Venkatesh et al., 2003; Zhou et al., 2010). Regarding HM, the results provide convincing evidence of the relevance of including hedonic concepts in work-related settings. This importance has been stressed in the literature by the notions of dual-purpose IS and consumerization (Harris et al., 2012; Jarrahi et al., 2017; Wu and Lu, 2013). For WCT, in particular, the main functionalities are common to the user from consumer settings: a persistent text-based communication channel is at the core of a WCT application, which resembles the look and feel of SMS, online chatrooms, and smartphone-based instant messaging. Audio and video calls are part of most mobile devices' standard equipment, such as the FaceTime App provided by Apple (Apple, 2020). A similar case can be made for third-party integrations, which are a significant characteristic of WCT (Gartner, 2018). From the consumer context, many IS users are familiar with searching, installing, and utilizing third-party apps for various tasks. Consequently, gaining the opportunity to upgrade a work-related platform may appear ergonomic; although, for software applications in the organizational context, this operation mode is rather uncommon.

Besides, FC was found to constrain BI critically. FC emphasizes the perceived compatibility of the technology with the individual's environment and denotes a user's "belief related to one's control over

the use of IS" (Venkatesh et al., 2011, p. 534). Thus, it is relatively unsurprising that environmental conditions have a crucial impact on usage intention regarding a highly integrated, pervasive collaboration platform. Drawing on the bottleneck technique (Dul, 2016b), FC was identified as a chokepoint for any level of BI and thus needs to be included in managerial decisions.

Examining use scenarios, it becomes evident that integrated platforms are not favored for all kinds of tasks. Stand-alone applications are preferred in the areas of e-mail and social media, both of which are scenarios with quite a long history of dedicated software. For tasks that require a rather high degree of specialization, as in the cases of website analytics, customer support, and documentation, participants also indicated a preference for dedicated, stand-alone software. Interestingly, voice calls were stated to be made using phones, i.e., neither an integrated WCT nor well-known applications such as Skype or Google Hangouts. WCT were found to be attractive for productivity-related tasks such as polls, file sharing, note-taking, and project management, but also for socializing. This is also consistent with the most used integrations: cloud storage and project management. While the others fit the PE assessment, socializing likely corresponds to the instant messaging-based, somewhat playful environment that many WCT exhibit. Furthermore, a variety of integrations (such as Donut for Slack) is solely dedicated to onboarding and socializing. Indeed, participants' evaluation of HM suggests the relevance of a joyful component. Overall, BI was assessed rather indifferent. This poses the question of why users might prefer other solutions even when confronted with an all-round tool. Findings in related areas, such as provided by Amoroso and Lim (2017), Gefen (2003), Venkatesh, Thong, and Xu (2012), and Polites and Karahanna (2012) propose that mere habit may be highly influential.

6 Conclusion

The study at hand investigated end-user acceptance of WCT from a configurational perspective. Using the established UTAUT model as a framework, both fsQCA and NCA corroborated the relevance of the model's variable set from a novel perspective. PE, EE, HM, and FC were identified as necessary conditions, with varying degrees of constraint on BI. Drawing on a bottleneck table, it could be shown that low levels of BI already require an interplay of HM and FC, which quickly extends to a combination of all conditions except for SI. On a large scale, i.e., when the full range of BI is considered, FC yields the most substantial impact, followed by EE. This result stresses the paramountcy of creating a supportive, technologically compatible software environment when introducing a WCT. This environment may comprise standardized manuals and help guides that users can access at any time, as well as dedicated personnel administrating the workspace. Particularly the vast amount of available third-party integrations requires organizations to establish rules and guidelines on mandatory and voluntary expansions, the degree of autonomy each end-user has when it comes to personalization, and the mode of operation these integrations require. For many integrations are connectors to full-size stand-alone applications, individuals should also be informed about whether the standard mode of operation is from within the WCT or direct access to the application to reduce friction and prevent misunderstandings. Besides,

strong evidence for the sufficient nature of SI could be established. Consequently, substantial social pressure may increase individuals' willingness to employ WCT for work. Consistent with the extant literature in technology acceptance, influences of age and gender were found. While for the age variable, young users displayed a tendency towards usage intention, for gender, men exhibited a focus on HM.

Future research might focus on the inter-device nature of WCT that allows a ubiquity of work processes and work-related communication. This "'always available' work culture" (Jarrahi et al., 2017, p. 570) of consumerization blurs the boundaries between work and private settings (Mazmanian et al., 2013). Extant research suggests that it is this kind of interference that may elicit feelings of technology-induced stress (Ayyagari et al., 2011; Tarafdar et al., 2007; Weil and Rosen, 1997). Consequently, it is essential to understand the nature of these stress effects, and particularly examine whether they are positive (i.e., eustress) or negative (i.e., distress) in their impact on employees (Tarafdar et al., 2019).

7 Limitations

As for all scientific studies, some limitations need to be addressed. First and most important, while the study's Slack workspace was continuously updated with content both by participants and supervisors and may be considered realistic in amount and type of information, respondents might have been well aware that many contributions did not demand a personal response. This may contrast real-world digital workspaces, where any content could require a reaction. Further, participation was voluntary, and all respondents were students with varying degrees of work experience. Concerning use scenarios, these were compiled drawing on earlier research, practitioner data sources such as blogs, a focus group consisting of eight individuals, and followed the lines of Ratneshwar and Shocker (1991). However, these scenarios may differ across contexts and environmental settings and may only serve as a first indication.

References

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211.

Alias, E. S., Mukhtar, M., & Jenal, R. (2017). Embedding key user values for the adoption of unified communication and collaboration service. In: Mat Zin NA (ed) Proceedings of the 2017 6th International Conference on Electrical Engineering and Informatics (ICEEI): Langkawi, Malaysia, November 25-27, 2017. IEEE, Piscataway, NJ, pp 1–4.

Amoroso, D., & Lim, R. (2017). The mediating effects of habit on continuance intention. International Journal of Information Management, 37(6), 693–702.

Apple. (2020). FaceTime. Available at: https://apps.apple.com/de/app/facetime/id1110145091.

Ayyagari, R., Grover, V., & Purvis, R. (2011). Technostress: technological antecedents and implications. MIS Quarterly, 35(4), 831–858.

Bol, D., & Luppi, F. (2013). Confronting Theories Based on Necessary Relations: Making the Best of QCA Possibilities. Political Research Quarterly, 66(1), 205–210.

Bouncken, R. B., & Reuschl, A. J. (2016). Coworking-spaces: how a phenomenon of the sharing economy builds a novel trend for the workplace and for entrepreneurship. Review of Managerial Science, 12(1), 317–334.

Bloom, N., Garicano, L., Sadun, R., & van Reenen, J. (2014). The distinct effects of information technology and communication technology on firm organization. Management Science, 60(12), 2859–2885.

Braumoeller, B. F. (2017). Aggregation Bias and the Analysis of Necessary and Sufficient Conditions in fsQCA. Sociological Methods & Research, 46(2), 242–251.

Braumoeller, B. F., & Goertz, G. (2000). The methodology of necessary conditions. American Journal of Political Science, 44(4), 844–858.

Cabrera, A., & Cabrera, E. F. (2002). Knowledge-sharing dilemmas. Organization Studies, 23(5), 687–710.

Chuah, S. H. W., Rauschnabel, P. A., Krey, N., Nguyen, B., Ramayah, T., & Lade, S. (2016). Wearable technologies: The role of usefulness and visibility in smartwatch adoption. Computers in Human Behavior, 65, 276–284.

Chung, K. S., & Shin, Y. M. (2011). Service Components for Unified Communication and Collaboration of an SOA-Based Converged Service Platform. In: Stephanidis C (ed) HCI International 2011 – Posters' Extended Abstracts. Springer Berlin Heidelberg, Berlin, Heidelberg, pp 491–495.

Circuit. (2020). Available at: www.circuit.com.

Cooper, B., & Glaesser, J. (2016). Exploring the robustness of set theoretic findings from a large n fsQCA: an illustration from the sociology of education. International Journal of Social Research Methodology, 19(4), 445–459.

Cooper, R. G. (2019). The drivers of success in new-product development. Industrial Marketing Management, 76, 36–47.

Cooper, R. G., & Kleinschmidt, E. J. (1987). New products: what separates winners from losers? Journal of Product Innovation Management, 4(3), 169–184.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. Management Science, 35(8), 982–1003.

Dul, J. (2016a). Identifying single necessary conditions with NCA and fsQCA. Journal of Business Research, 69(4), 1516–1523.

Dul, J. (2016b). Necessary condition analysis (NCA) logic and methodology of "necessary but not sufficient" causality. Organizational Research Methods, 19(1), 10–52.

Dul, J., Hak, T., Goertz, G., & Voss, C. (2010). Necessary condition hypotheses in operations management. International Journal of Operations & Production Management, 30(11), 1170–1190.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Addison-Wesley.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

Gartner (2019). Market Guide for Workstream Collaboration. Available at https://www.gartner.com/en/docments/3975373/market-guide-for-workstream-collaboration.

Gefen, D. (2003). TAM or just plain habit: A look at experienced online shoppers. Journal of Organizational and End User Computing (JOEUC), 15(3), 1–13.

Gewald, H., Wang, X., Weeger, A., Raisinghani, M. S., Grant, G., Sanchez, O., & Pittayachawan, S. (2017). Millennials' attitudes toward IT consumerization in the workplace. Communications of the ACM, 60(10), 62–69.

Gray, B. (1985). Conditions facilitating interorganizational collaboration. Human Relations, 38(10), 911–936.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. Journal of Marketing Theory and Practice, 19(2), 139–152.

Hair, J. F., Risher. J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24.

Harris, J., Ives, B., & Junglas, I. (2012). IT consumerization: When gadgets turn into enterprise IT tools. MIS Quarterly Executive, 11(3), 99–112.

Hendriks, P. (1999). Why share knowledge? The influence of ICT on the motivation for knowledge sharing. Knowledge and Process Management, 6(2), 91–100.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

Hinds, P., & Kiesler, S. (1995). Communication across boundaries: Work, structure, and use of communication technologies in a large organization. Organization Science, 6(4), 373–393.

Hsu, C. L., & Lin, J. C. C. (2008). Acceptance of blog usage: The roles of technology acceptance, social influence and knowledge sharing motivation. Information & Management, 45(1), 65–74.

Im, I., Hong, S., & Kang, M. S. (2011). An international comparison of technology adoption: Testing the UTAUT model. Information & Management, 48(1), 1–8.

Inkpen, A. C. (1996). Creating knowledge through collaboration. California Management Review, 39(1), 123–140.

Jarrahi, M. H., Crowston, K., Bondar, K., & Katzy, B. (2017). A pragmatic approach to managing enterprise IT infrastructures in the era of consumerization and individualization of IT. International Journal of Information Management, 37(6), 566–575.

Krogslund, C., Choi, D. D., & Poertner, M. (2015). Fuzzy Sets on Shaky Ground: Parameter Sensitivity and Confirmation Bias in fsQCA. Political Analysis, 23(1), 21–41.

Kryvinska, N., Auer, L., & Strauss, C. (2009). The Place and Value of SOA in Building 2.0-Generation Enterprise Unified vs. Ubiquitous Communication and Collaboration Platform. In: Lloret Mauri J (ed) Third International Conference on Mobile Ubiquitous Computing, Systems, Services and Technologies, 2009: UBICOMM '09; 11 - 16 Oct. 2009, Sliema, Malta; proceedings. IEEE, Piscataway, NJ, pp 305–310.

Ladd, D. A., Datta, A., Sarker, S., & Yu, Y. (2010). Trends in mobile computing within the IS discipline: A ten-year retrospective. Communication of Association of Information Systems (CAIS), 27, 285–316.

Lai, J., Mitchell, S., Viveros, M., Wood, D., & Lee, K. M. (2002). Ubiquitous Access to Unified Messaging: A Study of Usability and the Use of Pervasive Computing. International Journal of Human-Computer Interaction, 14(3–4), 385–404.

Lu, J., Yao, J., & Yu, C. S. (2005). Personal innovativeness, social influences and adoption of wire-less Internet services via mobile technology. The Journal of Strategic Information Systems, 14(3), 245–268.

Maggetti, M., & Levi-Faur, D. (2013). Dealing with Errors in QCA. Political Research Quarterly, 66(1), 198–204.

Marx, A. (2010). Crisp-set qualitative comparative analysis (csQCA) and model specification: Benchmarks for future csQCA applications. International Journal of Multiple Research Approaches, 4(2), 138–158.

Mazmanian, M., Orlikowski, W. J., & Yates, J. (2013). The Autonomy Paradox: The Implications of Mobile Email Devices for Knowledge Professionals. Organization Science, 24(5), 1337–1357.

McLean, G., & Osei-Frimpong, K. (2019). Hey Alexa… examine the variables influencing the use of artificial intelligent in-home voice assistants. Computers in Human Behavior, 99, 28–37.

Mendel, J. M., & Korjani, M. M. (2012). Charles Ragin's fuzzy set qualitative comparative analysis (fsQCA) used for linguistic summarizations. Information Sciences, 202, 1–23.

Microsoft. (2020). Microsoft Teams. Available at: https://www.microsoft.com/de-de/microsoft-365/microsoft-teams/group-chat-software.

Novet, J. (2019). Microsoft says its Teams app is bigger than Slack and growing faster. Available at: https://www.cnbc.com/2019/07/11/microsoft-teams-passes-slack-in-daily-users-rajesh-jha-explains-why.html.

Nunamaker, J. F., Dennis, A. R., Valacich, J. S., Vogel, D., & George, J. F. (1991). Electronic meeting systems. Communications of the ACM, 34(7), 40–61.

Ordanini, A., Parasuraman, A., & Rubera, G. (2014). When the Recipe Is More Important Than the Ingredients. Journal of Service Research, 17(2), 134–149.

Paluch, S., Antons, D., Brettel, M., Hopp, C., Salge, T. O., Piller, F., & Wentzel, D. (2019). Stage-gate and agile development in the digital age: Promises, perils, and boundary conditions. Journal of Business Research, 110, 495–501.

Polites, G. L., & Karahanna, E. (2012). Shackled to the status quo: The inhibiting effects of incumbent system habit, switching costs, and inertia on new system acceptance. MIS Quarterly, 36(1), 21–42.

Ragin, C. C. (1987). The comparative method: Moving beyond qualitative and quantitative strategies. University of California Press.

Ragin, C. C. (2006). Set relations in social research: Evaluating their consistency and coverage. Political Analysis, 14(3), 291–310.

Ragin, C. C. (2009). Redesigning social inquiry: Fuzzy sets and beyond. University of Chicago Press.

Ratneshwar, S., & Shocker, A. D. (1991). Substitution in Use and the Role of Usage Context in Product Category Structures. Journal of Marketing Research, 28(3), 281–295.

Reynolds, J. (2018). Workstream Collaboration: What It Is & Why You Need It. Available at: https://mattermost.com/blog/why-workstream-collaboration/.

Riemer, K., & Frößler, F. (2007). Introducing Real-Time Collaboration Systems: Development of a Conceptual Scheme and Research Directions. Communications of the Association for Information Systems, 20(1), 204–225.

Riemer, K., & Taing, S. (2009). Unified communications. Business & Information Systems Engineering, 1(4), 326–330.

Schneider, C. Q., & Wagemann, C. (2010). Qualitative comparative analysis (QCA) and fuzzy-sets: Agenda for a research approach and a data analysis technique. Comparative Sociology, 9(3), 376–396.

Schneider, C. Q., & Wagemann, C. (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge University Press.

Schneider, C. Q., & Wagemann, C. (2013). Doing Justice to Logical Remainders in QCA: Moving Beyond the Standard Analysis. Political Research Quarterly, 66(1), 211–220.

Schoeneborn, D., Kuhn, T. R., & Kärreman, D. (2019). The communicative constitution of organization, organizing, and organizationality. Organization Studies, 40(4), 475–496.

Slack. (2020). Available at: https://slack.com/intl/de-de/.

Szajna, B. (1996). Empirical evaluation of the revised technology acceptance model. Management Science, 42(1), 85–92.

Tarafdar, M., Cooper, C. L., & Stich, J. F. (2019). The technostress trifecta - techno eustress, techno distress and design: Theoretical directions and an agenda for research. Information Systems Journal, 29(1), 6–42.

Tarafdar, M., Maier, C., Laumer, S., & Weitzel, T. (2020). Explaining the link between technostress and technology addiction for social networking sites: A study of distraction as a coping behavior. Information Systems Journal, 30(1), 96–124.

Tarafdar, M., Tu, Q., Ragu-Nathan, B. S., & Ragu-Nathan, T. S. (2007). The Impact of Technostress on Role Stress and Productivity. Journal of Management Information Systems, 24(1), 301–328.

Thomann, E., & Maggetti, M. (2020). Designing Research With Qualitative Comparative Analysis (QCA): Approaches, Challenges, and Tools. Sociological Methods & Research, 49(2), 356–386.

Tjosvold, D., & Tsao, Y. (1989). Productive organizational collaboration: The role of values and cooperation. Journal of Organizational Behavior, 10(2), 189–195.

Tuma, A. (1998). Configuration and coordination of virtual production networks. International Journal of Production Economics, 56, 641–648.

Unify. (2020). Circuit is coming to Apple CarPlay. Available at: https://unify.com/en/blog/circuit-sprint-118.

Unify Square. (2019). Defining and Understanding Workstream Collaboration. Available at: https://www.unifysquare.com/blog/what-is-workstream-collaboration/.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425–478.

Venkatesh, V., Thong, J. Y. L., Chan, F. K. Y., Hu, P. J. H., & Brown, S. A. (2011). Extending the two-stage information systems continuance model: Incorporating UTAUT predictors and the role of context. Information Systems Journal, 21(6), 527–555.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. MIS Quarterly, 36(1), 157.

Veri, F. (2018). Coverage in Fuzzy Set Qualitative Comparative Analysis (fsQCA): A New Fuzzy Proposition for Describing Empirical Relevance. Comparative Sociology, 17(2), 133–158.

Vis, B., & Dul, J. (2018). Analyzing relationships of necessity not just in kind but also in degree: Complementing fsQCA with NCA. Sociological Methods & Research, 47(4), 872–899.

Weil, M. M., & Rosen, L. D. (1997). Technostress: Coping with technology@ work@ home@ play (Vol. 13, p. 240). New York: J. Wiley.

Woodside, A. G. (2013). Moving beyond multiple regression analysis to algorithms: Calling for adoption of a paradigm shift from symmetric to asymmetric thinking in data analysis and crafting theory. Journal of Business Research, 66(4), 463–472.

Wu, J., & Lu, X. (2013). Effects of extrinsic and intrinsic motivators on using utilitarian, hedonic, and dual-purposed information systems: A meta-analysis. Journal of the Association for Information Systems, 14(1).

Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. Computers in Human Behavior, 26(4), 760–767.

Appendix

Appendix A: Items (retranslated from German) and outer loadings.

Construct	Items	Loadings	Reference
Performance expectancy	PE1. I find Slack useful in my daily life.	0.808	Venkatesh et al. (2003), Venkatesh et al. (2012)
	PE2. Using Slack increases my chances of achieving things that are important to me.	0.843	
	PE3. Using Slack helps me accomplish things more quickly.	0.884	
	PE4. Using Slack increases my productivity.	0.811	
Effort expectancy	EE1. Learning how to use Slack is easy for me.	0.876	Venkatesh et al. (2003), Venkatesh et al. (2012)
	EE2. My interaction with Slack is clear and understandable.	0.866	
	EE3. I find Slack easy to use.	0.883	
	EE4. It is easy for me to become skillful at using Slack.	0.864	
Social influence	SI1. People who are important to me think that I should use Slack.	0.857	Venkatesh et al. (2003), Venkatesh et al. (2012)
	SI2. People who influence my behavior think that I should use Slack.	0.915	
	SI3. People whose opinions I value prefer that I use Slack.	0.908	
	SI4. Colleagues think that I should use Slack.	0.769	
Facilitating conditions	FC1. I have the resources necessary to use Slack.	0.706	Venkatesh et al. (2003), Venkatesh et al. (2012)
	FC2. I have the knowledge necessary to use Slack.	0.799	
	FC3. Slack is compatible with other technologies I use.	0.744	
	FC4. I can get help from others when I have difficulties using Slack	0.577	(dropped)
Hedonic motivation	HM1. Using Slack is fun.	0.924	Venkatesh et al. (2012)
	HM2. Using Slack is enjoyable.	0.912	
	HM3. Using Slack is very entertaining.	0.857	
	IN3. I feel constantly connected to work.	0.447	
Behavioral intention	BI1. I intend to continue using Slack in the future.	0.947	Venkatesh et al. (2012)
	BI2. I will always try to use Slack in my daily life.	0.926	
	BI3. I plan to continue to use Slack frequently.	0.952	

Appendix B: Indicator covariance matrix.

	BI_1	BI_2	BI_3	EE_1	EE_2	EE_3	EE_4	FC_1	FC_2	FC_3	HM_1	HM_2	HM_3	PE_1	PE_2	PE_3	PE_4	SI_1	SI_2	SI_3	SI_4
BI_1	1.252																				
BI_2	0.936	1.087																			
BI_3	1.011	0.884	1.078																		
EE_1	0.262	0.255	0.214	0.648																	
EE_2	0.214	0.187	0.212	0.460	0.709																
EE_3	0.273	0.179	0.185	0.470	0.450	0.646															
EE_4	0.312	0.258	0.278	0.489	0.536	0.514	0.871														
FC_1	0.161	0.050	0.069	0.220	0.230	0.211	0.186	0.611													
FC_2	0.336	0.221	0.249	0.369	0.359	0.378	0.368	0.300	0.737												
FC_3	0.440	0.307	0.319	0.221	0.135	0.199	0.208	0.277	0.347	0.930											
HM_1	0.530	0.516	0.442	0.274	0.165	0.253	0.272	0.093	0.243	0.215	0.696										
HM_2	0.560	0.526	0.440	0.259	0.181	0.198	0.250	0.129	0.353	0.190	0.595	0.793									
HM_3	0.573	0.582	0.465	0.302	0.211	0.223	0.312	0.076	0.272	0.174	0.574	0.586	1.032								
PE_1	0.665	0.658	0.564	0.264	0.161	0.170	0.206	0.063	0.202	0.279	0.508	0.526	0.505	0.916							
PE_2	0.469	0.461	0.385	0.160	0.157	0.134	0.123	0.070	0.109	0.286	0.348	0.414	0.321	0.490	0.797						
PE_3	0.596	0.589	0.495	0.238	0.178	0.248	0.275	0.028	0.184	0.356	0.456	0.483	0.479	0.597	0.671	1.123					
PE_4	0.643	0.536	0.509	0.186	0.166	0.218	0.180	0.054	0.230	0.342	0.408	0.422	0.392	0.576	0.509	0.731	1.165				
SI_1	0.339	0.398	0.333	0.141	0.111	0.150	0.197	-0.018	0.173	0.177	0.323	0.328	0.386	0.424	0.362	0.467	0.454	0.837			
SI_2	0.499	0.584	0.464	0.197	0.151	0.151	0.243	-0.013	0.143	0.247	0.356	0.440	0.422	0.573	0.517	0.668	0.661	0.746	1.246		
SI_3	0.496	0.562	0.417	0.190	0.142	0.203	0.206	-0.009	0.204	0.230	0.410	0.440	0.397	0.565	0.481	0.634	0.635	0.659	0.998	1.137	
SI_4	0.644	0.561	0.627	0.193	0.128	0.216	0.237	-0.025	0.229	0.364	0.462	0.448	0.424	0.545	0.449	0.588	0.673	0.592	0.740	0.751	1.386

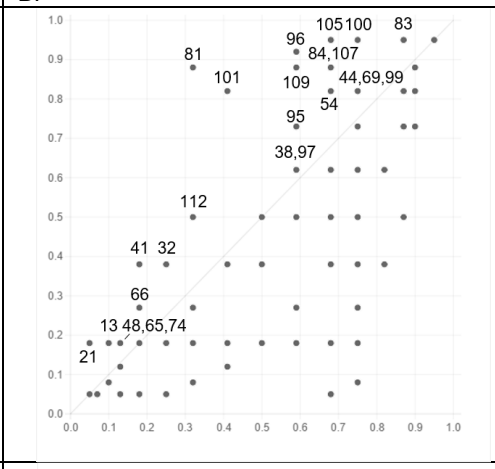
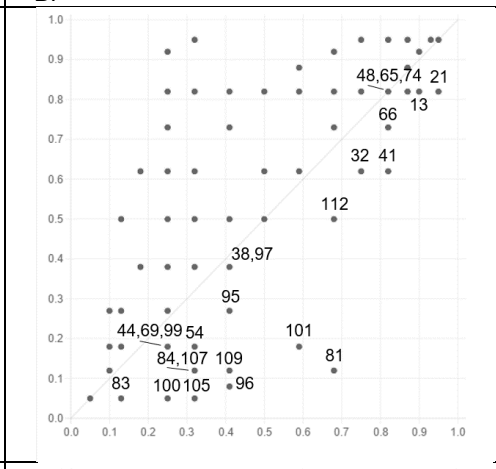
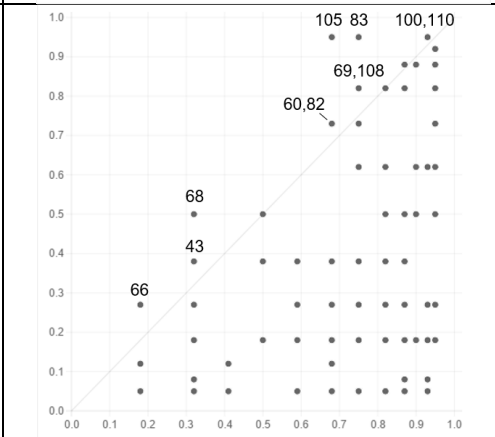
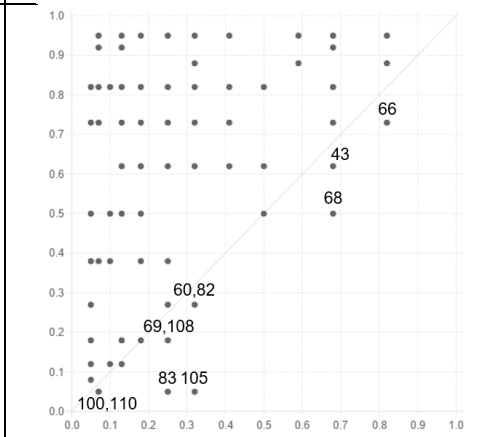
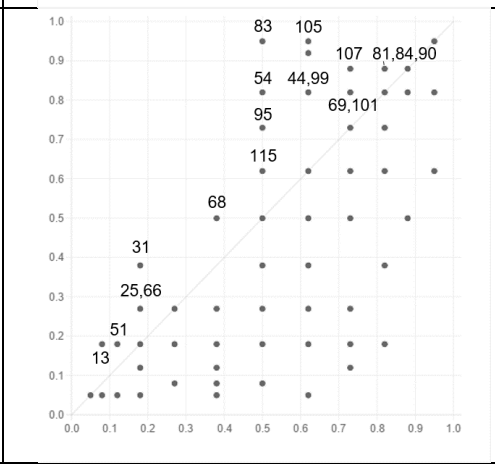
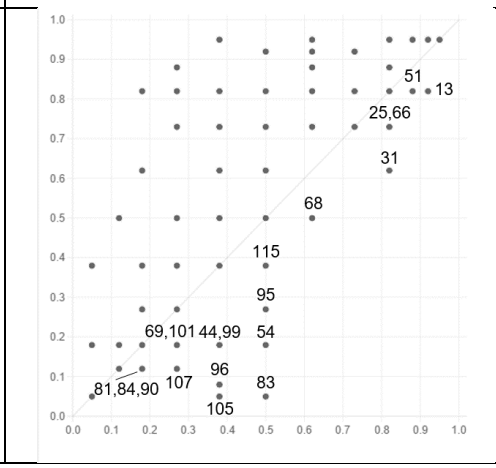
Appendix C: Fornell-Larcker assessment.

	BI	EE	FC	HM	PE	SI
BI	0.942					
EE	0.320	0.872				
FC	0.408	0.538	0.749			
HM	0.630	0.406	0.419	0.898		
PE	0.665	0.316	0.408	0.659	0.836	
SI	0.536	0.265	0.357	0.538	0.707	0.863

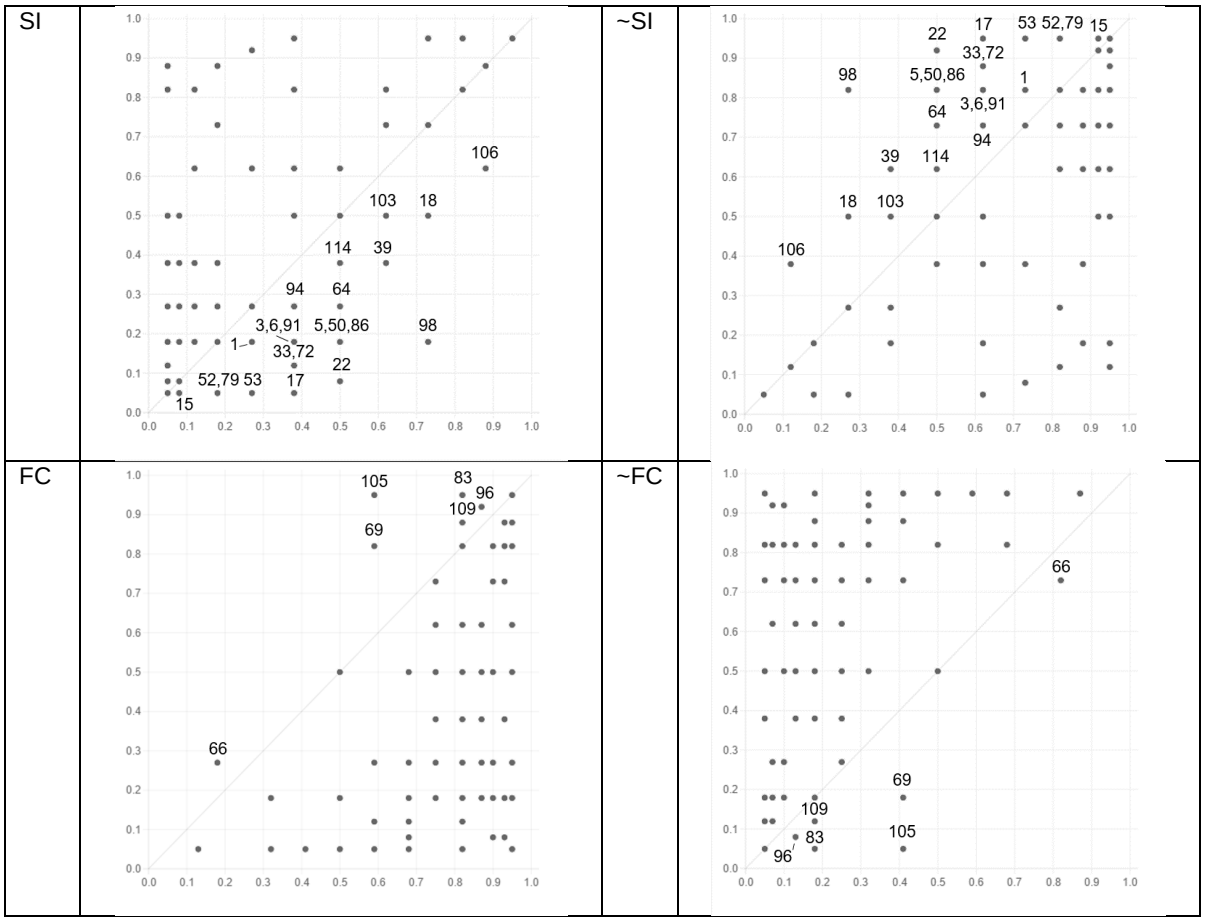
Appendix D: Heterotrait-monotrait ratio.

	BI	EE	FC	HM	PE	SI
BI						
EE	0.346					
FC	0.449	0.738				
HM	0.691	0.452	0.515			
PE	0.730	0.356	0.460	0.746		
SI	0.581	0.294	0.381	0.607	0.808	

Appendix E: XY plots. Values indicate case IDs.

	BI		~BI
PE		~PE	
EE		~EE	
HM		~HM	

Appendix E (continued): XY plots. Values indicate case IDs.



Essay 3: Two Heads are Better than one: Matchmaking Tools in Coworking Spaces

Kopplin, Cristopher Siegfried (2020).

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Abstract

Matchmaking is introduced to the coworking literature as a process of connecting potential collaboration partners. The process itself is realised through a smartphone application drawing on user-generated profiles, allowing coworkers to create tags according to their business interests and challenges, find cooperation opportunities, and get in touch via instant messaging or voice chat. Acceptance of software support for finding matches in the coworking space context is examined using a modified Technology Acceptance Model, investigating the role of personal innovativeness as additional factor. Personal innovativeness describes an individual's tendencies towards novel technology for the sake of trying something new. Cluster sampling was employed among 300 German coworking spaces, 93 responses qualified for analysis. Matchmaking is seen as an opportunity to find help for current challenges, personal learning, and establish relations by coworkers. Perceived usefulness is found to be the main factor of acceptance, indicating the need to design matchmaking mechanisms as organically implemented within the coworking ecosystem as possible, preferably integrating it with existing applications.

Keywords Coworking spaces, Matchmaking, Technology acceptance, Information

Systems

1 Introduction

Coworking spaces (CWS) are a quickly growing phenomenon that has reached significant attention from researchers in different fields. Contributions in business research have been made from the perspectives of entrepreneurship (Bouncken et al., 2018; Butcher, 2018), organizational research (Capdevila, 2013; Garrett et al., 2017), human relations (Waters-Lynch and Duff, 2019), knowledge management (Bouncken and Aslam, 2019), and innovation research (Cheah and Ho, 2019; Schmidt and Brinks, 2017). CWS offer a desk or a workspace for rent and provide access to a community of like-minded people, thereby creating a node of professional and private life, referred to as a social hub (Brinks, 2012; Capdevila, 2013; Gandini, 2015; Garrett et al., 2017). Community aspects of communication and collaboration are the main reasons for coworkers to stay in or leave a space (Garrett et al., 2017; Spinuzzi, 2012). Concerning their social atmosphere, CWS seek to (1) form communities and (2) initiate collaboration within these (Spinuzzi et al., 2019). Waters-Lynch and Potts (2017) propose to view social learning as overarching conceptual model to understand coworking, enabling discovery and mutual sharing of information as well as stipulating internal institutions for searching and matching, both technologically and socially. Bouncken and Reuschl (2018) extend this perspective and suggest that CWS serve as

institutions for innovation on the levels of individuals, teams, ventures, and corporates. For innovation to happen, social interaction and exchange are necessary, increasing an individual's 'network of possible wanderings' (Newell and Simon, 1972) for creative problem-solving. In order to foster transposition and sharing of knowledge and skills, so-called matchmaking tools have been identified as a potential assistance (Olma, 2012; Pallot, 2011; Pallot et al., 2014). These applications allow users to connect with others in order to engage in professional exchange. The idea behind bringing different professionals together is increasing the chance for serendipitous discoveries, and thus ultimately, innovation (Pallot et al., 2014). In fact, coworkers have been found as 'strategically increasing the probability of unforeseeable encounters' (Waters-Lynch and Potts, 2017), indicating adequacy of technologically enhanced matchmaking infrastructure. CWS offer the opportunity to connect with other professionals while engaging in daily work routines, creating links between individuals and groups (Schopfel et al., 2015). These connections occur online as well as offline (Bouncken et al., 2018; Gandini, 2015; Schopfel et al., 2015), leading to a complex socio-economic environment where the CWS itself serves as intermediator of dynamic interactions (Capdevila, 2013), fueled by coworkers' 'explicit purpose of social belonging' (Garrett et al., 2017). Participation opportunities are accessible through a variety of means, such as internal social network sites, social events, physical member boards, newsletters, and community hosts who know about their coworkers' projects (Waters- Lynch et al., 2016). Coworkers thus have to combine a variety of information in order to find collaboration partners with complementary knowledge, regularly under the constraint that who needs to be met is unclear (Waters-Lynch and Potts, 2017). Matchmaking tools have the potential to support these efforts and provide a reference frame for networking and fostering relations. They foster offline connections by showcasing coworkers and their skills, and enable a digital initiation that can either be maintained online (through text messaging or audio calls) or taken to the material world (by scheduling personal meetings). Gandini (2015) proposes that in extent to their hub function, CWS also serve as intermediators for continuous renegotiation of relationships, which takes place in an environment of both online and offline realms. As they are primarily designed to foster community-building and not necessarily for performance or productivity (Garrett et al., 2017), this poses the question of efficient coordination, for which a manifest approach may be the utilization of digital mobile devices such as smartphones that serve as a node between the physical and the digital space. Matchmaking applications may help in capturing the social structures and channel efforts in order to create economic value. The study at hand seeks to investigate the acceptance of matchmaking tools in the coworking sphere. The well-established Technology Acceptance Model (TAM, Davis, 1985) using the additional construct of personal innovativeness (Agarwal and Prasad, 1998) is employed. As sampling strategy, cluster sampling among 300 CWS in Germany is conducted. The remainder of the paper is structured as follows: The first section provides an overview of the relevant literature in the field, followed by a short review on innovation. Section 3 describes the research design; Section 4 provides the empirical results. The final section concludes findings and discusses practical implications.

2 Theoretical background

2.1 Coworking spaces

Research within the last years has adopted the investigation of a new work phenomenon known as CWS (see, e.g., Bouncken and Reuschl, 2016; Brinks, 2012; Garrett et al., 2017; Schopfel et al., 2015). Rooted in the sharing economy, these venues offer a place to work surrounded by a vivid community (Brinks, 2012; Capdevila, 2013; Gandini, 2015), seeking to establish an interactive and creative environment (Schmidt and Brinks, 2017). Their configuration makes CWS so-called third places between conventional workspaces and home offices (Oldenburg, 1999). Interplay of material amenities and social atmosphere is key, as coworkers find additional value in drawing inspiration and support from the social structures around them. Coworkers have been found to be generally willing to employ both novel as well as established ways for initiating and maintaining collaboration (Schmidt and Brinks, 2017). Even more, social relations are viewed as 'main factors of productivity' (Gandini, 2015) that allow pursuing 'new production opportunities in non-hierarchical situations' (Gandini, 2015). Many CWS offer supplemental services such as access to conference rooms, social events, and trainings (Schopfel et al., 2015; Spinuzzi, 2012). However, mere spatial adjacency and concurrent presence of coworkers do not necessarily lead to interaction or collaboration (Merkel, 2015). Instead, they oftentimes work alongside one another with little interaction or cross-fertilization (Spinuzzi, 2012). At the same time, work processes are characterized by a high amount of flexibility, as well as self-governed selection of collaboration partners (Bouncken and Reuschl, 2016), creating a complex environment. It seems adequate to support this instance in order to boost creativity, serendipity, and thus ultimately, innovation. CWS are a reasonable application area for matchmaking as the social evironment plays an important role in successful creative processes and thus sustainable innovation capacity (Amabile, 2012). Qualities that are oftentimes seen as typical for incumbents and have been identified as blocking creativity include criticisingnovel ideas, emphasizing the status quo, a conservative and risk-averse management attitude, and time pressure (Amabile, 2012). CWS are capable of attenuating these barriers. In addition, factors such as collaborative work teams with different skills, freedom in carrying out the work, and norms that postulate active sharing of ideas fertilise creativity (Amabile, 2012), all of which can be found in CWS.

2.2 Matchmaking tools

Matchmaking has its origins in third parties seeking 'to find compatible romantic partners' (Wu et al., 2018) and has since been adopted in a variety of fields, e.g., joint ventures (Hacklin et al., 2006), supplier selection (McCutcheon and Stuart, 2000), and crowdsourcing (Afuah and Tucci, 2012). Its scope in the context of collaboration is to find suitable colleagues or business partners for mutual inspiration and support, ideally resulting in innovation. As Surman (2013) puts it: '[Innovation] happens when perspectives collide in a collaborative environment'. Matchmaking tools also fit demands risen by Waters-Lynch and Potts (2017) concerning technological institutions for salient member display and presence information. They thus draw on and foster a CWS' social configuration, which is manifested in mutual

sets of values such as openness, accessibility, and collaboration (Bates, 2011; Schürmann, 2013). While explicit knowledge is rather simple to display and coordinate, coworkers also exhibit valuable resources in terms of tacit knowledge that cannot simply be elicited (Polanyi, 1967). An application can merely serve as facilitator for explicit knowledge sharing (Desouza, 2003), while the motivation to do so needs to stem from coworkers themselves. For tacit knowledge, matchmaking helps manifesting coworking's social underpinnings, personal meetings, and serendipitous connections (Cohen and Prusak, 2001), hence it may also allow identification and utilization of tacit knowledge bases. As augmentation of the network of coworkers, matchmaking applications may help enhancing proximity on cognitive and social levels, in addition to the CWS itself providing institutional, organisational, and geographical proximity (Boschma, 2005). The interplay of coworking and augmentation through matchmaking provides leverage for a pleasurable sharing experience, which supports both explicit and tacit knowledge exchange (Desouza, 2003). Depending on context and business model, matchmaking tools may yield a significant conflict of interest in terms of having higher earnings the longer a user stays on the platform versus losing value when a compatible match was found, e.g., in dating or job-hunting (Wu et al., 2018). Matchmaking applications for professional skill sharing and serendipitous discoveries do not face this challenge in its entirety, as there is no defined "endpoint" when the matchmaking has fulfilled a certain purpose.

Wu et al. (2018) characterise typical matchmaking tools as exhibiting three main characteristics: (1) charging a subscription fee, (2) users typically abandon the platform after a compatible match, and (3) the tool vendor has strategic control over the service's effectiveness. In the case of CWS, the second trait may depend on the coworkers' individual objectives and the business model the respective CWS employs. Hence, it appears reasonable that in general terms, customer lifetime may be treated as not being shortened by high precision in matchmaking. Rather, depending on their members, providers may have incentives to offer the best possible matching technology to prevent customer churn. Matchmaking tools also help to find support for current tasks or to engage in learning. However, for serendipitous discoveries to take place and thus making the connection fruitful, a certain similarity between the match partners is necessary. Gandini (2015) and Colleoni et al. (2014) note the relevance of complementary skills as factor of productivity in CWS. Brown et al. (2014) describe chance encounters as beneficial for new information, perspectives, and ideas. For examination of complementarity, matchmaking tools employ tags to create user profiles (Pallot et al., 2014). These tags can be automatically generated as with the CONEX prototype (Pallot et al., 2014) or user-generated as with the Serendipity Machine (Olma, 2012). One of the first implementations tailored to CWS is The Serendipity Machine, a mobile app that is part of the Seats2Meet CWS ecosystem. The main layout is schematically depicted in Figure 1, showing a free text field where coworkers enter information about their current tasks for the day, and a selection of fellow workers with their current tasks in the form of tags. Previous match partners can be accessed via a contact list (button "Matches"), while the messaging function may be reached via "Messages".

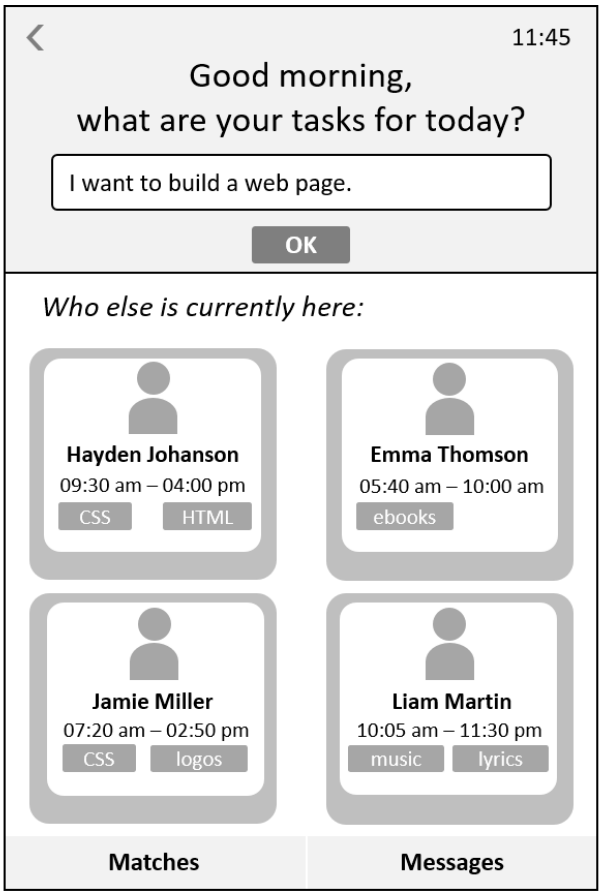

Figure 1: Mockup screen for a typical matchmaking tool.

When checking in at the CWS, coworkers can also enter their planned workhours, so others can see when they are available. This layout meets demands risen by Eagle and Pentland (2005) that a web-based application should not require the user to sit in front of a computer, but rather be embedded directly in everyday social settings. Although The Serendipity Machine is the first CWS-specific matchmaking app, earlier efforts have been made for connecting professionals. Most of these applications did not leave prototyping stages. Table 1 gives an overview of previous developments.

As can be seen, most applications were prototypes used for conferences and similar settings, where a rather homogeneous group of people (considering the general topic of the conference, not the actual research streams) might be interested in matching. This notion can be adopted in the coworking realm: CWS serve as infrastructure for discovery and exchange, which may be viewed from the perspective of Schelling points (Waters-Lynch and Potts, 2017). Just like conference attendees, coworkers are aware of benefits that might be gained from the social environment, however, they need to know whom to speak to.

Table 1: Previous matchmaking approaches in the professional context.

Matchmaking tool	User profiling	Matchmaking mechanic	Application areas	Year
BlueFOAF	None	Comparison of contact lists of Bluetooth devices	Conferences, office	2004
CONEX	Contents used while working on a PC	People-concept networking (PCN)	Living labs	2013
Experience Ubicomp Project	Name, photo, image of personal or professional interest on displays	RFID tags	Conferences	2003
Hummingbird	Mobile RF device	Location tracking	Office	1999
IntelliBadge	Interest profile based on 10 topics	Location tracking, RF location markers	Conferences	2002
MobiClique	Social networks	Ad hoc social network via Bluetooth	Conferences	2009
nTAG	Short notions on screen-based name tag	RFID-enhanced name tags	Conferences	1998
Serendipity	Picture, commonalities, list of talking points, contact information	Similarity score with thresholds	Conferences, MIT campus, enterprises and dating planned	2004
The Serendipity Machine	Picture, skill and task tags	Forum for questions, selects fitting respondents	Coworking Spaces	2007

Table 1 also indicates that the idea of matching professionals is not new itself, but has lacked general success so far. In part, this is likely due to technological limitations that were more strict a decade ago than they are now. Bluetooth connectivity, for example, was not as common as today, and cellphone batteries were not intended to support energy-intensive functions as is quite the norm nowadays. The Serendipity Machine may be viewed as the first general-purpose application, and was used as archetype for the mockup used in the study.

The actual matching mechanism is very similar across all approaches: user information expressed by the matchmaking members is employed to match coworkers on a one-to-one ratio; however, multiple match partners may be found and recommended. Earlier mechanisms apply radiofrequency technology and are intentionally delimited to physical proximity. Later approaches have the advantage of using existing and widely dispersed infrastructure such as mobile internet access and powerful smartphones and tablet computers. This development has several impacts on the way matchmaking is conducted: delimiting potential partners to proximal locations is a choice rather than a technical restriction, and information used for member profiling may be selected from a variety of databases such as social media or user generated content. Implementation can draw on a plurality of established technologies, e.g., Bluetooth, NFC tags, local WiFi, and GPS-based location tracking. Although matching is focused on a one-to-one ratio, users are free to organise themselves on different channels (e.g., instant messaging, e-mail) and form groups instead of only dyads for social exchange, which might be encouraged by the application by showing lists of potential collaboration partners instead of only one complete profile. A more complex approach is employed by CONEX, a matchmaking tool developed in the context of the European Horizon 2020 program. CONEX is based on the people-concepts networking approach (PCN)

which aims at stimulating creativity and innovativeness through exploration of knowledge connections. PCN also uses tags to represent a user's profile, but these are generated by automated scanning and classifying digital work material. The knowledge connections can be used to retrieve content objects which the particular user is linked to (Pallot et al., 2014). A schematic overview of matchmaking tools' environment is depicted in Figure 2.

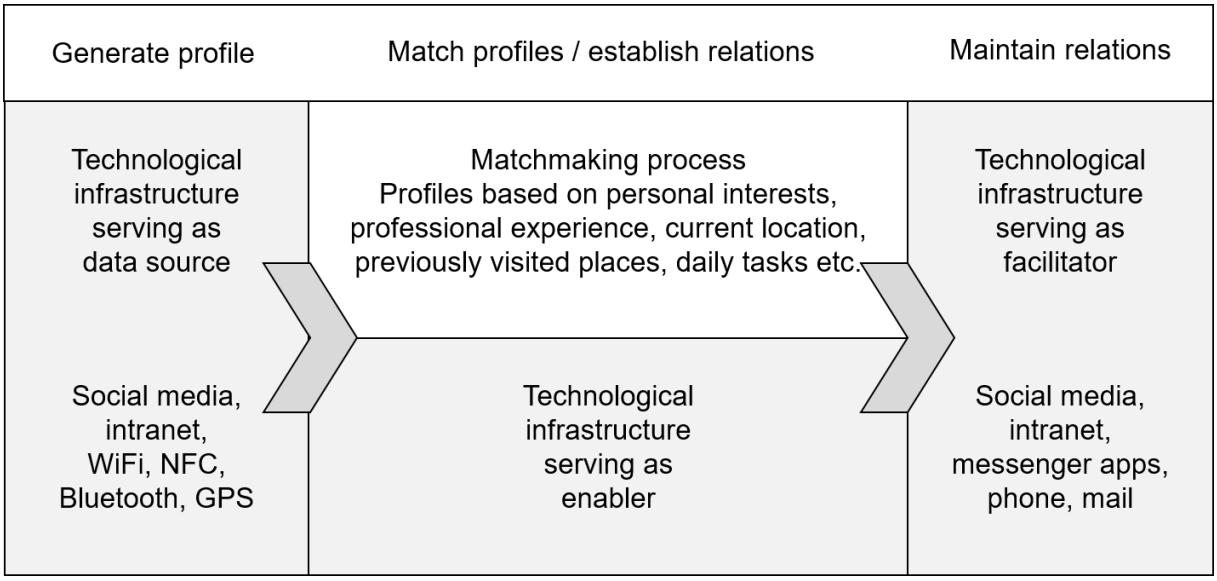

Figure 2: Matchmaking tool scheme.

Figure 2 depicts a single run leading to a successful match. A real-world application may also draw on previous results and include these for enhanced profiling i.e. the process can be designed as recursive, with failed matchmaking attempts and maintained relations as additional data sources.

2.3 Creativity, serendipity, and innovation

Creativity can be viewed as a process of combining knowledge (Wang et al., 2014) and is characterised as yielding novel and adequate ideas for products, procedures, and processes, making it the first step in innovation (Amabile, 1997; Baer, 2012; Hirst et al., 2009; Unsworth, 2001). In fact, creativity and innovation can be seen 'as different parts of essentially the same process' (Amabile and Pratt, 2016), which comprises 'the development of novel, useful ideas and their implementation' (Baer, 2012). The widely employed component model employs expertise, creativity skills, and task motivation as intra-individual parts of creativity. While expertise and task motivation are self-explanatory, creativity skills denote both cognitive and working styles, the former including the ability to take new perspectives and applying different techniques for cognitive pathways, the latter depicting disciplined, persistent, and energetic pursue (Amabile, 1997). Recent research has suggested to consider learning orientation as factor of both expertise and task motivation, as it leads individuals to pursue acquisition of knowledge and implies 'an intrinsic interest in understanding and mastering task performance' (Hirst et al., 2009; Janssen and van Yperen, 2004). One would thus suspect that a rather large fraction of coworkers interested in matchmaking will also be interested in gaining new knowledge, i.e., have a focus on learning.

Another important concept in this context is serendipity. Credited to novelist Horace Walpole and reaching back to 1754 (André et al., 2009), serendipity refers to accidental discoveries that were not intended to be made (Pallot et al., 2014).

For innovation to happen, these insights need to be consciously perceived by the match partner (André et al., 2009), which is oftentimes expressed by including sagacity as necessary condition (see, e.g., Dew, 2009). Otherwise we observe a phenomenon called pre-discovery, which means an individual does not recognise that he or she has just made a discovery (Merton and Barber, 2004). In fact, this seems to be rather commonplace (Cattani, 2006; Dew, 2009). The idea of sagacity is close to the recognition of meaningful patterns, which is part of identifying new business opportunities (Baron and Ensley, 2006) and also requires prior knowledge of a specific field (McKelvie and Wiklund, 2004; Shane, 2001). Yaqub (2018) proposes to discriminate four classes of serendipity, as portrayed in Table 2. It becomes obvious that one dimension of serendipity is whether an individual is actively engaged in a problem-solving process (Walpolian and Mertonian classes) or not (Bushian and Stephanian classes). Most adjacent to finding a solution for a certain problem are the Walpolian class, where the solving process leads to insights that can be used for a different problem, and the Mertonian class, where the targeted problem is solved, yet in an unexpected way.

The Bushian class is close to what may be an intuitive understanding of serendipity: an existing problem is solved while the individual is engaged in activities apart from solution-seeking. The final class of Stephanian serendipity appears as the most complete form, like a flash of genius, where by chance both a problem is identified and an adequate solution is found. Serendipity and creativity are close concepts, with creativity exhibiting a strong link to innovation (see, e.g., Amabile, 1998). Matchmaking is a reasonable approach for fostering creativity, as it purposefully selects potential collaboration partners and thus may ensure that all parties share sufficient domain-specific understanding, which is necessary for successful creative processes (Amabile, 2012). Tools that serve as connection makers between actors are also called ‘serendipitous connections’ (Pallot et al., 2014). CWS with their strong focus on collaboration and social interaction serve as driver for serendipitous encounters (Moriset, 2014) and hence seem an adequate environment for application.

Table 2: Classes of serendipitous discoveries. Based on Yaqub (2018).

Serendipity class	Mechanism
Walpolian	Discovering a solution for a different problem while targeting problem-solving
Mertonian	Discovering an unexpected route to the solution of a given problem while targeting problem-solving
Bushian	Discovering a solution to an existing problem while not targeting problem-solving
Stephanian	Discovering both a novel problem and a solution while not targeting problem-solving

3 Research design

3.1 Sample design and data collection

In order to reach the target group of German coworkers, CWS providers were viewed as gatekeepers and cluster sampling was used to extract spaces for interviewing. Drawing on the Schelling point conceptualization (Waters-Lynch and Potts, 2017), sites were filtered to fit the independent type in the typology provided by Bouncken et al. (2018). A list of CWS in Germany was compiled drawing on websites for desk booking, CWS databases, and coworking blogs, resulting in 300 entries. The questionnaire was written using Qualtrics and dispersed via e-mail to 40 randomly selected CWS hosts, who then distributed it among their coworkers.

3.2 Technology acceptance model

The Technology Acceptance Model (TAM, Davis, 1985; Davis et al., 1989) is one of the most prominent and widely used models for technology acceptance research. Acceptance is regarded as ongoing system use behavior, however, this cannot be captured by questionnaires directly. Instead, actual use is represented by its factor behavioral intention to use (Davis et al., 1989). The original TAM employs perceived usefulness, perceived ease of use, and attitude towards using as predictors of an individual's intention to actually use a technology (Davis, 1985); however, the attitude construct is abandoned in later research (Davis et al., 1989). Current research (Abdullah and Ward, 2016; see also meta-analysis by Dwivedi et al., 2019), as well as this study, re-introduces attitude which is defined as evaluation of system use desirability (Mathieson, 1991). Integrating previous knowledge from the literature about the construct, three different ways of incorporating attitude were identified: (1) utilizing items from the original TAM, (2) employing hierarchical component model strategy from Partial Least Squares modelling and re-using factor indicators for depicting attitude as higher- order construct (see, e.g., Ringle et al., 2017), and (3) applying a series of semantic differentials in order to catch detailed notions. With regard to the body of literature, (1) was ruled out quickly. As (2) and (3) are not mutually exclusive, both ways were taken into account. Perceived usefulness describes the notion that using a system will enhance a person's job performance, whereas perceived ease of use is a person's conception that using a system requires little effort (Davis, 1989). In this vein, TAM assumes rational decision-making by users that determines whether they adopt a new technology or not (Kim et al., 2010). TAM's constructs have been proven as highly reliable (see, e.g., King and He, 2006), while later developments such as TAM2 and TAM3 are rather accounted to the chaotic stadium that is ascribed to the field of acceptance research as more and more factors are included in existing models (Bagozzi, 2007). Despite it being an older model, it is still vividly used in top-level research (see, e.g., the work on mobile payment by Kim et al., 2010; Schmidthuber et al., 2018).

3.3 Personal innovativeness

Personal innovativeness has a long tradition in research on innovation diffusion (dating back to Rogers, 1962, 1971). Personal innovativeness in the context of this study is defined as 'the willingness of an individual to try out any new information technology' (Agarwal and Prasad, 1998) and is regarded as rather stable over different types of IT. This notion exhibits a focus on domain-specific innovativeness, in contrast to a global perspective for innovation in general. In their original work, Agarwal and Prasad describe personal innovativeness as moderator for both impact of perceived usefulness and perceived ease of use on intention to use (Agarwal and Prasad, 1998); however, its role has been evolving over the years. Yi et al. (2006) conclude it is more than a simple moderator. In subsequent research, the construct has been used as a factor of perceived usefulness and perceived ease of use (Jackson et al., 2013; Lewis et al,. 2003) as well as a factor of intention to use (Hong et al., 2011; Schmidthuber et al., 2018). Personal innovativeness stems from individual differences in adoption behavior (Hong et al., 2011) and is part of one's personality (Im et al., 2003). Hence, it is an important factor of intention to use and pivotal for a technology's actual use (Jackson et al., 2013).

3.4 Research model

For the study at hand, both the original TAM and the construct of personal innovativeness by Agarwal and Prasad (1998) are employed. Figure 3 shows the research model. The model postulates a direct positive impact of perceived usefulness on intention to use, and mediated positive influences of perceived ease of use and personal innovativeness. The mediating construct is attitude towards using, which itself is deemed to have a positive impact on intention to use. In addition, it is hypothesised that individuals interested in matchmaking are likely to feature a learning orientation, as derived from the work of Hirst et al. (2009) on creativity and innovation and Waters-Lynch and Potts (2017) on a social learning perspective of coworking. Table 3 summarizes the research hypotheses. The items used are provided in "Appendix 1". For the remainder of the paper, constructs will be abbreviated, with PU for perceived usefulness, PEOU for perceived ease of use, PI for personal innovativeness, ATT for attitude towards using, and BI for (behavioral) intention to use.

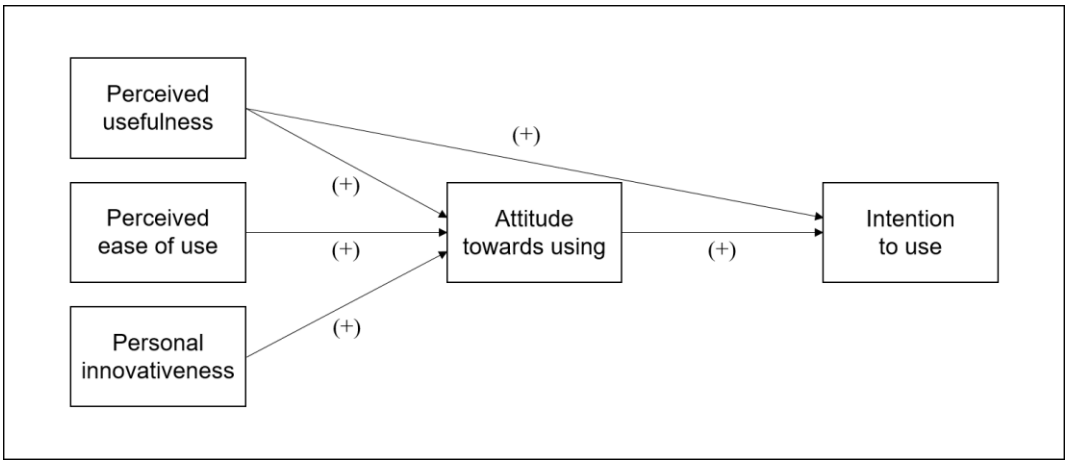

Figure 2: Research model based on Davis et al. (1989) and Agarwal and Prasad (1998).

Table 3: Research hypotheses.

Hypotheses				Postulated effect	Author(s)
TAM					
H1	Perceived usefulness	→	Attitude towards using	Increase	Davis et al. (1989)
H2	Perceived ease of use	→	Attitude towards using	Increase	Davis et al. (1989)
H3	Perceived ease of use	→	Perceived usefulness	Increase	Davis et al. (1989)
H4	Personal innovativeness	→	Attitude towards using	Increase	Agarwal and Prasad (1998)
H5	Perceived usefulness	→	Intention to use	Increase	Davis et al. (1989)
H6	Attitude towards using	→	Intention to use	Increase	Davis et al. (1989)
Supplementary hypotheses					
H7	Interest in matchmaking		Learning orientation	Positive correlation	Hirst et al. (2009), Waters-Lynch and Potts (2017)

4 Results

4.1 Descriptive statistics

40 spaces were sampled randomly and contacted for interviewing, which yielded 128 responses. 93 surveys were complete and used for analysis, resulting in 73% usable questionnaires. The sample consists of 34.7% women. Respondents comprise a broad range of age, the youngest being 16 and the oldest 63 years old. Mean is 36.59 years (SD = 9.31), median is 35 (upper quartile = 42), which mirrors previous research on CWS (see, e.g., Garrett et al., 2017). Coworkers visit the CWS about3.8 days a week (SD = 1.34), yet 47.6% come in five days. Only 1.2% indicate they are present for more than five days. A majority of coworkers (83.2%) has not been using matchmaking tools yet. Of the respondents who have experience with such applications, 75% report their usefulness in past situations (Tables 4, 5).

Respondents were asked to indicate potential improvements for the application to better serve their needs. A third expressed satisfaction with the current functionalities. Another third requested a booking option for meeting rooms, supporting interaction and sparking collaboration after a successful match. About another third asked for integration of a help forum, where members may post questions (about the CWS and its events, but also about professional topics) and have another channel to identify potential collaboration partners. This functionality, in fact, is part of The Serendipity Machine used by the Seats2Meet CWS, and helps identifying "with whom to speak", as demanded by Waters-Lynch and Potts (2017). Interestingly, differences between the male and the female parts of the survey can be observed concerning the rank order of additional features. Female respondents more often requested the help forum, followed by an indication of satisfaction. Male respondents, on the other hand, were mostly satisfied, followed by demands for a booking functionality. When it comes to use cases, a strong preference for support with current challenges was expressed.

Table 4: Sample occupations and industries, n = 93.

	Total
Occupation	
Freelancer	23.1 %
Entrepreneur	22.0 %
Employing entrepreneur	18.7 %
Employee (employer sited at CWS)	18.7 %
Employee (employer sited at different CWS)	1.1 %
Employee (employer not sited at CWS)	16.5 %
Branch/Industry	
Web development/IT	23.1 %
Graphic/Design	8.8 %
Consulting	22.0 %
PR/Marketing	11.0 %
Management	12.1 %
Journalism	5.5 %
Arts/Photography	4.4 %
Other	13.1 %

Table 5: Feature evaluation.

Feature	Total	Male	Female
Booking of meeting rooms	31.2 %	21.5 %	9.7 %
Help forum	29.0 %	17.2 %	11.8 %
Satisfied with the application	33.3 %	22.6 %	10.7 %
Specify other	15.0 %	9.7 %	5.4 %

About a third would also use the application for learning about new topics, and about a quarter stated the tool can be employed for get-togethers to meet new people and establish relationships. 14% mention other scenarios, with "finding collaboration partners" as the most frequent answer. Multiple answers were allowed to collect data about different use cases. Table 6 displays the results. In order to investigate potential differences between learning-oriented coworkers and those that are not, a t test was conducted. For segmentation, the item "learning" as shown in Table 6 was used. BI's items were employed as

indicators for future behavior (BI1 covers own future usage, BI2 recommending the matchmaking application). BI1 did not show relevant differences in means ($t = 0.911$), however, BI2 (i.e., if a coworker will suggest others to make use of the application) showed a striking result ($t = 2.441$, $p = 0.020$). These results seem harmonious, as coworkers that are eager to learn benefit from more users joining the application and might actively seek to increase the number of users in their CWS. H7 is thus partially supported.

Table 6: Use scenarios.

Use scenario	Total	Male	Female
Learning	38.7 %	27.9 %	10.7 %
Connecting to other coworkers	23.6 %	18.3 %	5.4 %
Support for current challenges	50.5 %	32.2 %	18.3 %
Specify other	12.9 %	8.6 %	4.3 %

4.2 Evaluation of the measurement model

Structural equation modelling using partial least squares (PLS-SEM) is employed for data analysis. The algorithm successfully converged after six iterations, employing a path weighting scheme with 300 iterations at maximum, and a stop criterion of 10^{-7}. Before the hypothesized relations between the constructs can be assessed, the measurement model needs to be checked. Only reflective constructs are used. The indicators' covariance matrix is provided in "Appendix 2". Cronbach's Alpha and composite reliability are calculated for verification of internal consistency (Hair et al., 2014). In a second step, validity of indicators is considered. For convergent validity, all outer loadings should be greater than 0.70, and the average variance extracted (AVE) should be over 0.50 (Hair et al., 2014). Only one indicator, PI2, falls short of the 0.70 threshold. Compairing the values of Cronbach's Alpha, composite reliability, and AVE for both inclusion and exclusion of PI2 respectively, exclusion improves these values. PI2 thus is eliminated from the model. Table 7 displays the results for the final model. Next, discriminant validity is verified using the Fornell Larcker criterion (Fornell and Larcker, 1981), examination of cross-loadings, and heterotrait-monotrait ratio (HTMT, Henseler et al., 2015). Results for the Fornell Larcker criterion and HTMT are depicted in Table 8, exhibiting all values within acceptable ranges. HTMT values should be below a threshold of 0.90 (Henseler et al., 2015); however, for conceptually more distinct constructs, a more conservative threshold of 0.85 may be used (Ringle et al., 2017). The conservative threshold holds for all constructs except for ATT and BI, which is no surprise due to their conceptual similarities. Still, HTMT values meet the "standard" of 0.90. The indicators' cross-loadings reveal that no indicator loads higher on an opposing construct (Hair et al., 2012). Cross-loadings are provided in "Appendix 3". Bootstrapping drawing 10,000 samples on a level of 0.01 is used to calculate $HTMT_{inference}$ (Henseler et al., 2015). The null value of 1 falls outside all confidence intervals' ranges, indicating discriminant validity. As a final step, the best way to incorporate ATT was investigated. The "standard solution" was chosen to be the use a semantic differential, which was employed for measurement model

evaluation. This approach makes use of PLS' capability of handling a variety of data types and scales (Haenlein and Kaplan, 2004).

Table 7: Summary statistics of measurement scales.

Construct	Indicators	Mean (SD)	Cronbach's α	Composite Reliability	AVE
PU	4	3.32 (0.87)	0.924	0.946	0.815
PEOU	4	4.11 (0.73)	0.910	0.937	0.787
PI	4 (3)	3.12 (0.55)	0.824	0.894	0.739
ATT	4	1.84 (0.33)	0.926	0.947	0.817
BI	2	3.31 (0.98)	0.920	0.961	0.926

Table 8: Evaluation of the Fornell Larcker criterion and HTMT (in parentheses).

	PU	PEOU	PI	ATT	BI
PU	0.903				
PEOU	0.424 (0.459)	0.887			
PI	0.055 (0.076)	0.012 (0.082)	0.859		
ATT	0.710 (0.756)	0.304 (0.319)	0.204 (0.229)	0.904	
BI	0.764 (0.822)	0.550 (0.593)	0.057 (0.088)	0.800 (0.861)	0.962

4.3 Evaluation of the structural model

After assessing that the measurement model works correctly, in a second step, the inner model is examined. Variance inflation factors indicate that no collinearity issues are present. The determination coefficient R^2 is used for investigating the model's predictive accurary, i.e. in-sample predictive power. ATT yields an R^2 value of 0.532, and an adjusted R^2 value of 0.516, respectively, which can be regarded as moderate (Hair et al., 2011). BI exhibits an R^2 value of 0.717, and an adjusted R^2 value of 0.711, with the same interpretation. PU, exlained by PEOU, yields an R^2 value of 0.181. Path coefficients are evaluated, amended with bootstrapping using 10,000 draws (Ringle et al., 2017). Summary statistics are displayed in Table 9. Regarding effect size, a large effect of PU on ATT can be found, and a medium effect of PU on BI (for thresholds, see Cohen, 1988). PEOU's effect on PU is also medium. ATT displays an f^2 value of 0.472, which is regarded as large. Hair et al. (2017) note that assessing path coefficients is oftentimes overlooked, however, it is important in order to derive meaningful implications. PU indeed has a rather strong impact on ATT. The path coefficient towards BI is smaller, yet still within reasonable size. PEOU displays a strong impact on PU. ATT, finally, yields a strong impact on BI. Next, a blindfolding procedure is used to test for predictive relevance. Q^2 values are 0.407 for ATT, 0.652 for BI, and 0.140 for PU (examining cross-validated redundancy), indicating their explanatory constructs indeed have predictive power (Hair et al., 2011; Ringle et al., 2017). These values, however, are calculated by omitting parts of the sample data, which is not actual out-of-sample prediction. PLSpredict was therefore introduced to PLS-SEM as an addition (Shmueli et al., 2016). Assessing predictive performance, RMSE and MAE values display dominance of the PLS model compared to a linear model benchmark (Table 10).

Table 9: Research hypotheses testing.

Hypotheses					Path coefficients (f^2)	T-statistics (p-value)
H1	Perceived usefulness	→	Attitude towards using	Supported	0.699 (0.852)	11.050 (<0.001)
H2	Perceived ease of use	→	Attitude towards using	Not supported	0.006 (0.000)	0.046 (0.971)
H3	Perceived ease of use	→	Perceived usefulness	Supported	0.425 (0.221)	5.721 (<0.001)
H4	Personal innovativeness	→	Attitude towards using	Not supported	0.165 (0.058)	1.545 (0.197)
H5	Perceived usefulness	→	Intention to use	Supported	0.395 (0.273)	4.847 (<0.001)
H6	Attitude towards using	→	Intention to use	Supported	0.520 (0.472)	6.921 (<0.001)

Table 10: PLSpredict results.

	PLS RMSE	LM RMSE	PLS MAE	LM MAE
PU1	0.925	0.999	0.754	0.787
PU2	0.908	0.978	0.745	0.797
PU3	0.863	0.942	0.689	0.733
PU4	0.925	0.978	0.713	0.765
ATT1	0.363	0.390	0.263	0.276
ATT2	0.389	0.402	0.299	0.299
ATT3	0.344	0.367	0.232	0.251
ATT4	0.346	0.367	0.233	0.249
BI1	0.919	0.947	0.749	0.731
BI2	0.901	0.930	0.704	0.693

5 Discussion

The study at hand contributes to the literature in several ways. First, findings could shed light on technology-based matchmaking in CWS, revealing little dispersion and strong focus on utility. This is consistent with the body of literature on technology acceptance (see, e.g., Davis, 1985; Dwivedi et al., 2019). Second, coworkers were shown to exhibit different preferences, hinting at rather distinct segments within CWS. Corroborating earlier work on CWS, socialising was found to be an important use scenario (Gerdenitsch et al., 2016). Third, a schematic blueprint for technology-based matchmaking was derived that may serve as an anchor for in-depth inspection, e.g., creating stimuli for preference analysis. Results indicate that coworkers tend to see matchmaking tools' amenities in a rather practical way, in the forms of seeking help for arisen challenges and learning about new topics. This fits the notion by Waters-Lynch and Potts (2017) who propose the perspective of social learning as lens through which to study coworking. Focus on seeking help for challenges and general learning implies that coworkers actively pursuit resource sharing, as mentioned by Capdevila (2013). This perception also supports the Schelling point thesis proposed by Waters-Lynch and Potts (2017), indicating that CWS serve as go-to anchor fora variety of needs such as socialising and community-building, collaboration, and learning. Hence, coworkers find an infrastructure providing both online and offline instruments for working towards their

goal, which in turn poses the question according to which criteria or contextual factors particular instruments are chosen.

CWS commonly provide a variety of amenities, many of which might also serve as matchmaking institutions, such as workshops and trainings, or architectural element such as coffee bars and lounges (Schopfel et al., 2015; Spinuzzi, 2012). The social aspects of coworking may also play a role when choosing to use or not to use a matchmaking application, hence future investigations may integrate perspectives such as social influence and facilitating conditions (e.g., Venkatesh et al., 2012). Findings from user experience research suggests that besides instrumental, utilitarian qualities, non-instrumental, hedonic qualities may shape user perception (Köse and Hamari, 2019; Thüring and Mahlke, 2007). Bouncken and Reuschl (2016) stress the level of autonomy that coworkers exhibit. Considering results from the study at hand, revealing that CWS members are distributed across freelancers, entrepreneurs, and employees, different degrees of autonomy may moderate coworker behavior. For example, freelancers depending on contracting may expect a high return from networking, whereas startup employees may be focused on overcoming challenges concerning their business model. This renders further investigation of serendipity's role an interesting path to follow. Moriset (2014) describes serendipity as core principle of CWS, linking to proximity notions elicited by Boschma (2005). Identification of places promising a density of serendipity might also shed new light on the Schelling point thesis. In their work, Waters-Lynch and Potts (2017) draw on Game Theory to describe the coordination problem, i.e. coworkers do not know whom to meet, but have a sense where to look. This notion can be integrated with serendipity-seeking in the way that resource sharing is at the heart of both. However, it is still unclear how these notions fit with findings of professionals working alongside each other without interaction, as described by Spinuzzi (2012). Surprisingly, no evidence for an impact of personal innovativeness on attitude towards using could be found. This is rather interesting, as CWS are seen as innovative environments and deeply integrate online and offline environments (Gandini, 2015). Overall findings are coherent with earlier results of the TAM, which indicated that perceived usefulness has a stronger impact on intention to use than perceived ease of use (Davis, 1989), to the degree where a high perceived ease of use cannot compensate for a low perceived usefulness (Keil et al., 1995).

Findings also suggest that a particular number of coworkers does not visit their CWS every day, instead, it appears that working hours are chosen as needed. This might explain the request for high usefulness, as coworkers have little spare time that could also be used for face-to-face interaction at workshops or on recreational amenities such as ping-pong or billiards, all of which increase the chance for serendipitous connection. Future research may target heterogeneity among coworkers, and inquire demands and needs within different segments. Another salient result is the lack of experience in using matchmaking tools: the majority of respondents has never used such an application. However, research on creativity and innovation suggests that there is hidden potential on hand (see also Waters-Lynch and Potts, 2017). Software vendors have developed a number of specialized CWS applications (e.g., Cobot, Nexudus)

that primarily serve as management and controlling tool for hosts, but increasingly may comprise additional, community-centered features. Future research might consider these applications as potential matchmaking tools. When coworkers select software sternly according to perceived usefulness, this would grant integrated all-in-one tools a natural advantage.

6 Limitations

As the sample was drawn in Germany, one needs to be careful when generalsing to other contexts. Coworkers were recruited from independent coworking spaces in the typology of Bouncken et al. (2018), i.e., for generalisability, potential heterogeneity among types of spaces needs to be taken into accout. Findings suggest the importance of utilitarian benefits, however, the socialising aspect of coworking itself may play a role in matchmaking tool acceptance. Hence, factors such as social influence and facilitating conditions may both enhance our understanding of coworker demands and integrate variables that help capture context. For example, facilitating conditions in corporate coworking spaces as described by Bouncken et al. (2018) likely exhibit different traits than in independent spaces. Matchmaking tools primarily support collaboration and serendipitous connections, as they do not include a holistic knowledge profile of their users. In order to best utilise insights gained from these encounters, sagacity and understanding of the discussed topics, respectively, are necessary. However, matchmaking might also create a sense of proximity and thus foster community and friendship (Garrett et al., 2017). Future studies may thus investigate the role of the matchmaking mechanism itself, and also advance it to incorporate prior user experience and demands that have not been captured in the form of tags, e.g. by integrating social media data. As coworking is a global phenomenon, cross-cultural investigation would be also interesting to include in future research, especially considering the differences in explicit and tacit knowledge that is held by coworkers. Also, the role of serendipity should be addressed, resolving the gap between Moriset (2014) proposing it as core principle, and Spinuzzi (2012) finding coworking as “working alone together”.

References

Abdullah, F., & Ward, R. (2016). Developing a general extended technology acceptance model for E-learning (GETAMEL) by analysing commonly used external factors. Computers in Human Behavior, 56, 238–256.

Afuah, A., & Tucci, C. L. (2012). Crowdsourcing as a solution to distant search. Academy of Management Review, 37(3), 355–375.

Agarwal, R., & Prasad, J. (1998). A conceptual and operational definition of personal innovativeness in the domain of information technology. Information Systems Research, 9(2), 204–215.

Amabile, T. M. (1997). Motivating creativity in organizations: on doing what you love and loving what you do. California Management Review, 40(1), 39–58.

Amabile, T. M. (1998). How to kill creativity. Harvard Business School Publishing, Boston.

Amabile, T. M. (2012). Componential theory of creativity. Harvard Business School 12:1–10.

Amabile, T. M., & Pratt, M. G. (2016). The dynamic componential model of creativity and innovation in organizations: making progress, making meaning. Research in Organizational Behavior, 36, 157–183.

André P., Schraefel, M. C., Teevan, J., & Dumais, S. T. (2009). Discovery is never by chance. In: Bryan-Kinns N, Gross MD, Johnson H, Ox J, Wakkary R (eds) Proceedings of the seventh ACM conference on Creativity and cognition. ACM, New York, NY, p. 305.

Baer, M. (2012). Putting creativity to work: the implementation of creative ideas in organizations. Academy of Management Journal, 55(5), 1102–1119.

Bagozzi, R. (2007). The legacy of the technology acceptance model and a proposal for a paradigm shift. Journal of the Association for Information Systems, 8(4), 244–254.

Baron, R. A., & Ensley, M. D. (2006). Opportunity recognition as the detection of meaningful patterns: evidence from comparisons of novice and experienced entrepreneurs. Management Science, 52(9), 1331–1344.

Bates, T. W. (2011). Community and collaboration: new shared workplaces for evolving work practices. Massachusetts Institute of Technology, Cambridge.

Boschma, R. (2005). Proximity and innovation: a critical assessment. Regional Studies, 39(1), 61–74.

Bouncken, R., & Aslam, M. M. (2019). Understanding knowledge exchange processes among diverse users of coworking-spaces. Journal of Knowledge Management, 23(10), 2067–2085.

Bouncken, R. B., & Reuschl, A. J. (2016). Coworking-spaces: how a phenomenon of the sharing economy builds a novel trend for the workplace and for entrepreneurship. Review of Managerial Science, 12(1), 317–334.

Bouncken, R. B., & Reuschl, A. J. (2018). Coworking-spaces: how a phenomenon of the sharing economy builds a novel trend for the workplace and for entrepreneurship. Review of Managerial Science, 12(1), 317–334.

Bouncken, R. B., Laudien, S. M., Fredrich, V., & Görmar, L. (2018). Coopetition in coworking-spaces: value creation and appropriation tensions in an entrepreneurial space. Review Management Science, 12(2), 385–410.

Brinks, V. (2012). Netzwerke(n) und Nestwärme im coworking space—Arbeiten zwischen Digitalisierung und Re-Lokalisierung. Geographische Zeitschrift, 100(3), 129–145.

Brown, C., Efstratiou, C., Leontiadis, I., Quercia, D., & Mascolo, C. (2014). Tracking serendipitous interactions. In: Fussell S, Lutters W, Morris MR, Reddy M (eds) Proceedings of the 17th ACM conference on computer supported cooperative work and social computing—CSCW '14. ACM Press, New York, New York, USA, pp 1072–1081.

Butcher, T. (2018). Learning everyday entrepreneurial practices through coworking. Management Learning, 49(3), 327–345.

Capdevila, I. (2013). Knowledge dynamics in localized communities: coworking spaces as microclusters. SSRN 2414121.

Cattani, G. (2006). Technological pre-adaptation, speciation, and emergence of new technologies: how corning invented and developed fiber optics. Industrial Corporate Change, 15(2), 285–318.

Cheah, S., & Ho, Y. P. (2019). Coworking and sustainable business model innovation in young firms. Sustainability, 11(10), 2959.

Colleoni, E., Rozza, A., & Arvidsson, A. (2014). Echo chamber or public sphere? Predicting political orientation and measuring political homophilyin Twitter using big data. Journal of Communication, 64(2), 317–332.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences, 2nd edn. Erlbaum, Hillsdale.

Cohen, D., & Prusak, L. (2001). In good company: How social capital makes organizations work. Harvard Business School Press, Boston.

Davis, F. D. (1985). A technology acceptance model for empirically testing new end-user information systems. PhD thesis, Massachusetts Institute of Technology, Sloan School of Management.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. Management Science, 35(8), 982–1003.

Desouza, K. C. (2003). Facilitating tacit knowledge exchange. Communications of the ACM, 46(6), 85–88.

Dew, N. (2009). Serendipity in entrepreneurship. Organization Studies, 30(7), 735–753.

Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M., & Williams, M. D. (2019). Re-examining the unified theory of acceptance and use of technology (UTAUT): towards a revised theoretical model. Information Systems Frontiers, 21(3), 719–734.

Eagle, N., & Pentland, A. (2005). Social serendipity: mobilizing social software. IEEE Pervasive Computing, 4(2), 28–34.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39.

Gandini, A. (2015). The rise of coworking spaces: a literature review. Ephemera, 15(1), 193–205.

Garrett, L. E., Spreitzer, G. M., & Bacevice, P. A. (2017). Co-constructing a sense of community at work: the emergence of community in coworking spaces. Organization Studies, 38(6), 821–842.

Gerdenitsch, C., Scheel, T. E., Andorfer, J., & Korunka, C. (2016). Coworking spaces: a source of social support for independent professionals. Frontiers in Psychology, 7, 1–12.

Hacklin, F., Marxt, C., & Fahrni, F. (2006). Strategic venture partner selection for collaborative innovation in production systems: a decision support system-based approach. International Journal of Production Economics, 104(1), 100–112.

Haenlein, M., & Kaplan, A. M. (2004). A Beginner's guide to partial least squares analysis. Understanding Statistics, 3(4), 283–297.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: indeed a silver bullet. Journal of Marketing Theory and Practice, 19(2), 139–152.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. Journal of the Academy of Marketing Science, 40(3), 414–433.

Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM) An emerging tool in business research. European Business Review, 26(2), 106–121.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). A primer on partial least squares structural equation modeling (PLS-SEM). Sage Publications.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

Hirst, G., van Knippenberg, D., Zhou, J. (2009). A cross-level perspective on employee creativity: goal orientation, team learning behavior, and individual creativity. Academy of Management Journal, 52(2), 280–293.

Hong, W., Thong, J. Y. L., Chasalow, L. C., & Dhillon, G. (2011). User acceptance of agile information systems: a model and empirical test. Journal of Management Information Systems, 28(1), 235–272.

Im, S., Bayus, B. L., & Mason, C. H. (2003). An empirical study of innate consumer innovativeness, personal characteristics, and new-product adoption behavior. Journal of the Academy of Marketing Science, 31(1), 61–73.

Jackson, J. D., Mun, Y. Y., & Park, J. S. (2013). An empirical test of three mediation models for the relationship between personal innovativeness and user acceptance of technology. Information & Management, 50(4), 154–161.

Janssen, O., & van Yperen, N. W. (2004). Employees' goal orientations, the quality of leader-member exchange, and the outcomes of job performance and job satisfaction. Academy of Management Journal, 47(3), 368–384.

Keil, M., Beranek, P. M., & Konsynski, B. R. (1995). Usefulness and ease of use: field study evidence regarding task considerations. Decision Support Systems, 13(1), 75–91.

Kim, C., Tao, W., Shin, N., & Kim, K. S. (2010). An empirical study of customers' perceptions of security and trust in e-payment systems. Electronic Commerce Research and Applications, 9(1), 84–95.

King, W. R., He, J. (2006). A meta-analysis of the technology acceptance model. Information & Management, 43(6), 740–755.

Köse, D. B., & Hamari, J. (2019). Dual information systems: a review of factors affecting their use. In: Americas conference on information systems. Association for Information Systems.

Lai, V., & Li, H. (2005). Technology Acceptance Model for Internet banking: an invariance analysis. Information & Management, 42(2), 373–386.

Lewis, W., Agarwal, R., & Sambamurthy, V. (2003). Sources of influence on beliefs about information technology use: an empirical study of knowledge workers. MIS Quarterly, 27(4), 657–678.

Mathieson, K. (1991). Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. Information Systems Research, 2(3), 173–191.

McCutcheon, D., & Stuart, F. I. (2000). Issues in the choice of supplier alliance partners. Journal of Operations Management, 18(3), 279–301.

McKelvie, A., & Wiklund, J. (2004). How knowledge affects opportunity discovery and exploitation among new ventures in dynamic markets. Opportunity Identification and Entrepreneurial Behavior, 4, 219–239.

Merkel, J. (2015). Coworking in the city. Ephemera, 15(2), 121–139.

Merton, R. K., & Barber, E. G. (2004). The travels and adventures of serendipity: a study in historical semantics and the sociology of science. Princeton University Press, Princeton.

Moriset, B. (2014). Building new places of the creative economy. The rise of coworking spaces. In: Paper presented at the 2nd geography of innovation conference, Utrecht University, Utrecht.

Newell, A., & Simon, H. A. (1972). Human problem solving. Prentice-Hall, Englewood Cliffs.

Oldenburg, R. (1999). The great good place: Cafés, coffee shops, bookstores, bars, hair salons, and other hangouts at the heart of a community. Marlowe; Da Capo Press a member of the Perseus Books Group, New York.

Olma, S. (2012). The Serendipity Machine. A Disruptive Business Model for Society 3.0. Lindonk & De Bres, Amersfoort.

Pallot, M. (2011). Collaborative distance: investigating issues related to distance factors affecting collaboration performance. PhD thesis, University of Nottingham.

Pallot, M., Alishevskikh, A., Krawczyk, P., & Holzmann, T. (2014). Exploring the feasibility of an online serendipity service in the context of open innovation within the EU Horizon2020 research program. Proceedings of ISPIM Conferences 25:1.

Polanyi, M. (1967). The tacit dimension. Routledge & Kegan Paul Ltd, London.

Ringle, C., Sarstedt, M., Mitchell, R., & Gudergan, S. (2017). Partial Least Squares Structural Equation Modeling in Human Resource Management Research. The International Journal of Human Resource Management, 31(12), 1617–1643.

Rogers, E. M. (1962, 1971). Diffusion of innovations, vol 12. Free Press of Glencoe, New York.

Schmidt, S., Brinks, V. (2017). Open creative labs: spatial settings at the intersection of communities and organizations. Creativity and Innovation Management, 26(3), 291–299.

Schmidthuber, L., Maresch, D., & Ginner, M. (2018). Disruptive technologies and abundance in the service sector—toward a refined technology acceptance model. Technological Forecasting and Social Change, 155, 119328.

Schopfel, J., Roche, J., & Hubert, G. (2015). Co-working and innovation: new concepts for academic libraries and learning centres. New Library World, 116(1 – 2), 67–78.

Schürmann, M. (2013). Coworking space: Geschäftsmodell für Entrepreneure und Wissensarbeiter. Springer, Berlin.

Shane, S. (2001). Technological opportunities and new firm creation. Management Science, 47(2), 205–220.

Shmueli, G., Ray, S., Estrada, J. M., Chatla, S. B. (2016). The elephant in the room: predictive performance of PLS models. Journal of Business Research, 69(10), 4552–4564.

Spinuzzi, C. (2012). Working alone together. Journal of Business and Technical Communication, 26(4), 399–441.

Spinuzzi, C., Bodrožić, Z., Scaratti, G., & Ivaldi, S. (2019). “Coworking is about community”: but what is “community” in coworking? Journal of Business and Technical Communication, 33(2), 112–140.

Surman, T. (2013). Building social entrepreneurship through the power of coworking. Innovations: Technology, Governance, Globalization, 8(3 – 4), 189–195.

Thüring, M., & Mahlke, S. (2007). Usability, aesthetics and emotions in human–technology interaction. International Journal of Psychology, 42(4), 253–264.

Unsworth, K. (2001). Unpacking creativity. Academy of Management Review, 26(2), 289–297.

Venkatesh, V., Davis, F. D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. Management Science, 46(2), 186–204.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157–178.

Wang, C., Rodan, S., Fruin, M., & Xu, X. (2014). Knowledge networks, collaboration networks, and exploratory innovation. Academy of Management Journal, 57(2), 484–514.

Waters-Lynch, J., & Duff, C. (2019). The affective commons of coworking. Human Relations, 74(3), 383–404.

Waters-Lynch, J., & Potts, J. (2017). The social economy of coworking spaces: a focal point model of coordination. Review of Social Economy, 75(4), 417–433.

Waters-Lynch, J., Potts, J., Butcher, T., Dodson, J., & Hurley, J. (2016). Coworking: a transdisciplinary overview. SSRN 2712217.

Wu, Y., Zhang, K., & Padmanabhan, V. (2018), Matchmaker competition and technology provision. Journal of Marketing Research, 55(3), 396–413.

Yaqub, O. (2018). Serendipity: towards a taxonomy and a theory. Research Policy, 47(1), 169–179.

Yi, M. Y., Fiedler, K. D., & Park, J. S. (2006). Understanding the role of individual innovativeness in the acceptance of IT-based innovations: comparative analyses of models and measures. Decision Sciences, 37(3), 393–426.

Appendix

Appendix A: Measurement model evaluation.

Construct	Items	Loadings	Reference
Perceived usefulness	PU1. Using the application increases my productivity.	0.921	Davis et al. (1989)
	PU2. Using the application improves my performance in my job.	0.914	
	PU3. Using the application enhances my effectiveness in my job.	0.899	
	PU4. I find the application to be useful in my job.	0.876	
Perceived ease of use	PEOU1. My interaction with the application is clear and understandable.	0.913	Venkatesh and Davis (2000)
	PEOU2. Interacting with the application does not require a lot of my mental effort.	0.815	
	PEOU3. I find it easy to get the application to do what I want it to do.	0.880	
	PEOU4. I find the application to be easy to use.	0.936	
Personal innovativeness	PI1. If I heard about a new information technology, I would look for ways to experiment with it.	0.897	Agarwal and Prasad (1998)
	PI2. Among my peers, I am usually the first to try out new information technologies.	0.622	
	PI3. In general, I am hesitant to try out new information technologies.	0.819	
	PI4. I like to experiment with new information technologies.	0.855	
Attitude toward using	ATT1. Using the application for my work is negative.	0.911	Based on Davis (1985)
	ATT2. Using the application for my work is meaningful.	0.892	
	ATT3. Using the application for my work is beneficial.	0.895	
	ATT4. Using the application for my work is harmful.	0.918	
Behavioral intention to use	BI1. I will use the application on a regular basis in the future.	0.961	Lai and Li (2005)
	BI2. I will strongly recommend others to use the application.	0.963	

Appendix B: Covariance matrix.

	PU1	PU2	PU3	PU4	PEOU1	PEOU2	PEOU3	PEOU4	PI1	PI2	PI3	PI4	ATT1	ATT2	ATT3	ATT4	BI1	BI2
PU1	0.932																	
PU2	0.749	0.908																
PU3	0.692	0.721	0.868															
PU4	0.692	0.649	0.631	0.953														
PEOU1	0.287	0.291	0.273	0.262	0.722													
PEOU2	0.158	0.165	0.203	0.197	0.397	0.503												
PEOU3	0.323	0.317	0.405	0.312	0.536	0.435	0.856											
PEOU4	0.240	0.244	0.293	0.297	0.566	0.376	0.571	0.622										
PI1	0.093	0.098	0.080	0.100	0.019	0.008	0.101	0.005	0.956									
PI2	-0.007	0.012	-0.029	-0.143	-0.085	-0.030	-0.033	-0.084	0.608	0.978								
PI3	-0.004	0.021	-0.051	0.090	0.018	-0.084	-0.072	-0.067	0.565	0.481	1.148							
PI4	-0.014	-0.004	0.019	-0.018	-0.001	0.046	0.105	0.026	0.727	0.620	0.561	0.966						
ATT1	0.229	0.217	0.177	0.233	0.110	0.051	0.086	0.074	0.085	0.020	0.081	0.064	0.142					
ATT2	0.262	0.230	0.218	0.276	0.115	0.059	0.137	0.102	0.060	-0.045	0.007	0.031	0.115	0.163				
ATT3	0.186	0.150	0.147	0.211	0.063	0.044	0.077	0.058	0.046	-0.034	0.068	0.033	0.094	0.100	0.120			
ATT4	0.208	0.172	0.136	0.190	0.073	0.033	0.034	0.047	0.067	0.020	0.101	0.044	0.105	0.100	0.099	0.120		
BI1	0.627	0.541	0.576	0.738	0.396	0.253	0.489	0.396	0.152	-0.094	0.026	0.061	0.279	0.319	0.239	0.217	1.046	
BI2	0.681	0.606	0.626	0.717	0.431	0.255	0.487	0.404	0.080	-0.114	-0.035	-0.030	0.280	0.303	0.225	0.214	0.875	1.009

Appendix C: Cross-loadings.

	PU	PEOU	PI	ATT	BI
PU1	**0.921**	0.360	0.039	0.689	0.695
PU2	**0.914**	0.368	0.055	0.607	0.618
PU3	**0.899**	0.430	0.025	0.547	0.662
PU4	**0.876**	0.376	0.077	0.700	0.764
PEOU1	0.378	**0.913**	0.018	0.319	0.499
PEOU2	0.295	**0.815**	-0.021	0.199	0.368
PEOU3	0.423	**0.880**	0.055	0.272	0.541
PEOU4	0.395	**0.936**	-0.019	0.268	0.520
PI1	0.110	0.044	**0.901**	0.199	0.121
PI3	0.018	-0.060	**0.814**	0.180	-0.005
PI4	-0.006	0.056	**0.861**	0.132	0.015
ATT1	0.660	0.298	0.239	**0.911**	0.759
ATT2	0.713	0.354	0.100	**0.892**	0.791
ATT3	0.586	0.238	0.166	**0.895**	0.685
ATT4	0.593	0.192	0.240	**0.918**	0.638
BI1	0.708	0.516	0.097	0.775	**0.961**
BI2	0.761	0.542	0.014	0.764	**0.963**

Essay 4: Acceptance of Matchmaking Tools in Coworking Spaces: An Extended Perspective

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Abstract

An extended technology acceptance model for matchmaking tools in coworking spaces is presented and tested among 92 German coworkers. Advancing previous research, hedonic and community-related aspects are integrated into a framework based on the extended unified theory of acceptance and use of technology (UTAUT2). Coworkers emphasize a matchmaking tool's productivity aspects, which is positively moderated by their sense of community. Hedonic motivation and personal innovativeness contribute to usage intention, while effort expectancy is not a driver. The influence of hedonic motivation is negatively moderated by sense of community, suggesting that a favorable social atmosphere that is explorable in person acts as a partial substitute for the enjoyment of tool usage. Surprisingly, satisfaction with face-to-face activities does not affect their perception of a matchmaking tool.

Keywords coworking spaces; matchmaking tools; sense of community; technology acceptance; partial least squares; structural equation modeling

1 Introduction

Coworking spaces (CWS) are membership-based innovation hubs for cross-fertilization, inspiration, and professional exchange, and economic environments that provide essential infrastructure for daily business (Bouncken and Reuschl, 2018; Garrett et al., 2017; Gerdenitsch et al., 2016). Individuals as well as startup companies and employees of large corporations work alongside each other and utilize the same physical and digital amenities (Bianchi et al., 2018), which may comprise basic technology such as WiFi access, but also social events in the form of pitch sessions, workshops, and the like (Blagoev et al., 2019; Garrett et al., 2017). Within this environment, coworkers have personal goods (e.g., a mailbox or a messaging inbox) and collective goods (e.g., mutually used lounge areas, phone booths) at their disposal (DeGuzman and Tang, 2011). In short, CWS may be described as surroundings of sociomateriality (Bouncken et al., 2020a; Orlikowski, 2007) that offer an out-of-the-box ecosystem.

This interplay between a community of like-minded people and supporting infrastructure renders interaction among coworkers a vital component of everyday coworking. The extant literature has found mixed evidence regarding CWS' community spirit, and the phrase 'working alone together' has been cited in many publications (coined by Spinuzzi, 2012; see also the discussion of the term community in Spinuzzi et al., 2019). As Bouncken et al. (2020a) summarize, coworking has not lived up to expectations so far and has brought disappointment on the sides of providers and coworkers. It appears that mere spatial proximity is not sufficient for beneficial interaction; instead, cognitive proximity needs to

be created (Bouncken and Aslam, 2019; Kopplin, 2020). As one remedy, digital tools for information dissemination and supporting coworkers find complementary resources, such as a business partner, have been proposed (Bouncken et al., 2020a). The study at hand hence investigates the potential of matchmaking tools for enhancing coworkers' experience.

A growing body of evidence indicates that interaction indeed yields positive impacts on coworkers, such as enhancing knowledge sharing and creative performance (Rese et al., 2020) and increasing work satisfaction (Bouncken et al., 2020b). Even more important, evidence has been found that ascribes the community a critical role in deciding to stay in or leave a CWS (Garrett et al., 2017), and nascent coworkers highly profit from more experienced members that may act similar to mentors (Bouncken and Aslam, 2019). On the other hand, research also emphasizes that CWS are fragile business models (Seo et al., 2017). As such, providers need to understand their coworkers' needs and demands and offer a portfolio of adequate solutions. One of the main challenges, therefore, is understanding, inducing, and managing social interaction among coworkers.

For this undertaking, a holistic perspective, including both physical and digital amenities as well as coworkers' perception of these, is deemed necessary to investigate coworking-related phenomena. As digital applications are an inevitable component of a CWS (Bouncken et al., 2020a), they need to be included in their design, amelioration, and management. Previous research has outlined the concept of so-called matchmaking tools, which are software applications meant to facilitate social connections and, as such, elicit serendipity, creativity, and innovation (Kopplin, 2020). Matchmaking tools offer a platform that serves as an intermediary between physical and digital, i.e., online and offline, activities within the CWS and increases the number of possible business opportunities and the probability of encountering serendipitous situations, which some authors have proposed the main principle of CWS (Moriset, 2013). For example, they may link individuals from different backgrounds who may profit from a decontextualization, i.e., an idea's transfer from one realm to another (Bouncken and Aslam, 2019), which in essence is a coordination problem. Through their algorithmic nature, in contrast to more or less casual, free-of-constraints face-to-face encounters, they may take the problem of pre-discoveries into account. This term refers to serendipitous insights that cannot be exploited as they are not recognized due to a lack of knowledge or skill (Merton and Barber, 2004). By creating digital profiles that may be specified with rich data on professional experience, personal interest, and existing knowledge, matchmaking tools can introduce coworkers who are likely to benefit from the encounter.

Considering coordination, they may also be viewed as a signaling device that attenuates uncertainty by creating a transparent interface for the social community within a CWS, which has been linked to the concept of Schelling points (Kopplin, 2020; Waters-Lynch and Potts, 2017). Indeed, recent research has shown that the facilitation of building relationships is an essential coworker demand (Seo et al., 2017), and successful collaboration may help to strengthen the social support among coworkers, i.e., enhance the CWS' community (Bianchi et al., 2018).

In this regard, the extant work on matchmaking tools is somewhat conceptual and needs empirical amplification. To understand the prospects and the role of these applications, it is necessary to integrate them within a broader nomological net extending the utilitarian view, which considers hedonic factors as well as CWS-specific contextual influences such as the availability of "offline" activities such as workshops, breakfasts, and pitch sessions, which are common elements of coworking (Blagoev et al., 2019). The study at hand seeks to advance our understanding of coworkers' technology acceptance of matchmaking tools. Based on a UTAUT2 framework, an adapted model is derived and tested using partial least squares structural equation modeling (PLS-SEM). Most importantly, as an advancement of the extant literature, hedonic factors and the social surroundings are introduced, and the interplay of online and offline activities is integrated.

The remainder of the paper is structured as follows. Section 2 outlines the related work and sheds light on the theoretical underpinnings. The research design is presented in Section 3, followed by the results in Section 4, and a discussion in Section 5. The final section gives concluding remarks and provides an outlook for future research.

2 Theoretical background

2.1 Utilitarian beliefs

CWS have mushroomed worldwide and sparked a rich body of scientific studies from a broad range of disciplines. As out-of-the-box workplaces, they offer a mixture of basic infrastructure, such as Internet access, and various amenities like workshops (Spinuzzi, 2012). Due to their embedding in the sharing economy (Bouncken et al., 2020b; Gandini, 2015), they are characterized by the idea of an interactive environment that enables collaboration (Schmidt and Brinks, 2017). This sharing focus is enabled by the omnipresence and availability of digitalized tools, making it feasible to connect supply and demand anytime and anywhere, and, thus, it emphasizes the role of access to resources instead of owning them (Belk, 2014). Recent research indicates that collaborative efforts, such as knowledge sharing, increase coworkers' creative performance, which is frequently viewed as a major benefit of CWS (Bouncken and Aslam, 2019; Parrino, 2015; Rese et al., 2020). Indeed, a thrive to learn has been proposed as the defining quality of coworking (Bouncken and Aslam, 2019; Waters-Lynch and Potts, 2017). Seo et al. (2017) add that CWS provide an essential realm for exchange and gaining experience, which is of particular help in regions with high numbers of one-person companies and startups. This functionality of providing a junction, serving as a beacon for those who need it, appears vastly similar to the Schelling Point notion mentioned by Waters-Lynch and Potts (2017). In essence, CWS may be described as loci for conjointly venturing, which implies coordination requirements among coworkers.

Within a typical CWS, several mechanisms are in place to facilitate socially connecting for inspiration and innovation. Common elements comprise digital member directories, newsletters, and social events,

but also community hosts, and digital interfaces between the digital and physical realm such as matchmaking tools (Kopplin, 2020; Waters-Lynch and Potts, 2017). Coworkers, of course, need to be aware of these amenities to be able to benefit from them. Such learning opportunities that have been institutionalized "support the combination and recombination of knowledge" (Bouncken and Aslam, 2019, p. 2068), and, consequently, are valuable assets for both coworkers and CWS providers. Focusing on mere co-location for collaboration can be misleading (Spinuzzi, 2012), as instead, the interplay of "social actors and material artifacts" (Bouncken and Aslam, 2019, p. 2069) needs to be considered. Any solution that seeks acceptance thus needs to bear an advantage regarding identifying and approaching helpful others, i.e., coworkers will evaluate whether it is reasonable to assume "the existence of a use-performance relationship" (Agarwal and Karahanna, 2000, p. 674). As CWS are spheres where the online and the offline realms mix, and coworkers may ask around for help in person, use a bulletin board, or ask the community host for information, it is assumed that rational decision-makers will also evaluate whether the usage of a matchmaking tool is low in effort. Hence, we derive the following hypotheses:

H1. Performance expectancy has a positive impact on coworkers' behavioral intention to use a matchmaking tool.

H2. Effort expectancy has a positive impact on coworkers' behavioral intention to use a matchmaking tool.[1]

2.2 Hedonic beliefs and personal innovativeness

Recent years have witnessed the implementation of technologies previously known from consumer settings in the professional context. This phenomenon has been termed consumerization and proposes to view individuals as consumers, regardless of whether they are in an actual demand situation or on the supply side (Harris et al., 2012). We believe that consumerization adequately represents the entanglement of coworkers within a CWS, and, particularly in the case of matchmaking tools, it is likely that most coworkers have experiences with similar applications from their private contexts. For example, Tinder may be a prominent specimen of matchmaking tools in the realm of romantic relationships.

Further, including private settings into the professional context, renders coworkers' behavioral beliefs about receiving hedonic benefits an essential factor (Venkatesh et al., 2012). This integration is also consistent with the notion of dual-purpose information systems, i.e., applications that fulfill both utilitarian and hedonic needs, and of which communication-related tools are a prominent example (Wu and Lu, 2013). Thus, we hypothesize:

H3. Hedonic motivation has a positive impact on coworkers' behavioral intention to use a matchmaking tool.

[1] Note that in the technology acceptance field, effort expectancy is commonly reverse scaled (e.g., in UTAUT2); i.e., high values indicate perceptions of low effort.

Extant research has further proposed to include the concept of personal innovativeness (PI; Kopplin, 2020). As CWS yield an innovative, creative, and inspirational nature, coworkers may feel attracted to novel tools that incorporate a progressive and forward-looking quality. PI has been introduced to the literature to explain why some individuals are willing to employ a new technology while others are not, and has a long history in research on innovation diffusion but also marketing (Agarwal and Prasad, 1998). In the literature on the diffusion of innovations, notions of consumers being located on a continuum from innovative to not innovative serve as anchor points for segmentation based on the time of particular individuals' adoption (Rogers and Shoemaker, 1971). This conceptualization has not been without criticism (see, e.g., Midgley and Dowling, 1978), and more specific definitions distinguishing between global and domain-specific innovativeness have been proposed (Flynn and Goldsmith, 1993). Consistent with this distinction, Agarwal and Prasad (1998) develop the concept of PI in the domain of information technology and view it as an essential moderator for technology acceptance measurement. However, this specification has led to mixed results, and Agarwal and Karahanna (2000) proposed a new construct termed cognitive absorption as an antecedent of TAM-based variables (i.e., perceived usefulness and perceived ease of use), which in turn is influenced by PI and playfulness. Here, a first shift from a moderating role towards an antecedent could be observed.

Complementary research shows that it may be adequately used as a factor of behavioral intention; however, it is mediated by TAM-related constructs such as perceived usefulness and perceived ease of use (Jackson et al., 2013; Lu et al., 2005), corroborating the work by Agarwal and Karahanna (2000). For example, Lu et al. (2005) argue that predominant technology acceptance models are commonly used after adoption, and, as such, they are more related to continuous use than to acceptance. They conclude that for the pre-adoption context, "holistic experiences with technology as captured in constructs such as enjoyment, flow, and social image are potentially important explanatory variables in technology acceptance" (Lu et al., 2005, p. 246). During this initial phase of adoption, "decision-making is exposed to variables other than those incurred by the technology itself" (Lu et al., 2005, p. 247). We need to understand how beliefs about a technology's properties are created (Agarwal and Karahanna, 2000). Besides perceived relevance, PI is included for this purpose. Consequently, we derive:

H4a. Personal innovativeness has a positive impact on coworkers' behavioral intention to use a matchmaking tool.

H4b. Personal innovativeness has a positive impact on hedonic motivation.

2.3 Perceived relevance

The extant literature mentions that coworkers may follow different goals and behavioral patterns during their visit. In the terminology provided by Bouncken et al. (2020b), they may be classified as utilizers (i.e., they focus on the infrastructure), socializers (i.e., social acknowledgment is emphasized), and learners (i.e., knowledge acquisition is the main motive). To incorporate this heterogeneity in our model,

we propose that not only the perception that a matchmaking tool will support social interactions will have an impact, but also coworkers' belief that such tools' capabilities match their own goals. For example, a socializer may prefer attending events in person rather than assessing member profiles on her smartphone, i.e., a matchmaking tool's perceived relevance (PR) may be low. PR has been studied in a variety of contexts such as online advertising (Campbell and Wright, 2008; Jung, 2017), Internet use for information seeking (Shih, 2004), media usage in education (Hu et al., 2003), and technology acceptance in general (Bhattacherjee and Sanford, 2006), and describes individuals' impression of goal congruency, i.e., the object under investigation is "related to personal needs and values" (Jung, 2017, p. 304) and "instrumental in achieving their personal goals" (Celsi and Olson, 1988, p. 211). Extant research shows that PR has a positive influence on attitude, which is established by beliefs about the likely outcomes of a certain behavior (Celsi and Olson, 1988; Fishbein and Ajzen, 1975; Madden et al., 1992). Consequently, PR is expected to impact the perception of technology's performance capabilities positively.

When a coworker observes a high degree of congruency between personal goals and the matchmaking tools' capabilities, it is also assumed that the effort that is necessary to make use of the tool is viewed in a positive light, as a sort of investment which helps to take the next steps towards one's goal. Indeed, evidence has been found that notions of usefulness and ease of use are influenced by PR (Shih, 2004). Further, depending on the individual coworker's goals, the entertaining, i.e., hedonic component of the application, may be the vital reason for usage. We thus hypothesize:

H5a. Perceived relevance has a positive impact on performance expectancy.

H5b. Perceived relevance has a positive impact on effort expectancy.

H5c. Perceived relevance has a positive impact on hedonic motivation.

2.4 Community and social interaction

The final set of hypotheses includes coworkers' sense of community and their interactions in the physical rather than the digital realm. These context factors are critical to understanding the role of matchmaking tools in CWS, as, for example, a particular coworker's goals may be entirely achievable through personal communication, rendering a software application for the same purpose irrelevant. A CWS' community may be viewed as consisting of distinct economic entities – which may be individual freelancers, startup teams, and other actors such as employees from incumbent organizations – and consequently, there is commonly no shared economic agenda (Bianchi et al., 2018; Garrett et al., 2017). Hence, initiating a collaboration is unsolicited.

In this regard, it is important to keep in mind that CWS are not only practical, utility-focused environments but organizational phenomena (Blagoev et al., 2019), and the notion of community is central to these places (Bouncken et al., 2020b; Garrett et al., 2017; Gerdenitsch et al., 2016; Spinuzzi et al., 2019).

In contrast to a „neutral container“ (Blagoev et al., 2019, p. 894), CWS provide opportunities for networking and identification (Capdevila, 2013). As Waters-Lynch and Potts (2017) mention, coworkers frequently do no seek traditional office standards but pay their membership for entering a space that solves the coordination problem of ‘who needs to be met’. Against the backdrop of a matchmaking tool’s capabilities, the concept of a coordination problem is a valuable theoretical lens. In line with Waters-Lynch and Potts (2017), we deem community and coordination not mutually exclusive perspectives on coworking but complements that provide a partial understanding each. Exchange is contingent upon social factors such as trust and perceived absence of opportunity (Bouncken and Reuschl, 2018; Rese et al., 2020; Spinuzzi et al., 2019). Consequently, a favorable assessment of a CWS’ social sphere should positively affect coworkers’ perception of a matchmaking tool.

We use two constructs to capture the interplay of personal and digital interaction in CWS: sense of community and satisfaction with offline activities. Both constructs are assumed to mirror the social sphere of the CWS. The open layout and architecture has been mentioned as a facilitator for social interaction (Bilandzic and Foth, 2013), and, as such, a certain degree of rivalry between online and offline activities may be expected.

We, therefore, hypothesize:

H6a. Sense of community positively moderates the impact of performance expectancy on coworkers’ behavioral intention to use a matchmaking tool.

H6b. Sense of community positively moderates the impact of effort expectancy on coworkers’ behavioral intention to use a matchmaking tool.

H6c. Sense of community positively moderates the impact of hedonic motivation on coworkers’ behavioral intention to use a matchmaking tool.

H7a. Satisfaction with offline activities negatively moderates the impact of perceived relevance on performance expectancy.

H7b. Satisfaction with offline activities negatively moderates the impact of perceived relevance on effort expectancy.

Figure 1 displays the final research model.

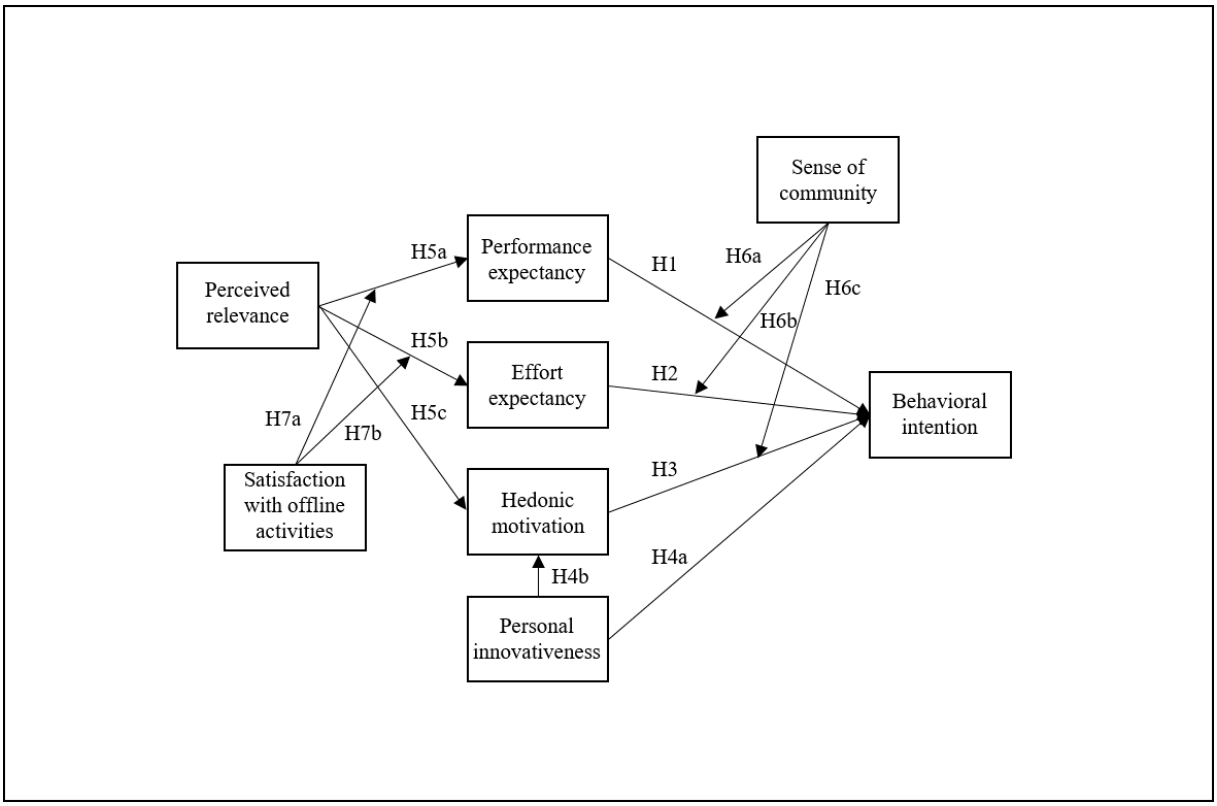

Figure 1: Research model and hypotheses.

3 Research design

3.1 Constructs and items

We adapted established measures from the literature. The items for the 'core model', i.e., PE, EE, and HM postulated to impact BI, are taken from the UTAUT2 framework (Venkatesh et al., 2012). PI is operationalized drawing on the indicators suggested by Agarwal and Prasad (1998). For PR, we adopted the construct from Alalwan (2018). SOA is measured with items from Liaw (2008) and Arbaugh (2000). Finally, we used the scale proposed by Peterson et al. (2008) for SOC. A complete list is provided in Appendix A.

3.2 Questionnaire design

The questionnaire was drafted using Qualtrics. All constructs were measured on a five-point Likert-type scale, ranging from 'I completely disagree' (i.e., 1) to 'I completely agree' (i.e., 5). To prevent common method bias, participants were instructed that there were no incorrect answers, and the collected data will be handled confidentially. As an incentive to complete the survey, respondents had the opportunity to participate in a lottery and had the chance to win gift cards (25 Euros of value) for a large online shopping platform.

All items were adapted from the literature, as there was no need to draft new variables.

3.3 Sampling strategy

German CWS were targeted for sampling. Due to the different types of CWS emerging over time (Blagoev et al., 2019), it is worthwhile to address which kind of spaces we targeted briefly. In the terminology provided by Bouncken et al. (2018), our population may be classified as independent CWS. We did not include incumbent organizations that designed offices for their employees in the architecture of CWS, and we also excluded highly specialized hubs as we believe these would introduce a vast amount of heterogeneity due to potential (harmful) competition among the coworkers. Independent CWS, in contrast, are expected to yield coopetition, i.e., a duality of collaboration and competition, which is linked to innovation potential (Bouncken et al., 2018).

Using websites for desk-booking, blogs, newspaper reports, and complementary search engine queries, an exhaustive list of CWS located in Germany was compiled. Employing a cluster sampling approach, CWS were selected from that list and contacted via telephone and a follow-up e-mail, including a link to the survey. Each sampled CWS was asked to provide five completed questionnaires from coworkers.

4 Results

4.1 Descriptive statistics

To ensure high data quality, the received questionnaires are checked for speeders and straightliners. Three data points had to be removed due to unlikely short response times. In total, 92 questionnaires qualified for analysis.

Regarding age, our sample is consistent with earlier reports on coworkers, with a mean age of 34.63 years (median = 33) and a standard deviation of 7.79. The female-to-male ratio was balanced, with 47.4 % women and 52.6 % men. In line with the extant literature, which noticed a shift from freelancers towards employees, only 14.7 % reported they worked as freelancers, while 52.6 % were employees. About a sixth (16.8 %) was entrepreneurs and 10.5 % employers. Concerning industries, most respondents are rooted in the IT field (28.4 %), followed by consulting (17.9 %), management (11.6 %), and marketing (8.4 %).

We also collected data about the CWS' social spheres. Coworkers were reasonably heterogeneous in their CWS attendance: about a third (31.6 %) visits the space five times a week, followed by four days (16.8 %) and three days (14.7 %). Another third, however, only rarely come to the CWS (11.6 % come in twice a week, 8.4 % once a week; 10.5 % even reported they visited they space less than once a month). The spaces were rather manageable in size, with 35.8 % reporting less than ten fellow coworkers and another 33.7 % ranging between 11 and 30. Only 9.6 % responded that their CWS hosted more than 40 coworkers. Regarding the mode of daily work, about a third each indicated that they rented flexible, i.e., "hot", desks (29.5 %), fixed desks (30.5 %), and individual rooms (35.8 %). The most frequently stated access type was 24/7 (73.7 %), followed by a restriction to office hours during the day (20.0 %). The majority of respondents were also rather experienced in their current CWS: 37.9 % initiated their

membership more than a year ago, and another 17.9 % attended the space for six to twelve months. A fifth (20.0 %) indicated a shorter period of three to five months; shorter durations were infrequent. To gain an impression of the coworkers' current outlook concerning the CWS' offerings, participants were also asked about their plans in the near future. The majority indicated that they intend to stay in their space for more than a year (60.0 %), and 17.9 % want to maintain their membership for another six to twelve months. In total, most coworkers, i.e., three-quarters, are likely to stay within their current CWS, and, as such, may be interested in novel instruments to strengthen its social community and collaborative opportunities. In line with the typology proposed by Bouncken and Reuschl (2018), coworkers were asked for the reasons they attended coworking. Social orientation, i.e., being a socializer, was the most frequent answer (63.2 %), followed by using the available infrastructure, i.e., being a utilizer (62.1 %). Learning was mentioned by a minority only (7.4 %).

Asked for offline activities, i.e., social events such as breakfasts, workshops, and pitch sessions, 76.8 % responded their CWS offers this type of amenity. 10.5 % refused, while 12.6 % indicated that they did not know. Consequently, matchmaking tools may be assumed to be deployed in an environment requiring integrating both the digital and the analog realm. Consistent with previous research, matchmaking tools are considered relatively new technology and most coworkers have not used such an application before (95.8 %). After being introduced to the state-of-the-art and typical features, as described in Kopplin (2020), we asked the participants to assess possible use scenarios of the tool. Two-thirds (64.2 %) responded they would seek to get in touch with fellow coworkers, and 62.1 % would look for support with current challenges. About half of the participants (51.6 %) mentioned finding learning opportunities, and 44.2 % would search collaboration partners for a project idea. Coworkers also stated more business-related applications: identifying new customers (46.3 %), expanding their professional network (67.4 %), and finding partners for the incorporation of an enterprise (7.4 %). Altogether, most coworkers identified as either socializers or utilizers instead of learners; however, the majority still emphasizes matchmaking tools' potential for identifying learning opportunities.

4.2 Outer model evaluation

Two approaches are employed to evaluate potential common method bias, namely Harman's single-factor test (Podsakoff and Organ, 1986) and the full collinearity approach (Kock, 2015). Both assessments indicate an absence of common method bias. Confirmatory tetrad analysis (CTA-PLS) is used to check whether our specifications as reflective measures are appropriate (Gudergan et al., 2008). For all constructs, the reflective model could be confirmed.

To test the model's factor structure, a confirmatory composite analysis is conducted (Hair et al., 2020; Schuberth et al., 2018; Schuberth, 2020). SmartPLS 3.3.2 is used for calculation (Ringle et al., 2015). The PLS algorithm is set to a maximum of 300 iterations, a stop criterion of 10^{-7}, and a path weighting scheme. The covariance matrix is provided in Appendix B. All indicators' outer loadings should exceed a threshold of 0.708 (Hair et al., 2019), which is the case for all manifest variables except for PI3, SOA3,

and SOC4. Construct validity and reliability are checked, drawing on composite reliability (CR) and the average variance extracted (AVE). For all constructs, the thresholds of 0.70 for CR and of 0.50 for AVE are met (Hair et al., 2019). Hence, we decided to retain PI3, SOA3, and SOC4 (see, e.g., Hair et al., 2016). Table 1 displays the assessment of our constructs.

Table 1: Construct assessment.

Note: AVE = average variance extracted.

	Indicators	Mean (SD)	Cronbach's Alpha	Composite Reliability	AVE
PE	4	4.49 (1.24)	0.931	0.951	0.828
EE	4	5.39 (0.92)	0.834	0.889	0.666
HM	3	4.85 (1.08)	0.865	0.916	0.785
PI	4	4.91 (1.22)	0.820	0.877	0.648
BI	4	4.49 (1.23)	0.899	0.930	0.770
PR	4	4.41 (1.40)	0.942	0.959	0.853
SOC	4	5.31 (1.22)	0.877	0.899	0.695
SOA	3	5.27 (0.89)	0.754	0.840	0.641

Discriminant validity is checked using an examination of cross-loadings, the Fornell-Larcker criterion, and the heterotrait-monotrait ratio (HTMT, Henseler et al., 2015). The HTMT ratios are provided in Table 2; evaluations of the Fornell-Larcker criterion and cross-loadings are displayed in Appendices C and D. As can be observed, HTMT rations are within the recommended range below 0.85 for all pairs except for PR-BI, which yields a value of 0.859. Albeit above the conservative threshold, the literature suggests a second, more liberal anchor of 0.90 (Henseler et al., 2015). A bootstrapping procedure using 10,000 draws further corroborates discriminant validity, showing that all 95 and 99 percent confidence intervals' upper borders are far off the null value of 1 (Henseler et al., 2015). Discriminant validity could be established, and hence, the assessment of the outer model is complete.

Table 2: HTMT ratios.

	PE	EE	HM	PI	PR	BI	SOC	SOA
PE								
EE	0.419							
HM	0.658	0.566						
PI	0.173	0.355	0.273					
PR	0.798	0.464	0.789	0.250				
BI	0.770	0.493	0.738	0.363	0.859			
SOC	0.064	0.102	0.119	0.213	0.118	0.112		
SOA	0.091	0.132	0.098	0.350	0.090	0.083	0.401	

4.3 Inner model evaluation

The evaluation of the inner model begins with a check for potential collinearity problems. Variance inflation factors (VIFs) are employed for this purpose, with values below 3 indicating an absence of collinearity issues (Hair et al., 2019). The highest VIF is 1.940, and consequently, we assume that collinearity is not a threat to our model. In the next step, the coefficient of determination (R^2) is used to assess the model's explanatory power. The highest value was calculated for BI ($R^2 = 0.731$), followed

by PE (R^2 = 0.562). HM could be explained with a similar fit (R^2 = 0.545). For EE, the explanatory power was reasonably low, yielding an R^2 of 0.183. Through blindfolding, Q^2 values were derived. All values are greater than zero and indicate relevance (Hair et al., 2019), yielding values of 0.509 for BI, 0.449 for PE, 0.090 for EE, and 0.403 for HM. In the cases of BI, PE, and HM, their respective predictors appear adequate and relevant; however, for EE, the Q^2 value is relatively low. Table 3 displays a summarization.

Table 3: Explanatory power. Interpretation adopted from Hair et al. (2019).

Construct	R^2 value	R^2 adjusted	Interpretation	Q^2 value	Interpretation
PE	0.562	0.557	Moderate	0.449	Medium to large relevance
EE	0.183	0.174	Weak	0.090	Small relevance
HM	0.545	0.535	Moderate	0.403	Medium to large relevance
BI	0.731	0.705	Substantial	0.509	Large relevance

For hypotheses testing, we employ a bootstrapping procedure using 10,000 draws. We evaluate the path relations drawing on path coefficients and f^2 measures and interpret 95 percent confidence intervals as compatibility intervals, i.e., a span of values that are compatible with our empirical data. Table 4 summarizes the results.

Table 4: Hypotheses testing.

Hypothesis				Path coefficient (f^2 value)	95 percent confidence interval (BCa)	T-value (p-value)
H1	PE	→	BI	0.503 (0.521)	[0.323, 0.642]	5.999 (< 0.001)
H2	EE	→	BI	0.001 (< 0.001)	[-0.162, 0.106]	0.018 (0.986)
H3	HM	→	BI	0.273 (0.143)	[0.113, 0.453]	2.889 (0.004)
H4a	PI	→	BI	0.173 (0.090)	[0.011, 0.319]	2.436 (0.015)
H4b	PI	→	HM	0.087 (0.016)	[-0.089, 0.240]	1.059 (0.290)
H5a	PR	→	PE	0.749 (1.321)	[0.652, 0.837]	15.746 (< 0.001)
H5b	PR	→	EE	0.424 (0.229)	[0.240, 0.577]	4.614 (< 0.001)
H5c	PR	→	HM	0.712 (1.046)	[0.608, 0.802]	14.509 (< 0.001)
H6a	SOC	→	PE → BI	0.281 (0.224)	[0.160, 0.438]	2.430 (0.015)
H6b	SOC	→	EE → BI	-0.166 (0.072)	[-0.381, 0.045]	1.035 (0.301)
H6c	SOC	→	HM → BI	-0.250 (0.187)	[-0.394, -0.032]	2.280 (0.023)
H7a	SOA	→	PR → PE	-0.113 (0.026)	[-0.279, 0.325]	0.585 (0.559)
H7b	SOA	→	PR → EE	-0.157 (0.024)	[-0.276, 0.443]	0.738 (0.461)

As Table 4 displays, most hypotheses could be corroborated. No evidence was found for EE's impact on BI, and three moderating effects: SOC did not statistically significantly influence the EE-BI relation, and the impact of SOA on PR-PE and PR-EE was also not striking. Regarding the research model's

dual-purpose core, PE yielded a large effect on BI ($f^2 = 0.521$), followed by HM with a medium influence ($f^2 = 0.143$). PI exhibited a small but significant impact on BI.

Considering the formation of PE, EE, and HM, PR was found to be a substantial influence with a very large impact on PE ($f^2 = 1.321$), a medium effect on EE ($f^2 = 0.229$), and another large influence on HM ($f^2 = 1.046$). The remaining moderator relations, SOC's influence on the PE-BI and the HM-BI link, were both found to exhibit medium effects ($f^2 = 0.224$ and 0.187, respectively). However, the direction of the moderating effect on the HM-BI relation contradicts our hypothesis, yielding a negative sign. Consequently, the larger coworkers' sense of community is, the smaller the impact of HM on their intention to use the matchmaking tool. Figure 2 presents a succinct summary of our findings.

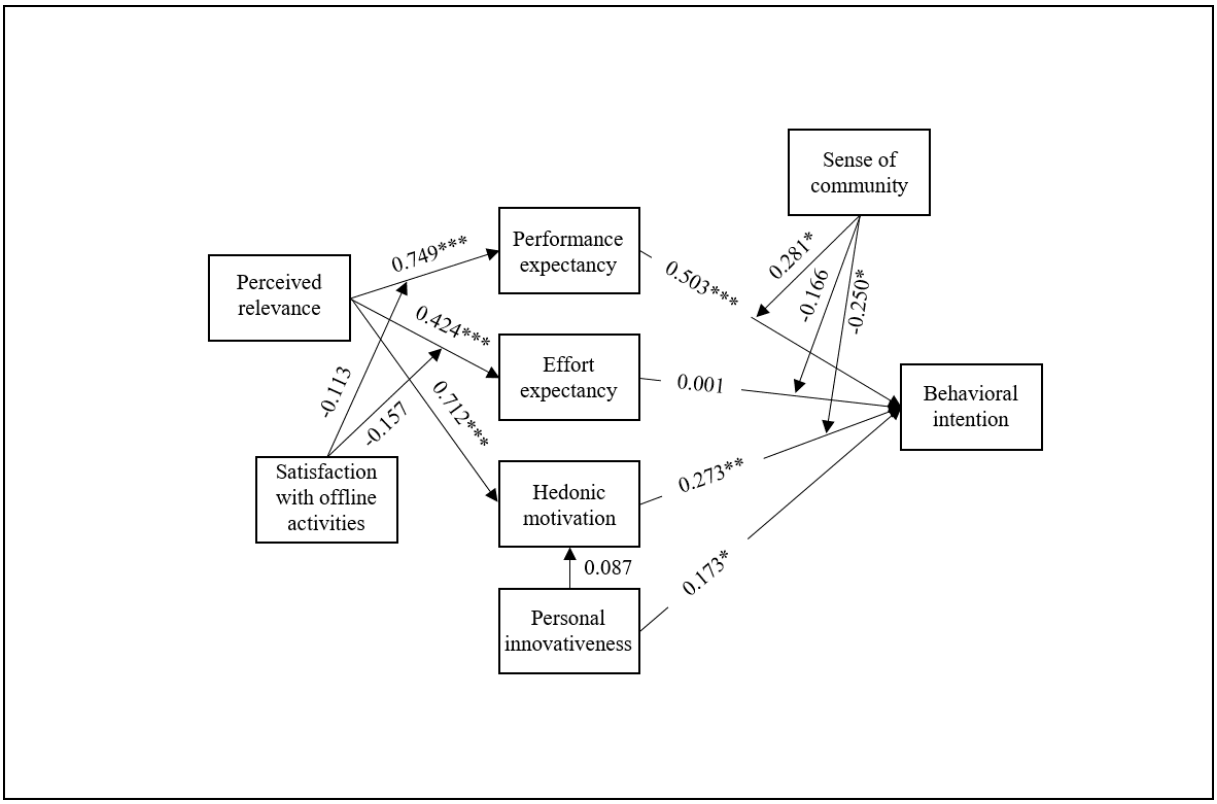

Figure 2: PLS results.

Note: Values indicate path coefficients; *: $p < 0.05$, **: $p < 0.01$, ***: $p < 0.001$.

4.4 Necessary condition analysis

Following the recommendations by Richter et al. (2020), a necessary condition analysis (NCA, Dul, 2016a). Latent variable scores are exported from the PLS model and used as input. In contrast to other approaches such as fsQCA (Ragin, 2009), which allow an examination of necessity *in kind* (i.e., yes or no), NCA provides further insights into each condition's *degree* of constraint that is imposed on the outcome (Dul, 2016b). Consequently, PLS and NCA may be used as complementary analyses: while PLS ensures the validity and reliability of the measurement model and gives information about each variable's sufficiency in terms of path coefficients, NCA reveals potential necessity qualities that need to be considered when deriving theoretical or practical implications (Richter et al., 2020).

To perform NCA, XY plots containing the data points are drawn for each condition-outcome combination (with the condition on the horizontal and the outcome on the vertical axis), and a ceiling line is drawn above the scatterplot (Dul, 2016a). The area atop, i.e., the ceiling zone, is an empty sector that describes values of the outcome that are constrained by the condition. The larger this zone is, the more substantial the effect of the necessary condition (Dul, 2016b). For the study at hand, we use ceiling regression – free disposal hull (CR-FDH). Our outcome of interest is BI, and our conditions are the variables from our research model that yield a direct impact: PE, EE, HM, and PI. To assess the NCA results for their statistical significance, we carried out a bootstrapping procedure with 10,000 draws. The results are presented in Table 5.

Table 5: NCA results.

Note: The observations column indicates the number of cases located above the ceiling line.

Condition	Observations	Accuracy	p-accuracy	Effect size d	p-value
PE	4	95.7 %	< 0.001	0.230	< 0.001
EE	2	97.8 %	< 0.001	0.349	< 0.001
HM	3	96.7 %	< 0.001	0.274	< 0.001
PI	4	95.7 %	0.006	0.133	0.112

To gain more detailed insights, the results can be presented using the bottleneck technique (Dul, 2016a), which is displayed in Table 6. As can be observed, all four conditions are necessary and impose moderate to reasonably strong constraints on the outcome. PI yields the weakest restrictions and becomes only necessary for high values of BI; still, to allow the full range of BI to unfold, the requirements of PI quickly increase to about a third (36.6 %) and a half (46.6 %), respectively. HM is the second-to-last condition; however, note that all constraints become rather strict for high outcome values. For relatively moderate BI values (i.e., around 50 %), about a third of HM needs to be in place. PE plays an even more substantial role, rising to 60.2 % for the full range of BI. Finally, EE is the condition sticking out the most, requiring half of its range for moderate to high values of BI and increasing to two-thirds and three-quarters to allow BI to unfold in its entirety.

Table 6: Bottleneck table.

Note: Y denotes the outcome, i.e., the occurrence of BI. All values in percent.

Y	EE	HM	PE	PI
0	NN	NN	NN	NN
10	0.3	3.0	NN	NN
20	8.8	9.1	NN	NN
30	17.4	15.2	5.0	NN
40	26.0	21.3	12.9	NN
50	34.5	27.4	20.7	NN
60	43.1	33.4	28.6	6.4
70	51.7	39.5	36.5	16.5
80	60.2	45.6	44.4	26.5
90	68.8	51.7	52.3	36.6
100	77.4	57.8	60.2	46.6

In the last step of our analysis, we combine the results from PLS-SEM (i.e., information about each variable's sufficiency) and NCA (i.e., information about each variable's necessity). Table 7 summarizes our findings. We also included the three remaining calculations for H4b, H5a, H5b, and H5c; however, these are not the focus of our analysis. Overall, the fruitfulness of combining PLS-SEM and NCA could be proven. For example, a focus on PLS-SEM would have resulted in EE being treated as irrelevant; however, this conclusion is only valid in terms of a sufficient condition. Our NCA reveals that EE is indeed a necessary condition and yields a large effect on BI. In total, all four predictors of BI (i.e., PE, EE, HM, and PI) were identified as being necessary *in degree* with varying constraints. Besides EE, the most substantial effect is imposed by HM, followed by PE and then PI. In terms of sufficiency, PE exhibits the most substantial effect on BI, while HM and PI play a subordinate role. EE does not yield any striking impact at all. SOA was found not to have a moderating influence. For SOC, two out of three postulated effects could be verified: it positively moderates the impact of PE on BI and has a negative effect on HM's influence on BI. The role of PR is striking: the variable is necessary for PE and HM, yielding medium effects, and sufficient with large effects for PE and HM, and a medium effect for EE.

Table 7: Total result summary.

Note: Interpretation for effect size d adopted from Dul (2016b).

Hypothesis				Necessary condition	Sufficient condition
H1	PE	→	BI	Yes; medium effect (d = 0.230)	Yes; large effect (f^2 = 0.521)
H2	EE	→	BI	Yes; large effect (d = 0.349)	No
H3	HM	→	BI	Yes; medium effect (d = 0.274)	Yes; medium effect (f^2 = 0.143)
H4a	PI	→	BI	Yes; medium effect (d = 0.133)	Yes; small effect (f^2 = 0.090)
H4b	PI	→	HM	No	Yes; small effect (f^2 = 0.074)
H5a	PR	→	PE	Yes; medium effect (d = 0.251)	Yes; large effect (f^2 = 1.321)
H5b	PR	→	EE	No	Yes; medium effect (f^2 = 0.229)
H5c	PR	→	HM	Yes; medium effect (d = 0.235)	Yes; large effect (f^2 = 1.046)
H6a	SOC	→	PE → BI	No	Yes; medium effect (f^2 = 0.224)
H6b	SOC	→	EE → BI	No	No
H6c	SOC	→	HM → BI	No	Yes; medium effect (f^2 = 0.187)
H7a	SOA	→	PR → PE	No	No
H7b	SOA	→	PR → EE	No	No

5 Discussion

Consistent with the extant literature, coworkers' perception of utilitarian benefits was found to yield the most substantial impact on their intention to use a matchmaking tool in terms of sufficiency (Kopplin, 2020). Personal innovativeness, however, was also identified as an influential driver, which contrasts previous findings. The study at hand employed a UTAUT2-based framework, as opposed to TAM in the extant literature. Hence, a difference might occur due to the modifications of the structural model:

as opposed to the TAM framework, where behavioral beliefs (except for perceived usefulness) only directly influence an individual's attitude towards using a particular technology, UTAUT2 postulates a direct linkage between technology acceptance factors and behavioral intention to use (Venkatesh et al., 2012). As our sample was also drawn from independent CWS, we believe that a systematic difference between both studies is rather unlikely.

From a necessity perspective, EE's large effect appears plausible for technology in general and matchmaking tools in particular. CWS are designed to enable interaction and communication, and coworkers may leave their desks and talk to others in person (Bouncken et al., 2020a). Consequently, a tool imposing high effort is deemed unattractive. Besides, HM was identified as a necessary condition, consistent with the notion of dual-purpose information systems (see, e.g., Wu and Lu, 2013). PR shows reasonably mixed results: while the construct is a necessary condition for PE and HM and yields large effects in terms of sufficiency, it is not necessary for EE and only imposes a medium effect in the role of a sufficient condition. This divergence may be explained with the goal alternatives that coworkers may seek to achieve when using a matchmaking tool. Some will use the application as an efficient solution for contacting and, as such, perceive its utilitarian aspects as congruent with their goals. Others stress the hedonic component and consequently view this facet as goal-congruent. EE, in contrast to this dyad, is not a purpose itself but the effort required to utilize the application to achieve a purpose.

Our finding of offline activities (i.e., SOA) not impacting coworkers' perception of digital applications appears counterintuitive at first. We would have assumed that satisfying face-to-face communication opportunities render matchmaking tools irrelevant to at least some degree. Several factors may explain this result: first, daily work patterns may differ between individual coworkers, and hence some potentially helpful contacts may be simply not within the CWS at the current time. Second, it is unlikely to assume that all coworkers excel at networking, and a digital platform may facilitate contact compared to face-to-face interaction at a workshop or breakfast. For example, empirical evidence has been provided that for some coworkers, the potential of participating in a community is more important than actually becoming involved (Garrett et al., 2017), and this potential is tangible in the form of a matchmaking application. Third, it might also be the case that individuals consciously refrain from networking during community events such as lunch or parties, which may be perceived as less business-oriented than pitch sessions or exhibitions, in order not to shift the community's atmosphere from mutual coworking towards viewing each other as customers and business opportunities. Fourth, a matchmaking application allows assessing many profiles at a glance, providing a workflow very different from face-to-face contact, and may be viewed as a self-contained alternative equal to existing forms of social interaction.

SOC, on the other hand, was confirmed as moderating the influence of PE on BI and the effect of HM on BI. In the case of PE, a positive moderation was expected, as coworkers' perception of social entanglement and belonging increases the likelihood of not only identifying a suitable contact but also being able to benefit from it. For the HM-BI relation, however, SOC reveals an impact contrariwise to our

hypothesis, yielding a negative effect. We would have assumed that a high SOC boosts the impact of hedonic factors. Our empirical data suggests, on the contrary, that a lower SOC corresponds to a stronger link, and a higher SOC corresponds to a weaker link. We believe the spirit of coworking can explain this result: a high SOC is likely related to an open and welcoming atmosphere, and in such an environment, the main benefit a matchmaking application may offer is facilitating interaction in terms of efficiency; nevertheless, the community spirit would have allowed for social interaction without the tool, and coworkers who identify with coworking's values (see, e.g., Schuermann, 2014) may find enjoyment primarily in personal interaction.

5.1 Theoretical implications

The study at hand addressed matchmaking tools in CWS, which has been hardly investigated, although the digital infrastructure is an essential component of coworking (Bouncken et al., 2020a). We advanced the body of knowledge by erecting a coworking-specific technology acceptance model, drawing on well-established insights from the literature (see, e.g., Venkatesh et al., 2012). Empirical insights confirmed our structural model, providing insights into the dual-purpose nature of matchmaking tools. Regarding the social composition of CWS, we found relatively stable communities with medium- to long-term memberships, and individual rooms and fixed desks were as equally frequent as hot desks. Hence, coworking in independent CWS is shown to not consist primarily of fast-moving digital nomads but instead of individuals seeking a place where they can get things done – which is consistent with the third-place notion of CWS and the origin of coworking, when knowledge workers sought to break free from isolation at home (Brown, 2017; Moriset, 2013; Oldenburg, 1989). We also provided empirical evidence for coworkers' social orientation (i.e., sense of community) and its impact on technology within the CWS, and coworkers' proclivity to view the coworking environment as a learning opportunity. This fits the notion of gainers (Colleoni and Arvidsson, 2015) and novices and mentors (Bouncken and Aslam, 2019), respectively. Further, as learning was a common motive regardless of the personal background, we provide support for the suggestion by Waters-Lynch and Potts (2017) to consider learning as the overarching concept of CWS.

Our findings suggest that matchmaking tools may amend CWS as an original class of amenities. They appear not to be influenced by face-to-face interaction. We believe that as digital platforms, accessible anytime and anywhere, they may provide feelings of security and structure. An important motive for coworking is the precarity and atomization of work (Brown, 2017; McRobbie, 2018), and CWS' community may mitigate the impression of being isolated and lost. Matchmaking tools not only visualize the community but make it tangible in a literal sense, as users may swipe, touch, and physically experience the rather abstract concepts of community and collaboration. In a Schelling Point sense (Waters-Lynch and Potts, 2017), when individuals perceive that CWS are a focal point to approach, matchmaking tools can be viewed as a technological manifestation of this perception, as they present an impression

of the CWS' community, skills, and learning and business opportunities in a structured and comprehensible manner. Consequently, we frame matchmaking tools as a potential remedy for the insight that, frequently, unexpected encounters are fairly scarce (Merkel, 2015; Parrino, 2015).

5.2 Practical implications

Coworkers were found to be willing to employ matchmaking tools for their daily activities in the CWS. While utilitarian factors play the most critical role in their decision-making, hedonic motivation has been identified as an important driver as well.

Coworkers' satisfaction with offline activities, i.e., events like workshops or pitch sessions, did not have an impact on their perception of matchmaking tools. Consequently, the physical and the digital realm may be viewed as complements rather than as substitutes. As matchmaking tools may establish connections without both coworkers needing to be present within the CWS, they have an advantage over personal interaction in terms of temporal and spatial independence. However, on the other hand, face-to-face contact is much richer and more natural compared to software applications. Hence, coworkers may seek to utilize both to get 'the best of both worlds'. CWS providers should support this entanglement and provide easy-access and up-to-date member databases that are not only lists of coworkers but ready to be analyzed using, for example, matchmaking tools, but also simple queries such as 'who works on a website' and 'who is currently present in my CWS'. Consequently, a matchmaking tool may not be replaced by physical, social events but is a fruitful amenity for a CWS.

As a sense of community was found to have a positive influence on the effect of performance expectancy on intention to use, we may conclude that the digital realm is an enhancement of the physical space that makes the community spirit tangible, and, consequently, this digital layer may also increase coherence and solidarity by providing a who is who of the CWS.

5.3 Limitations and future research

Our study was conducted among German CWS to prevent biases stemming from diversity in the cultural background (see also Bouncken et al., 2018). Consequently, our results need to be treated with care when being applied to other settings. Future research may seek to advance our model into an international context. Further, the sample sizes can be considered reasonably small. However, PLS-SEM has been found to yield high statistical power even in small-N situations, and, as such, our results appear reasonable. Nevertheless, it is deemed essential to replicate our findings drawing on larger samples. Finally, we opted for independent CWS as our target population, and hence, the results should not be adapted for different types without caution.

A typical downside of matchmaking, in general, is that the better it works, the more satisfied the users are, and when they found what they were looking for, they are ready to abandon the platform (Kopplin, 2020). In the context of coworking, most respondents indicated that they have already been in their

current CWS for a rather long time and also intend to stay a member. As most coworkers have not used a matchmaking tool before, it would be a valuable insight whether the implementation of such an application reduced the membership duration. Also, as our sample was reasonably small, we could not examine potential differences between types of CWS users, i.e., utilizers, socializers, and learners, which is a promising opportunity for further investigation. In similar regard, our findings may be challenged by targeting CWS other than independent ones as population. For example, corporate CWS (Bouncken et al., 2018) would highly benefit from knowledge exchange, inspiration, and innovation.

6 Conclusion

Concerning the matchmaking tools' embedding within CWS, i.e., their locus in a sociomaterial space, it is essential to note that they are subject to ephemerality (Orlikowski, 2007). These applications provide an interface between coworkers, and, in essence, they are a mediator between individuals and, consequently, contingent upon the CWS members, which may vary from day to day. Future research might embrace this dynamic complexity by employing qualitative instruments such as Grounded Theory (Corbin and Strauss, 1990), or configurational methods at the intersection of qualitative and quantitative work, such as fuzzy-set qualitative comparative analysis (Ragin, 2009). The study at hand sought to provide insights into the matter by combining necessary and sufficient conditions through means of NCA and PLS-SEM, respectively, which might be carried on in future works.

References

Agarwal, R., & Karahanna, E. (2000), Time Flies When You're Having Fun: Cognitive Absorption and Beliefs about Information Technology Usage. MIS Quarterly, 24(4), 665–694.

Agarwal, R., & Prasad, J. (1998), A conceptual and operational definition of personal innovativeness in the domain of information technology. Information Systems Research, 9(2), 204–215.

Alalwan, A. A. (2018). Investigating the impact of social media advertising features on customer purchase intention. International Journal of Information Management, 42, 65–77.

Arbaugh, J. B. (2000). Virtual classroom characteristics and student satisfaction with internet-based MBA courses. Journal of Management Education, 24(1), 32–54.

Belk, R. (2014). You are what you can access: Sharing and collaborative consumption online. Journal of Business Research, 67(8), 1595–1600.

Bhattacherjee, A., & Sanford, C. (2006). Influence Processes for Information Technology Acceptance: An Elaboration Likelihood Model. MIS Quarterly, 30(4), 805–825.

Bianchi, F., Casnici, N., & Squazzoni, F. (2018). Solidarity as a byproduct of professional collaboration: Social support and trust in a coworking space. Social Networks, 54, 61–72.

Bilandzic, M., & Foth, M. (2013). Libraries as coworking spaces: Understanding user motivations and perceived barriers to social learning. Library Hi Tech, 31(2), 254–273.

Blagoev, B., Costas, J., & Kärreman, D. (2019). 'We are all herd animals': Community and organizationality in coworking spaces. Organization, 26(6), 894–916.

Bouncken, R. B., Ratzmann, M., Barwinski, R., & Kraus, S. (2020a). Coworking spaces: Empowerment for entrepreneurship and innovation in the digital and sharing economy. Journal of Business Research, 114, 102–110.

Bouncken, R. B., & Aslam, M. M. (2019). Understanding knowledge exchange processes among diverse users of coworking-spaces. Journal of Knowledge Management, 23(10), 2067–2085.

Bouncken, R. B., Aslam, M. M., & Qiu, Y. (2020b). Coworking spaces: Understanding, using, and managing sociomateriality. Business Horizons, 64(1), 119–130.

Bouncken, R. B., Laudien, S. M., Fredrich, V., & Görmar, L. (2018). Coopetition in coworking-spaces: value creation and appropriation tensions in an entrepreneurial space. Review of Managerial Science, 12(2), 385–410.

Bouncken, R. B., & Reuschl, A. J. (2018). Coworking-spaces: how a phenomenon of the sharing economy builds a novel trend for the workplace and for entrepreneurship. Review of Managerial Science, 12(1), 317–334.

Brown, J. (2017). Curating the "Third Place"? Coworking and the mediation of creativity. Geoforum 82, 112–126.

Campbell, D. E., &Wright, R. T. (2008). Shut up I Don't Care: Understanding the Role of Relevance and Interactivity on Customer Attitudes Toward Repetitive Online Advertising. Journal of Electronic Commerce Research, 9(1).

Capdevila, I. (2013). Knowledge dynamics in localized communities: Coworking spaces as microclusters. SSRN 2414121.

Celsi, R. L., & Olson, J. C. (1988). The Role of Involvement in Attention and Comprehension Processes. Journal of Consumer Research, 15(2), 210–224.

Colleoni, E., & Arvidsson, A. (2015). La partecipazione dei giovani al mercato del lavoro: il ruolo dei co-working space per i giovani freelance. L. Manzo (a cura di), MI Generation. Il Piano di Governance delle Politiche Giovanili della Città di Milano (2013-2014), 141–189.

Corbin, J. M., & Strauss, A. (1990). Grounded theory research: Procedures, canons, and evaluative criteria. Qualitative sociology, 13(1), 3–21.

DeGuzman, G. V., & Tang, A. I. (2011). Working in the unoffice: A guide to coworking for indie workers, small businesses, and nonprofits: Night Owls Press LLC.

Dul, J. (2016a). Identifying single necessary conditions with NCA and fsQCA. Journal of Business Research, 69(4), 1516–1523.

Dul, J. (2016b). Necessary condition analysis (NCA) logic and methodology of "necessary but not sufficient" causality. Organizational Research Methods, 19(1), 10–52.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Addison-Wesley.

Flynn, L. R., & Goldsmith, R. E. (1993). A validation of the Goldsmith and Hofacker innovativeness scale. Educational and Psychological Measurement, 53(4), 1105–1116.

Gandini, A. (2015). The rise of coworking spaces: A literature review. Ephemera, 15(1), 193.

Garrett, L. E., Spreitzer, G. M., & Bacevice, P. A. (2017). Co-constructing a sense of community at work: The emergence of community in coworking spaces. Organization Studies, 38(6), 821–842.

Gerdenitsch, C., Scheel, T. E., Andorfer, J., & Korunka, C. (2016). Coworking Spaces: A Source of Social Support for Independent Professionals. Frontiers in Psychology, 7, 581.

Gudergan, S. P., Ringle, C. M., Wende, S., & Will, A. (2008). Confirmatory tetrad analysis in PLS path modeling. Journal of Business Research, 61(12), 1238–1249.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24.

Hair, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. Journal of Business Research, 109, 101–110.

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). A primer on partial least squares structural equation modeling (PLS-SEM). Sage Publications.

Harris, J., Ives, B., & Junglas, I. (2012). IT consumerization: When gadgets turn into enterprise IT tools. MIS Quarterly Executive, 11(3), 99–112.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

Hu, P. J. H., Clark, T. H. K., & Ma, W. W. (2003). Examining technology acceptance by school teachers: a longitudinal study. Information & Management, 41(2), 227–241.

Jackson, J. D., Yi, M. Y., & Park, J. S. (2013). An empirical test of three mediation models for the relationship between personal innovativeness and user acceptance of technology. Information & Management, 50(4), 154–161.

Jung, A. R. (2017). The influence of perceived ad relevance on social media advertising: An empirical examination of a mediating role of privacy concern. Computers in Human Behavior, 70, 303–309.

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of e-Collaboration (ijec), 11(4), 1–10.

Kopplin, C. S. (2020). Two heads are better than one: matchmaking tools in coworking spaces. Review of Managerial Science, 1–25.

Liaw, S. S. (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. Computers & Education, 51(2), 864–873.

Lu, J., Yao, J. E., & Yu, C. S. (2005). Personal innovativeness, social influences and adoption of wireless Internet services via mobile technology. The Journal of Strategic Information Systems, 14(3), 245–268.

Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. Personality and Social Psychology Bulletin, 18(1), 3–9.

McRobbie, A. (2018). Be creative: Making a living in the new culture industries: John Wiley & Sons.

Merkel, J. (2015). Coworking in the city. Ephemera, 15(2), 121–139.

Merton, R. K., & Barber, E. (2004). The Travels and Adventures of Serendipity. A Study in Sociological Semantics and the Sociology of Science: Princeton University Press.

Midgley, D. F., & Dowling, G. R. (1978). Innovativeness: The concept and its measurement. Journal of Consumer Research, 4(4), 229–242.

Moriset, B. (2013). Building new places of the creative economy. The rise of coworking spaces. Available at https://halshs.archives-ouvertes.fr/halshs-00914075.

Oldenburg, R. (1989). The great good place: Cafés, coffee shops, community centers, beauty parlors, general stores, bars, hangouts, and how they get you through the day: Paragon House Publishers.

Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. Organization Studies, 28(9), 1435–1448.

Parrino, L. (2015). Coworking: assessing the role of proximity in knowledge exchange. Knowledge Management Research & Practice, 13(3), 261–271.

Peterson, N. A., Speer, P. W., & McMillan, D. W. (2008). Validation of a brief sense of community scale: Confirmation of the principal theory of sense of community. Journal of Community Psychology, 36(1), 61–73.

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. Journal of Management, 12(4), 531–544.

Ragin, C. C. (2009). Qualitative comparative analysis using fuzzy sets (fsQCA). Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques, 51, 87–121.

Rese, A., Kopplin, C. S., & Nielebock, C. (2020). Factors influencing members' knowledge sharing and creative performance in coworking spaces. Journal of Knowledge Management, 24(9), 2327–2354.

Richter, N. F., Schubring, S., Hauff, S., Ringle, C. M., & Sarstedt, M. (2020). When predictors of outcomes are necessary: Guidelines for the combined use of PLS-SEM and NCA. Industrial Management & Data Systems, 120(12), 2243–2267.

Ringle, C. M., Wende, S., & Becker, J. M. (2015). SmartPLS 3: SmartPLS GmbH.

Rogers, E. M., & Shoemaker, F. F. (1971). Communication of Innovations: a cross-cultural approach. Free Press.

Schmidt, S., & Brinks, V. (2017). Open creative labs: Spatial settings at the intersection of communities and organizations. Creativity and Innovation Management, 26(3), 291–299.

Schuberth, F. (2020). Confirmatory composite analysis using partial least squares: setting the record straight. Review of Managerial Science, 1–35.

Schuberth, F., Henseler, J., & Dijkstra, T. K. (2018). Confirmatory composite analysis. Frontiers in Psychology, 9, 2541.

Schuermann, M. (2014). Coworking space: A potent business model for plug 'n play and indie workers: epubli.

Seo, J., Lysiankova, L., Ock, Y. S., & Chun, D. (2017). Priorities of coworking space operation based on comparison of the hosts and users' perspectives. Sustainability, 9(8), 1494.

Shih, H. P. (2004). Extended technology acceptance model of Internet utilization behavior. Information & Management, 41(6), 719–729.

Spinuzzi, C. (2012). Working alone together: Coworking as emergent collaborative activity. Journal of Business and Technical Communication, 26(4), 399–441.

Spinuzzi, C., Bodrožić, Z., Scaratti, G., & Ivaldi, S. (2019). “Coworking is about community”: but what is “community” in coworking?. Journal of Business and Technical Communication, 33(2), 112–140.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157–178.

Waters-Lynch, J., & Potts, J. (2017). The social economy of coworking spaces: a focal point model of coordination. Review of Social Economy, 75(4), 417–433.

Wu, J., & Lu, X. (2013). Effects of extrinsic and intrinsic motivators on using utilitarian, hedonic, and dual-purposed information systems: A meta-analysis. Journal of the Association for Information Systems, 14(3), 1.

Appendix

Appendix A: Constructs and items (translated from German)

Construct	Item		Outer loading	Adapted from
Performance expectancy	PE1	A matchmaking tool is useful for my daily work	0.879	Venkatesh et al. (2012)
	PE2	Using a matchmaking tool increases my chances to achieve things that are important to me	0.921	
	PE3	A matchmaking tool helps me achieve things faster	0.936	
	PE4	Using a matchmaking tool increases my productivity	0.904	
Effort expectancy	EE1	Learning how to use a matchmaking tool is easy for me	0.827	Venkatesh et al. (2012)
	EE2	My interaction with the matchmaking tool is clear and understandable	0.845	
	EE3	I find a matchmaking tool easy to use	0.780	
	EE4	It is easy for me to become skillful at using a matchmaking tool	0.813	
Hedonic motivation	HM1	Using a matchmaking tool is fun	0.934	Venkatesh et al. (2012)
	HM2	Using a matchmaking tool is enjoyable	0.901	
	HM3	Using a matchmaking tool is very entertaining	0.820	
Personal innovativeness	PI1	If I heard about a new information technology, I would look for ways to experiment with it	0.913	Agarwal and Prasad (1998)
	PI2	Among my peers, I am usually the first to try out new information technologies	0.836	
	PI3	In general, I am hesitant to try out new information technologies (reversed)	0.547	
	PI4	I like to experiment with new information technologies	0.873	
Behavioral intention	BI1	I intend to use a matchmaking tool when available	0.912	Venkatesh et al. (2012)
	BI2	I will try to use a matchmaking tool in my daily life	0.818	
	BI3	I plan to use a matchmaking tool regularly	0.926	
	BI4	I intend to recommend using a matchmaking tool	0.849	
Perceived relevance	PR1	A matchmaking tool within my coworking space would be relevant to me	0.904	Alalwan (2018)
	PR2	A matchmaking tool within my coworking space would be important	0.901	
	PR3	A matchmaking tool within my coworking space would fit my interests	0.948	
	PR4	A matchmaking tool within my coworking space would meet my preferences	0.939	
Satisfaction with offline activities	SOA1	I am satisfied with the offered offline activities	0.918	Arbaugh (2000), Liaw (2008)
	SOA2	I am satisfied with using my coworking space's offline activities	0.797	
	SOA3	My coworking space's offline activities satisfy my needs	0.667	
Sense of community	SOC1	I feel like a member of this coworking space	0.925	Peterson et al. (2008)
	SOC2	I belong to this coworking space	0.938	
	SOC3	I feel connected with my coworking space	0.825	
	SOC4	I have good connections with my fellow coworkers	0.603	

Appendix B: Indicator covariance matrix

	BI1	BI2	BI3	BI_4	EE1	EE2	EE3	EE4	HM1	HM2	HM3	PE1	PE2	PE3	PE4	PI1	PI2	PI3	PI4	PR1	PR2	PR3	PR4	SOA1	SOA2	SOA3	SoC1	SoC2	SoC3	SoC4
BI1	2.062	1.223	1.791	1.252	0.522	0.399	0.491	0.227	0.863	1.133	0.610	1.326	1.185	1.147	1.130	0.683	0.711	0.195	0.415	1.509	1.664	1.593	-0.071	-0.007	0.128	0.204	0.131	-0.019	-0.053	1.545
BI2	1.223	1.793	1.299	0.995	0.636	0.342	0.413	0.418	0.723	0.989	0.489	1.049	0.967	0.913	0.951	0.592	0.370	0.353	0.337	1.217	1.152	1.038	0.002	-0.030	-0.003	0.228	0.272	0.130	-0.071	0.995
BI3	1.791	1.299	2.122	1.323	0.470	0.470	0.478	0.264	0.758	1.005	0.592	1.253	1.255	1.190	1.139	0.780	0.723	0.204	0.446	1.462	1.473	1.486	-0.124	-0.031	0.024	0.250	0.196	0.076	0.046	1.476
BI4	1.252	0.995	1.323	1.614	0.512	0.580	0.426	0.358	0.798	0.867	0.558	0.947	0.817	0.810	0.843	0.558	0.356	0.240	0.354	1.198	1.119	1.048	0.052	0.069	0.218	0.218	0.324	0.097	0.003	1.207
EE1	0.522	0.636	0.470	0.512	1.024	0.624	0.462	0.736	0.405	0.432	0.205	0.557	0.396	0.342	0.402	0.375	0.368	0.643	0.286	0.460	0.446	0.460	0.133	0.037	0.071	-0.110	0.072	-0.031	0.116	0.470
EE2	0.399	0.342	0.470	0.580	0.624	1.136	0.642	0.699	0.509	0.507	0.401	0.439	0.422	0.332	0.477	0.172	0.197	0.143	0.085	0.602	0.437	0.493	0.066	0.072	0.031	-0.125	0.080	0.060	0.027	0.659
EE3	0.491	0.413	0.478	0.426	0.462	0.642	1.106	0.541	0.443	0.594	0.518	0.516	0.445	0.348	0.496	0.390	0.241	0.225	0.148	0.656	0.519	0.601	0.118	0.018	-0.005	0.048	0.183	0.234	0.078	0.709
EE4	0.227	0.418	0.264	0.358	0.736	0.699	0.541	1.163	0.342	0.403	0.187	0.291	0.320	0.201	0.297	0.420	0.399	0.592	0.322	0.303	0.242	0.294	0.137	0.068	0.077	0.016	0.085	0.017	0.201	0.489
HM1	0.863	0.723	0.758	0.798	0.405	0.509	0.443	0.342	1.163	0.936	0.893	0.872	0.722	0.690	0.596	0.403	0.246	0.043	0.388	1.042	0.992	0.984	-0.016	0.077	0.124	-0.093	0.074	0.017	-0.261	0.951
HM2	1.133	0.989	1.005	0.867	0.432	0.507	0.594	0.403	0.936	1.336	0.740	1.008	0.961	0.902	0.841	0.411	0.285	0.125	0.277	1.153	1.198	1.146	0.008	-0.011	0.029	0.159	0.128	0.156	-0.127	1.314
HM3	0.610	0.489	0.592	0.558	0.205	0.401	0.518	0.187	0.893	0.740	1.288	0.727	0.498	0.478	0.452	0.509	0.205	0.076	0.285	0.804	0.749	0.750	-0.010	0.119	0.155	0.045	0.186	0.150	-0.146	0.704
PE1	1.326	1.049	1.253	0.947	0.557	0.439	0.516	0.291	0.872	1.008	0.727	1.763	1.320	1.353	1.293	0.364	0.411	0.219	0.025	1.329	1.349	1.319	0.057	0.069	0.169	-0.045	0.051	-0.031	-0.243	1.220
PE2	1.185	0.967	1.255	0.817	0.396	0.422	0.445	0.320	0.722	0.961	0.498	1.320	1.879	1.587	1.488	0.261	0.247	-0.280	-0.004	1.321	1.306	1.290	0.047	-0.024	0.062	-0.035	-0.084	-0.008	-0.159	1.234
PE3	1.147	0.913	1.190	0.810	0.342	0.332	0.348	0.201	0.690	0.902	0.478	1.353	1.587	1.859	1.549	0.114	0.217	-0.397	-0.152	1.283	1.261	1.234	0.074	-0.052	0.102	0.043	0.087	0.141	-0.082	1.136
PE4	1.130	0.951	1.139	0.843	0.402	0.477	0.496	0.297	0.596	0.841	0.452	1.293	1.488	1.549	1.926	0.104	0.204	-0.540	-0.256	1.398	1.301	1.252	0.049	-0.108	-0.061	0.083	0.138	0.080	0.137	1.279
PI1	0.683	0.592	0.780	0.558	0.375	0.172	0.390	0.420	0.403	0.411	0.509	0.364	0.261	0.114	0.104	2.040	1.528	1.006	1.346	0.524	0.651	0.727	0.232	0.288	0.264	0.589	0.575	0.378	0.341	0.515
PI2	0.711	0.370	0.723	0.356	0.368	0.197	0.241	0.399	0.246	0.285	0.205	0.411	0.247	0.217	0.204	1.528	2.741	0.982	1.495	0.345	0.560	0.529	0.250	0.149	0.224	0.370	0.041	-0.131	0.522	0.493
PI3	0.195	0.353	0.204	0.240	0.643	0.143	0.225	0.592	0.043	0.125	0.076	0.219	-0.280	-0.397	-0.540	1.006	0.982	2.834	0.970	-0.093	0.124	-0.122	0.271	0.349	0.269	0.274	0.164	0.139	0.172	-0.092
PI4	0.415	0.337	0.446	0.354	0.286	0.085	0.148	0.322	0.388	0.277	0.285	0.025	-0.004	-0.152	-0.256	1.346	1.495	0.970	1.857	0.256	0.337	0.225	0.189	0.367	0.250	0.260	0.059	0.142	0.152	0.265
PR1	1.545	0.995	1.476	1.207	0.470	0.659	0.709	0.489	0.951	1.314	0.704	1.220	1.234	1.136	1.279	0.515	0.493	-0.092	0.265	2.272	1.795	1.769	1.706	-0.031	-0.018	0.135	0.321	0.317	0.179	0.201
PR2	1.509	1.217	1.462	1.198	0.460	0.602	0.656	0.303	1.042	1.153	0.804	1.329	1.321	1.283	1.398	0.524	0.345	-0.093	0.256	2.532	1.824	1.832	0.142	0.056	0.085	0.134	0.340	0.170	-0.156	1.795
PR3	1.664	1.152	1.473	1.119	0.446	0.437	0.519	0.242	0.992	1.198	0.749	1.349	1.306	1.261	1.301	0.651	0.560	0.124	0.337	1.824	2.094	1.887	-0.137	-0.050	0.082	0.171	0.158	0.101	-0.067	1.769
PR4	1.593	1.038	1.486	1.048	0.460	0.493	0.601	0.294	0.984	1.146	0.750	1.319	1.290	1.234	1.252	0.727	0.529	-0.122	0.225	1.832	1.887	2.117	-0.102	-0.019	0.120	0.216	0.259	0.132	0.007	1.706
SOA1	-0.071	0.002	-0.124	0.052	0.133	0.066	0.118	0.137	-0.016	0.008	-0.010	0.057	0.047	0.074	0.049	0.232	0.250	0.271	0.189	0.142	-0.137	-0.102	0.882	0.513	0.325	0.403	0.432	0.342	0.367	-0.031
SOA2	-0.007	-0.030	-0.031	0.069	0.037	0.072	0.018	0.068	0.077	-0.011	0.119	0.069	-0.024	-0.052	-0.108	0.288	0.149	0.349	0.367	0.056	-0.050	-0.019	0.513	0.823	0.496	0.325	0.312	0.395	0.170	-0.018
SOA3	0.128	-0.003	0.024	0.218	0.071	0.031	-0.005	0.077	0.124	0.029	0.155	0.169	0.062	0.102	-0.061	0.264	0.224	0.269	0.250	0.085	0.082	0.120	0.325	0.496	0.952	0.274	0.199	0.248	0.212	0.135
SoC1	0.204	0.228	0.250	0.218	-0.110	-0.125	0.048	0.016	-0.093	0.159	0.045	-0.045	-0.035	0.043	0.083	0.589	0.370	0.274	0.260	0.134	0.171	0.216	0.403	0.325	0.274	1.876	1.543	1.254	1.362	0.321
SoC2	0.131	0.272	0.196	0.324	0.072	0.080	0.183	0.085	0.074	0.128	0.186	0.051	-0.084	0.087	0.138	0.575	0.041	0.164	0.059	0.340	0.158	0.259	0.432	0.312	0.199	1.543	2.231	1.566	1.223	0.317
SoC3	-0.019	0.130	0.076	0.097	-0.031	0.060	0.234	0.017	0.017	0.156	0.150	-0.031	-0.008	0.141	0.080	0.378	-0.131	0.139	0.142	0.170	0.101	0.132	0.342	0.395	0.248	1.254	1.566	1.876	1.008	0.179
SoC4	-0.053	-0.071	0.046	0.003	0.116	0.027	0.078	0.201	-0.261	-0.127	-0.146	-0.243	-0.159	-0.082	0.137	0.341	0.522	0.172	0.152	-0.156	-0.067	0.007	0.367	0.170	0.212	1.362	1.223	1.008	2.379	0.201

Appendix C: Evaluation of the Fornell-Larcker criterion

	BI	EE	HM	PE	PI	PR	SOA	SOC
BI	0.877							
EE	0.437	0.816						
HM	0.673	0.503	0.886					
PE	0.709	0.384	0.614	0.910				
PI	0.340	0.275	0.262	0.065	0.805			
PR	0.793	0.425	0.732	0.750	0.246	0.923		
SOA	0.005	0.124	0.039	0.046	0.248	0.003	0.800	
SOC	0.134	0.027	0.069	0.020	0.198	0.127	0.343	0.834

Appendix D: Cross-loadings

Note: Indicator loadings on their assigned constructs are highlighted in bold.

	BI	EE	HM	PE	PI	PR	SOA	SOC
BI1	**0.912**	0.350	0.629	0.676	0.316	0.796	-0.009	0.079
BI2	**0.818**	0.403	0.573	0.587	0.267	0.593	-0.005	0.137
BI3	**0.926**	0.349	0.557	0.672	0.339	0.732	-0.062	0.109
BI4	**0.849**	0.439	0.602	0.545	0.268	0.649	0.096	0.150
EE1	0.438	**0.827**	0.361	0.342	0.293	0.328	0.126	-0.023
EE2	0.349	**0.845**	0.451	0.317	0.112	0.370	0.070	-0.013
EE3	0.356	**0.780**	0.494	0.348	0.207	0.426	0.084	0.094
EE4	0.243	**0.813**	0.303	0.208	0.298	0.222	0.129	0.027
HM1	0.605	0.466	**0.934**	0.544	0.246	0.665	0.042	-0.002
HM2	0.716	0.496	**0.901**	0.651	0.220	0.753	0.011	0.102
HM3	0.411	0.349	**0.820**	0.388	0.238	0.479	0.061	0.084
PE1	0.713	0.412	0.668	**0.879**	0.158	0.711	0.083	0.001
PE2	0.637	0.343	0.553	**0.921**	0.077	0.680	0.035	-0.026
PE3	0.615	0.271	0.527	**0.936**	0.008	0.651	0.054	0.045
PE4	0.605	0.361	0.472	**0.904**	-0.020	0.680	-0.007	0.057
PI1	0.378	0.276	0.303	0.123	**0.913**	0.308	0.223	0.299
PI2	0.269	0.209	0.152	0.134	**0.836**	0.212	0.173	0.072
PI3	0.122	0.273	0.049	-0.111	**0.547**	-0.019	0.216	0.096
PI4	0.236	0.175	0.234	-0.054	**0.873**	0.144	0.222	0.091
PR1	0.718	0.456	0.683	0.653	0.203	**0.904**	0.010	0.153
PR2	0.701	0.383	0.644	0.677	0.176	**0.901**	0.089	0.112
PR3	0.774	0.346	0.698	0.729	0.272	**0.948**	-0.059	0.086
PR4	0.735	0.384	0.679	0.709	0.254	**0.939**	-0.028	0.119
SOA1	-0.030	0.141	-0.005	0.049	0.193	-0.029	**0.918**	0.330
SOA2	0.001	0.059	0.059	-0.022	0.251	-0.008	**0.797**	0.282
SOA3	0.081	0.049	0.097	0.059	0.206	0.078	**0.667**	0.189
SOC1	0.136	-0.040	0.029	0.005	0.243	0.112	0.332	**0.925**
SOC2	0.128	0.084	0.082	0.026	0.146	0.129	0.301	**0.938**
SOC3	0.043	0.063	0.076	0.025	0.103	0.076	0.306	**0.825**
SOC4	-0.010	0.075	-0.117	-0.049	0.161	-0.001	0.241	**0.603**

Essay 5: Chatbots in the Workplace: A Technology Acceptance Study Applying Uses and Gratifications in Coworking Spaces

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Abstract

The uses and gratifications approach is used to examine chatbot acceptance in coworking spaces. Office-automation chatbots are introduced to the literature, and a framework to classify intra-organizational bots is derived. A sample of 101 German coworkers is drawn using cluster sampling, and a combination of partial least squares structural equation modeling and necessary condition analysis is used for evaluation. Instrumental and non-instrumental gratifications, as well as social norm, influence chatbot acceptance in the form of sufficient and necessary conditions, and social norm appears to have a more substantial impact than hedonic factors in terms of sufficiency. However, social norm is not a necessary condition. A moderator analysis reveals that privacy concerns, age, and gender do not affect individuals' intention to use a chatbot.

Keywords Chatbots; uses and gratifications; technology acceptance; office automation; coworking spaces

1 Introduction

The digital workplace has been a topic for intensive research for many years, coming from notions of computer and internet usage (Benson et al., 2002) to integrating consumer-oriented technologies (Gregory et al., 2018; Harris et al., 2012; Jarrahi et al., 2017), such as features and applications known from private computer and smartphone usage. This convergence is also visible in the way users interact with their devices and applications: conversational interfaces may be used in private contexts (e.g., McLean and Osei-Frimpong, 2019), in organizations at customer touchpoints such as general support (Köhler et al., 2011) and online shopping guidance (Saad and Abida, 2016), and for workflow optimization within the organization (Stieglitz et al., 2018). Their ongoing dissemination can be explained due to their high business potential (Luo et al., 2019), leading to a multiplicity of applications entering the market. However, insights on conversational interfaces, their role in organizations, and how they are approached and levered by employees are lacking. Stieglitz et al. (2018) sparked research on so-called enterprise bots (EB) and argue that workplace advancements increase complexity and pressure to be productive, which renders employees' access to information and information systems (IS) a critical field of study. They propose to view natural language implementation for this purpose as the next logical step in automation. Importantly, they emphasize that most approaches from the past, such as the assistant Clippy that was integrated into Microsoft Word, failed to meet expectations. Consequently, implementing office automation is not a trivial task, and technology acceptance needs to be studied on the individual level. The

study at hand seeks to contribute to the body of literature by advancing the nascent research path on enterprise-related automation, examining user acceptance of text-based chatbots. Text-based communication is chosen to take workplace requirements of providing a calm and productive atmosphere into account, which fairly opposes the use of voice-based applications. Interaction via text entry further allows operators to use natural language (as opposed to clicking command buttons), which is necessary for modern-day EB (Stieglitz et al., 2018). Hence, the study at hand sheds light on a subsegment of EB, which operates via natural language in the form of text-entry and seeks to automate and facilitate work processes. For this paper, the term text-based office-automation chatbots (OACs) will be used for clarification, denoting automation applications (i.e., bots) that employ natural language processing to automate work-related tasks and processes on an individual level.

More and more chatbots are implemented within collaboration application environments, namely workstream collaboration tools such as Slack, Circuit, or Mattermost. These allow users to set reminders, customize reactions such as providing the WiFi password upon request or when onboarding new members, and schedule meetings (see, e.g., Slack, 2020). In other words, these chatbots seek to facilitate and automate routine tasks; thus, they might also be referred to as OAC as a subtype of general EB. OACs serve two primary purposes: provide useful services (such as automation) and help and guidance (van den Broeck et al., 2019). For the office context, Toxtli et al. (2018) point out that employees usually need to switch between different applications relevant to their current work and communication tools. OAC may help to integrate these functionalities to create a more holistic experience and reduce friction. The locus of integration, which implements OACs within workstream collaboration platforms, enables users to delegate tasks from within communication channels (Toxtli et al., 2018), allowing them to achieve more output without disconnecting from coworkers. Levering OAC usage thus facilitates work processes and pledges productivity increase. Recent years have witnessed the increasing relevance of initiatives targeting the transformation of organizational settings towards digital workplaces. Employing technologies known widely known from the private context, OACs appear as adequate building blocks for creating a digital workplace. This ‘consumerization’ has not to be forced, but merely ingests a trend that has been evolving for several years (Harris et al., 2012), and that leads to “blurring boundaries between production and consumption, work and leisure, enterprise IS and consumer IS” (Gregory et al., 2018). Consumerization thus bridges the knowledge gap between dedicated personnel and other employees (Jarrahi et al., 2017). As a result, chatbot usage in the organizational context is deemed a fruitful development that provides beneficial opportunities (Stieglitz et al., 2018). More specifically, this notion

applies to the 'consumer-worker' who carries experiences from his or her private life to the organizational context and aligns their work practices and expectations accordingly (Yoo, 2010)[1]. This assumption is consistent with consumerization findings, resulting in the "democratization of IS access and the individualization of IS use" (Gregory et al., 2018).

The study at hand seeks to contribute to our understanding of chatbots in the office context by employing a uses and gratifications (U&G) approach (Katz et al., 1973). Extant work in the consumer setting reports that usefulness and helpfulness are significant drivers of users' attitude towards chatbots, as they are usually implemented for problem-solving such as support tasks (Brandtzaeg and Følstad, 2017; Zarouali et al., 2018). The experience gained from application usage does not emerge from the software alone but is elicited by an interplay of the system and a user's emotional responses (Thüring and Mahlke, 2007). This notion provides a lens through which to examine users as proactive decision-makers when choosing applications and renders U&G a promising investigation approach. U&G views users as actively choosing alternatives that provide attractive gratifications and taking a goal-directed evaluation approach (O' Donohoe, 1994), which is backed by the extant literature in other fields essential for the study at hand, such as Human-Computer Interaction and consumer research (see, e.g., Srivastava et al., 1984).

U&G as an overarching framework has been applied successfully in a variety of IS-related research settings in recent years, such as investigation of social media use (Gan and Li, 2018; Ifinedo, 2016; Kim et al., 2019; Malik et al., 2016), mobile shopping (Huang and Zhou, 2018), diet and fitness apps (Lee and Cho, 2017), food delivery apps (Ray et al., 2019), and instant messaging (Chou and Liu, 2016). In these studies, U&G has proven to be a valuable instrument to examine user interaction with technology. Work on in-home voice assistants by McLean and Osei-Frimpong (2019) using U&G offers a stable reference point for the study at hand.

For the quantitative model, coworking spaces (CWS) are selected as a work environment to employ hypotheses testing. CWS are characterized by providing state-of-the-art infrastructure and easy access to technology (Gandini, 2015; Garrett et al., 2017). People working in CWS (i.e., coworkers) benefit from an open and social atmosphere that supports learning and innovation (Waters-Lynch and Potts, 2017) and exhibit a high degree of autonomy. Major organizations, on the other hand, focus on IS governance and provide mandatory guidelines for application use (Gregory et al., 2018). This notion has been a central theme in research on technology acceptance in the organizational context (e.g., user perception of voluntariness of use is used as moderating variable in UTAUT, Venkatesh et al., 2003) and may be used as a salient discriminant distinguishing organizational from consumer settings. Another distinction is the inclusion of hedonic factors in models used for the consumer context (e.g., UTAUT2,

[1] Previous work on the organization-customer interface, such as support enhanced with chatbots, refers to consumer-customers, accordingly (Yoo, 2010).

Venkatesh et al., 2012). However, research suggests that hedonic traits are relatively common, and instead of strictly parting utilitarian from hedonic systems, a perspective of dual-purpose systems serving both ends may be applied (van der Heijden, 2004; Wu and Lu, 2013). In essence, a model studying user perception of OACs and their intention to use the technology needs to include productivity-related (i.e., utilitarian and instrumental, respectively) and enjoyment-related influences (i.e., hedonic and non-instrumental, respectively).

The remainder of the paper is organized as follows. Section 2 presents the theoretical backgrounds of chatbots and the U&G approach in CWS. The identification of gratifications is portrayed in Section 3, followed by the final research model in Section 4. Section 5 presents the results. A discussion of the results is provided in Section 6, also giving an overview of limitations and suggestions for future research. The paper ends with concluding remarks.

2 Theoretical background

2.1 Chatbots as application features

Chatbots are part of the field termed virtual assistants, digital assistants, or conversational interfaces, with voice-driven applications being the most prominent agents, such as Siri by Apple, Alexa by Amazon, Cortana by Microsoft, and the Google Assistant (Dale, 2016). The underlying notion is entering input into a machine by dialog using natural language, which in the case of a text-based chatbot is executed via text commands (Dale, 2016). Chatbots have been viewed as a significant breakthrough: Microsoft CEO Satya Nadella praised them as the interface of the future (Weinberger, 2016), and Facebook's Mark Zuckerberg claimed them to be the solution for the app overload problem (McMillan, 2016). However, chatbots themselves are not new. One of the first implementations of natural language processing was Eliza in 1966 (Weizenbaum, 1966), which in essence was an early chatbot. What makes them compelling is the variety of technological advances that have been made since then, such as machine learning (Luo et al., 2019) and the omnipresence of virtual, online-connected software environments. Social networking sites and instant messengers have popularized the idea of communicating by short text snippets, which makes it easy for users to employ chatbots as they do not need to learn a novel type of human-machine interaction.

Chatbots provide the interface of human input and machine processing. As text-based agents, such as the Slackbot (Slack, 2020), do not require voice commands, they appear suitable for everyday work practice and may be used more versatilely than voice-operated applications such as Siri, or Google Assistant (Sergott, 2019). Besides, they are commonly used on the same device an employee is currently dedicated to, such as laptops, making them very low in invasiveness and highly ergonomic in handling. Existing text-based chatbots, mostly facing the customer side, appear to be received rather well, particularly for routine tasks (Press, 2019). The question thus arises if these findings hold for the intra-organizational side. The study at hand seeks to shed light on OACs, i.e., chatbots used to facilitate internal

processes and that are commonly implemented within business applications, as opposed to well-known customer service chatbots at the interface of an organization and its stakeholders. They may also exhibit characteristics found in other particular scenarios, such as newsfeed aggregation as carried out by social bots (Ferrara et al., 2016). OACs can be distinguished in terms of technical implementation, which is closely related to their capability limits and degree of generalization and specialization, respectively. Generalized tools such as Siri, Cortana, and the Google Assistant can deal with various global-level tasks, such as making a call, initiating a search query, and setting reminders. Still, they may not allow deep dives into a specific application.

Specialized tools, such as chatbots integrated into Slack, work on a local level, delimiting their functionality to a clear-cut range and giving them more in-depth abilities for this area (Toxtli et al., 2018). For office automation, the study at hand focuses on local-level, within-application tools. In contrast to EB, which comprise both voice-commanded and text-commanded tools for general application within the organization (Stieglitz et al., 2018), OACs in the context here are understood as being specialized and focused on office-work automation, i.e., meeting scheduling, project management, and similar tasks. Consequently, blue-collar, assembly-related tasks or job positions that mainly revolve around domains other than a computer workstation are not covered by OAC capabilities. Further, the study at hand investigates OACs operated by text input, such as the Slackbot, which may be denoted text-based OACs or tOACs in contrast to voice-based OACs or vOACs. Besides text and speech input, other types are possible or may become more fruitful in the future. For example, gesture-based interaction has been tested, among other applications, for design software operation and smart-TV usage (Kela et al., 2006; Lee et al., 2014) and may be employed in domains such as OACs.

OACs allow various tasks such as running search queries online, scheduling a meeting, or sending a message. As they are integrated into business applications, users do not have to switch between different environments (see, e.g., Slack, 2020). Furthermore, as they are commonly implemented organically, results following user input may directly be passed on for further processing. For example, a user may send an invitation for a meeting in a workstream collaboration tool, such as Slack or Microsoft Teams. The OAC remembers having disseminated a request and detects that a colleague has sent an answer. Now the OAC may ask the user if they wish to add an appointment to a personal calendar and set a reminder. This automation helps reducing friction in terms of switching applications and hence may diminish the associated stress potential (Mark et al., 2008). OACs may also help solve the ‘white elephant problem’ many organizations experience, where a lot of potentially valuable data is stored but is not meaningfully accessed and used. Due to their business-focused nature (usually restricted to a specific software environment), the OACs examined in this study are rather specialized than general personal assistants. The current state of OAC role in the workplace is that of augmentation, i.e., complementing human workers (Davenport and Kirby, 2015), where specific tasks but not complete positions can be taken over, starting with highly structured, mechanical tasks and moving towards more general and

complex duties over time (Huang and Rust, 2018). To fulfill their goal of increasing efficiency, OACs need to be integrated into work routines and employed regularly (see also the notion of OAC success by Peart, 2019).

OACs need an environment where users can find and make use of them, and tools allowing natural language processing and conversational interfaces are increasingly being appended to software solutions (Stieglitz et al., 2018). For users to yield advantage, these applications need to be capable of handling a variety of business tasks, so the user is not forced to switch back and forth between different solutions and different OACs (the 'point-of-entry-problem', see, e.g., Stieglitz et al. (2018)). Workstream collaboration tools provide such an environment by integrating multiple communication channels, such as instant messaging, voice and video calls, and e-mails, with collaboration functionalities such as filesharing, operating third-party project management tools and reporting (Reynolds, 2018). These functions are leveraged through automation, e.g., chatbots (Kopplin and Baier, 2020). For the most prominent application Slack, 47.2 million daily active users are forecasted for 2025 (GP Bullhound, 2019). As they provide an all-round environment for both routine and non-routine tasks on a state-of-the-art technical level (Reynolds, 2018), workstream collaboration tools are employed as software environments accommodating the OAC in this study.

2.2 Coworking spaces as work environment

As OACs blur the boundaries between human-human and human-machine interaction, workplaces prone to innovative projections may serve as a starting point to understand user perception. Hence, coworking spaces (CWS) are selected as appropriate environments, providing a software-enhanced workplace with ready-to-use infrastructure (Gandini, 2015; Garrett et al., 2017; Spinuzzi, 2012). Coworking emphasizes communication and collaboration fostered by software applications (Bouncken and Reuschl, 2018; Kopplin, 2020); however, CWS offer various opportunities for social interaction, such as pitch sessions, workshops, and community breakfasts (Bianchi et al., 2018; Blagoev et al., 2019; Garrett et al., 2017). The existence of a supportive community is often considered a CWS' critical property (Bouncken et al., 2020; Garrett et al., 2017; Moriset, 2013; Schmidt and Brinks, 2017), but this notion is not received uncritically, and ambiguity remains (Spinuzzi et al., 2019). Hence, CWS are reasonably complex surroundings. Coworkers are located in an environment that offers benefits, such as knowledge sharing and finding inspiration (Rese et al., 2020), as well as costs, such as potential economic competition (Bouncken et al., 2018).

Further, CWS are understood as realms of sociomateriality, i.e., an entanglement of technology and social practices where both components cannot be separated (Bouncken et al., 2020). As a part of the sociomaterial entanglement, it is critical to understand the role of digital applications, as they support and shape the development of social practices (Orlikowski, 2007). Application features need to take care of the particular demands and needs exhibited by coworkers, especially high flexibility in work teams and processes (Bouncken and Reuschl, 2018; Kopplin and Baier, 2020) and, as such, identifying and

contacting potential collaboration partners which are usually supported by digital workspaces (Schopfel et al., 2015). Recent work has proposed integrated collaboration platforms, so-called workstream collaboration tools, as adequate software environments for CWS (Kopplin and Baier, 2020). These applications include OACs as a standard feature. OACs, in particular, help to navigate the software environment and, consequently, are vital access points to the coworking sphere.

2.3 Uses and gratifications

The basic concept of U&G is to view the role of the recipient as active and goal-directed rather than passive (see, e.g., O'Donohoe, 1994; Palmgreen and Rayburn, 1979). Originating from research on mass media, U&G shifts the perspective from 'what does the medium do to the recipient?' to 'what does the recipient do to the medium?' (Katz et al., 1973) and has been used to address a variety of media such as television (Babrow, 1987), newspapers (Elliott and Rosenberg, 1987), and radio (Mendelsohn, 1964). U&G has subsequently been employed to investigate technologically mediated communication such as virtual communities (Cheung and Lee, 2009), social networking sites (Ifinedo, 2016; Phua et al., 2017; Xu et al., 2012), and e-mail (Dimmick et al., 2000). Instead of providing a set of theoretically linked variables as established technology acceptance models do, U&G offers a nomological network to build on (see, e.g., Li et al., 2015).

Concerning IS, studies in the field increasingly suggest the use of U&G to capture user behavior (Liang et al., 2006; Stafford et al., 2004). The extant literature also emphasizes the fit of U&G and established models such as UTAUT (Unified Theory of Acceptance and Use of Technology, Venkatesh et al. (2003)) in their underlying motivational factors (Stafford et al., 2004), indicating the fruitfulness of its use in IS-related research. This compatibility also becomes visible in terms of the convergence of employed constructs. Chiu and Huang (2015), for example, identified the usefulness of habit as a variable to use in U&G, which had been added to technology acceptance research through UTAUT2 a few years prior (Venkatesh et al., 2012). Holsapple and Wu (2007) further posit a merge of hedonic- and utilitarian-orientation in modern technologies, which fits the notion of dual-purpose IS granting both instrumental and non-instrumental benefits (Wu and Lu, 2013) and is the central aspect of consumerization (Harris et al., 2012), describing the application of technologies known from private settings in the organizational context.

This duality shares broad commonalities with research on user experience, which features the categories of instrumental (i.e., utilitarian) and non-instrumental (i.e., hedonic) qualities (Hassenzahl and Tractinsky, 2006; Köse and Hamari, 2019). Thüring and Mahlke (2007) emphasize users' response as the third component of user experience, resulting in a notion that is very similar (if not equal) to U&G. That is, it becomes increasingly important to study a dyad of utilitarian and hedonic traits to fully capture the benefits a user can derive from a particular technology. Cutler and Danowski (1980) further propose a perspective of two categories of gratifications: content gratifications, which refer to the information gained from the medium, and process gratifications, which stem from the act itself. In essence, it seems

reasonable to study user behavior from the perspective of an interplay between a technology's characteristics and a user's demands, and a model drawing on this body of knowledge is expected to capture both a technology's instrumental and non-instrumental qualities.

3 Identification of gratifications and hypotheses

3.1 Dependent variable

Intention to use (ITU) is employed as a target variable that needs to be explained: to benefit from OAC capabilities, they need to become part of individuals' regular work. This choice is consistent with major technology acceptance models such as TAM (Davis, 1989), UTAUT (Venkatesh et al., 2003), and UTAUT2 (Venkatesh et al., 2012), as well as with the extant U&G literature: the prospect of gaining gratifications affects media recipients to make use of a particular medium (Katz et al., 1973; Ruggiero, 2000). Research on dual-purpose IS, and the consumerization phenomenon suggests that users seek utilitarian and hedonic benefits (Harris et al., 2012; van der Heijden, 2004; Wu and Lu, 2013); and, indeed, U&G studies have consistently identified entertainment- and information-related benefits as determinants of media usage (Lee and Cho, 2017).

3.2 Instrumental gratifications

The extant literature employing U&G for novel communication technology uses the focal technology's capabilities as an anchor point for gratification identification (see, e.g., the work by Lee and Cho, 2017 on fitness apps). In addition to this technical approach, the study at hand uses the work by McLean and Osei-Frimpong (2019) as a starting point, who investigated voice-based chatbots in the consumer context. Information quality (IQ) has been identified as an essential factor in using communication technology and has been verified as a driver in U&G studies (Lee and Cho, 2017). IQ plays a vital role in users' perception of a technology's usefulness (Lemire et al., 2008). Commonly, particularly in online-related environments, the quantity of information is not lacking, and quality considerations become increasingly vital (Lee and Cho, 2017). A user must comprehend the information provided by the OAC, and it needs to fit the current task. Ambiguous, outdated, or even incorrect information would severely affect the user's progress.

Productivity (PR) stresses an augmenting rather than replacing role concerning the relationship between chatbots and operators (Brandtzaeg and Følstad, 2017). Commonly, productivity enhancement is viewed as the most dominant facet of instrumentality, i.e., technology's utilitarian aspects (van der Heijden, 2004). This notion was prominently introduced in the form of perceived usefulness in TAM (Davis, 1989) and later integrated into the performance expectancy variable of UTAUT (Venkatesh et al., 2003). A large body of knowledge corroborates the criticality of productivity enhancement in users' evaluation of a particular technology and, thus, of digital environments suited to offer OACs (Chuah et al., 2016; Davis, 1989; Dishaw and Strong, 1999; Igbaria, 1994; Kopplin, 2020; McLean and Osei-Frimpong, 2019). In the context of this study, both variables, IQ, and PR are encompassed by a reflective-formative

higher-order construct (HOC), which seeks to capture instrumental gratifications as a whole and is, hence, denoted IG (i.e., instrumental gratifications). Consequently, the first hypothesis is derived:

H1. Instrumental gratifications have a positive effect on intention to use.

3.3 Non-instrumental gratifications

Enjoyment-related gratifications have been consistently identified as critical drivers of media adoption and use throughout the years (Ferguson and Perse, 2000; Lee and Cho, 2017), and they are also essential drivers in technology acceptance research (Ha and Stoel, 2009; Mun and Hwang, 2003; Pikkarainen Tero et al., 2004; Venkatesh et al., 2012; Venkatesh and Bala, 2008). In fact, hedonic factors may be the primary reason to use a certain technology (van der Heijden, 2004). Still, particularly in the case of communication-related technology, the notion of dual-purpose IS combines non-instrumental aspects with instrumentality (Wu and Lu, 2013). Hence, enjoyment (EN) is included in the model.

Besides, personal innovativeness (PI) comprises concepts such as curiosity about novel technology and intrinsic motivation to experiment with new gadgets and constitutes hedonic benefits, which is commonly accompanied by enjoyment (Agarwal and Karahanna, 2000; Agarwal and Prasad, 1998; Lu et al., 2005; Xu and Gupta, 2009). Two variables are modeled as formative higher-order variables to create a holistic concept of non-instrumental gratifications (denoted NG). Thus, it is postulated:

H2. Non-instrumental gratifications have a positive effect on intention to use.

Affective gratifications may include not only personal aspects, such as EN and PI but also social ones (Lee and Cho, 2017). To take this facet into account, social norm (SN) is added to the model (Hsu and Lin, 2008; Mun et al., 2006; Venkatesh and Morris, 2000). This triad of IG, NG, and SN is congruent with the categories of utilitarian, hedonic, and symbolic benefits proposed by Rauschnabel et al. (2018). Consistent with the extant literature, it is hypothesized:

H3. Social norm has a positive effect on intention to use.

3.4 Moderating variables

In line with the extant literature on voice-based chatbots and established technology acceptance models such as UTAUT (Venkatesh et al., 2003), age and gender are tested as moderating variables, and privacy risk is included as a context-specific construct (McLean and Osei-Frimpong, 2019). Although age and gender are established variables in technology acceptance research, their integration into a U&G-based framework is not straightforward. For example, UTAUT employs the two utilitarian variables, performance expectancy and effort expectancy, both of which impacts are moderated by age (Venkatesh and Morris, 2000). However, the moderating effect is postulated to be negative in the case of performance expectancy (i.e., its influence is stronger for young people) but positive for effort expectancy (i.e., its impact is more substantial for older people). From a U&G perspective, both variables are instrumental gratifications.

As a remedy, the variable's conceptualizations are compared to the gratifications employed in the study at hand. While effort expectancy captures perceptions of efficiency, i.e., low effort requirements, performance expectancy measures perceptions of effectiveness, i.e., enhanced productivity (Venkatesh and Morris, 2000). This differentiation was influenced by TAM's perceived usefulness and perceived ease of use (Davis, 1989; Venkatesh and Davis, 2000) and has been maintained in UTAUT2 (Venkatesh et al., 2012). Hence, it appears reasonable to consider this distinction robust; and as productivity gain and information quality are closely related to the effectiveness-conceptualization (as opposed to the efficiency notion), a negative moderation by age is hypothesized:

H4. Age has a negative moderating effect on instrumental gratification's impact on intention to use.

Regarding gender, a similar ambiguity needs to be treated. UTAUT postulates a stronger effect for men considering performance expectancy and a stronger impact for women considering effort expectancy (Venkatesh et al., 2003). In line with age, it is deemed adequate to view performance expectancy as closely related to the instrumental gratifications employed in the study at hand. Consequently, the following hypothesis is derived:

H5. Instrumental gratifications have a stronger impact on intention to use for men.

Moving on to non-instrumental gratifications, the extant literature shows a clearer picture. Young men are more substantially driven by hedonic considerations such as innovativeness and novelty-seeking than other groups (Chau and Hui, 1998; Lee et al., 2010; Venkatesh et al., 2012). Thus, it is hypothesized:

H6. Age has a negative moderating effect on non-instrumental gratification's impact on intention to use.

H7. Non-instrumental gratifications have a stronger impact on intention to use for men.

Particularly for voice-based chatbots, privacy concerns have been identified as an important variable (Alepis and Patsakis, 2017; Hoy, 2018; McLean and Osei-Frimpong, 2019; Moorthy and Vu, 2015). While for voice commands, the question is whether authorized individuals may be distinguished from unauthorized ones, text commands may be less complex to misuse. Further, due to their deep integration and access rights, OACs can perform various tasks that may harm the user if abused.

H8. Privacy concerns have a negative moderating effect on instrumental gratification's impact on intention to use.

H9. Privacy concerns have a negative moderating effect on non-instrumental gratification's impact on intention to use.

4 Research design

4.1 Research model and measurement

The final research model is presented in Figure 1. PR and IQ are specified as lower-order constructs (LOCs) formatively establishing IG. EN and PI are employed equivalently to create NG. SN is used as a direct predictor of ITU. IG's and NG's impacts on ITU are negatively moderated by age and privacy concerns. Both effects are also moderated by gender in the way that the influence is more substantial for men.

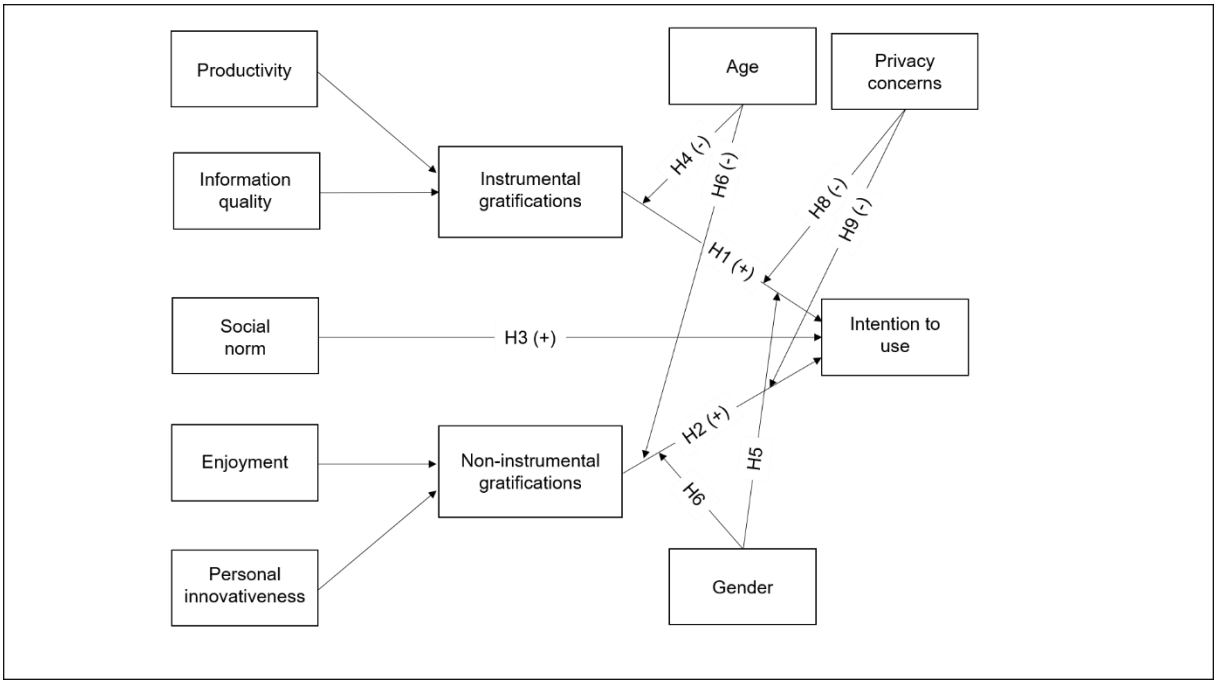

Figure 1: Research model.

To ensure validity, the literature was scanned for adequate measurement items. Primarily drawing on technology acceptance research (i.e., studies employing quantitative models such as UTAUT) and recent U&G applications, established measures for all model variables were identified. Non-instrumental gratifications, i.e., hedonic factors, are captured by EN and PI. Items are adopted from Kujala et al. (2017) and Agarwal and Prasad (1998), respectively. SN is adopted from Gao et al. (2015) to depict perceptions of social pressure. PR is adapted from Brandtzaeg and Følstad (2017), and IQ is taken from Wixom and Todd (2005). ITU is adapted from Venkatesh and Davis (2000), and the moderator variable privacy concerns stems from Rauschnabel et al. (2017). In addition, participants were asked whether they already use OACs or not. Constructs and measurement items are provided in Appendix A.

4.2 Sampling strategy

Independent CWS were targeted as the population (Bouncken et al., 2018). Cluster sampling was used to select a set of CWS in the first step and contact them for questionnaire dissemination in the second step. A pre-test was conducted and showed that coworkers' notions of chatbots' capabilities might vary.

Thus a short video at the beginning of the survey was provided to ensure all participants have a shared understanding of the technology. 300 German CWS were compiled in a list, drawing on various sources such as desk-booking websites, news articles on CWS, and blog posts. From this list, 30 CWS were sampled at random and contacted for surveying. Questionnaires were compiled using Qualtrics and distributed via e-mail. The sample size is estimated using the rule of ten, which is a prominent rule of thumb in PLS-SEM (Hair et al., 2016). The maximum number of arrows pointing towards a construct in the model is five, requiring at least 50 observations. However, an additional posterior evaluation of sample size will be conducted applying the minimum R-squared method (e.g., Kock and Hadaya, 2018).

5 Results

5.1 Descriptive statistics

Data collection took place over five weeks in September and October 2019. In total, 101 questionnaires were completed and qualified for analysis. The sample size is evaluated, drawing on the minimum R-squared method. The significance level is set to 0.05, the maximum number of arrows pointing at a construct is three, and the minimum R^2 is 0.640 (discussed in more detail in the research model evaluation); hence minimum sample size is below 38 observations (Kock and Hadaya, 2018). Thirty respondents were female, and one indicated a diverse gender. Age ranged from 18 to 62 years with a mean of 33.18 (median 30, standard deviation 9.34). Asked for their role within the CWS, most (n = 42) stated to be employed by an organization located within their CWS. Ten respondents' employers were sited at a different CWS, and 18 were employees without their employer being situated at a CWS. Table 1 summarizes branches and membership duration. 31.7 % use chatbots as part of their work, about half of them (41 %) daily, followed by another 31 % engaging in chatbot conversations three to four times a week.

Table 1: Descriptive statistics.

Characteristics	Responses
Branch	
Web Development/IS	42.6 %
Consulting	6.9 %
Marketing	2.0 %
Architecture	2.0 %
Journalism	2.0 %
Photography/Arts	3.0 %
Graphics/Design	3.0 %
Management	6.9 %
Tourism	5.0 %
Service	4.0 %
Real estate	5.0 %
Membership duration in current CWS	
Less than one month	9.9 %
2 to 3 months	11.9 %
4 to 6 months	9.9 %
More than six months	68.3 %

5.2 Measurement model evaluation

Partial least squares structural equation modeling (PLS-SEM) is used for calculation, drawing on the software package SmartPLS 3.3.2 (Ringle et al., 2015). The PLS algorithm is set to 300 maximum iterations and a stop criterion of 10^{-7} using a path weighting scheme. Successful convergence was reached after seven iterations. To test for common method bias, the full collinearity approach (Kock, 2015) using variance inflation factors (VIFs) as well as Harman's single-factor test (Podsakoff and Organ, 1986) were employed, finding an absence of critical values.

The model assessment follows a two-step approach moving from the outer, i.e., measurement model to the inner, i.e., structural model (Hair et al., 2011). The indicators' covariance matrix is provided in Appendix B. In the first step, internal consistency is evaluated. Outer loadings need to be evaluated and should meet a threshold of 0.708 (Hair et al., 2019). Most indicators show sufficient values, except for EN2 (0.489) and PI4 (0.528). As Table 2 displays, the thresholds for composite reliability (between 0.70 and 0.90) and average variance extracted (higher than 0.50) are met (Benitez et al., 2020). Cronbach's α is additionally calculated because of the measure's predominance and high profile; however, for evaluation, composite reliability is more suitable (Hair et al., 2019). All criteria exhibit sufficient values; hence, to ensure theoretical rigor, indicators with loadings below 0.708 are kept (Hair et al., 2011).

Table 2: Latent variable assessment. SD = standard deviation, CR = composite reliability, AVE = average variance extracted.

Latent variable	Indicators	Mean (SD)	Cronbach's α	CR	AVE
Productivity	5	3.13 (1.07)	0.873	0.909	0.668
Information quality	5	2.99 (1.09)	0.906	0.930	0.727
Social norm	4	1.86 (1.03)	0.850	0.899	0.690
Enjoyment	4	2.22 (0.96)	0.786	0.854	0.604
Personal innovativeness	4	3.56 (0.87)	0.820	0.887	0.670
Intention to use	3	2.92 (1.32)	0.912	0.945	0.851
Higher-order constructs					
Instrumental gratifications	2	-	0.702	0.738	0.591
Non-instrumental gratifications	2	-	0.866	0.937	0.882

To assess discriminant validity, three measures are employed: the Fornell-Larcker criterion, examination of cross-loadings, and heterotrait-monotrait ratio (HTMT). All latent variables meet the requirements postulated by Fornell and Larcker (1981), displayed in Appendix C. Evaluation of cross-loadings reveals that no indicator loads higher on a construct it is not assigned to compared to its respective latent variable. However, checking cross-loadings is considered a rather liberal test (Henseler et al., 2009). Hence, HTMT is used for complementation. HTMT (Table 3) shows a slightly high value of 0.855 for the pair PR/IQ; still, $HTMT_{inference}$ (95 % and 99 % confidence intervals) calculated by bootstrapping with 10,000 draws reveals that no confidence interval comprises a value of 1. Further, it is suggested to use a rather liberal threshold of 0.90 for exploratory research, which is met in any case (Henseler et al., 2015). Hence, discriminant validity is verified.

Table 3: Heterotrait-monotrait ratios.

Note: When using the repeated indicators approach, HOCs are established through their LOCs. Hence, discriminant validity assessment does not apply.

	PR	IQ	SN	EN	PI	ITU	IG	NG
PR								
IQ	0.855							
SN	0.434	0.472						
EN	0.765	0.768	0.655					
PI	0.385	0.272	0.208	0.307				
ITU	0.713	0.742	0.674	0.664	0.457			
IG	-	-	0.473	0.799	0.341	0.759		
NG	0.733	0.661	0.548	-	-	0.717	0.726	

5.3 Structural model evaluation

After assessing the outer model, the inner model is evaluated. VIFs for the relations among the latent variables yield values below 2.4, indicating an absence of collinearity issues (Hair et al., 2019). The HOCs were specified using the repeated indicators approach, also known as the hierarchical components model (Chin et al., 2003; Lohmöller, 1989). Convergent validity is tested using redundancy analysis (Cheah et al., 2018; Chin, 1998). A global single-item for each HOC is used for this purpose (Hair et al., 2016). Findings reveal a path coefficient of 0.896 for instrumental gratifications and a value of 0.917 for non-instrumental gratifications, which satisfy the conservative thresholds proposed by Chin (2010): a value of 0.80 is deemed adequate, while coefficients of 0.90 are very strong results. Hence, convergent validity could be established. Table 4 summarizes hypotheses testing using bootstrapping with 10,000 draws on a 0.05 level.

Table 4: Hypotheses testing. *LOC-HOC relation. IG = instrumental gratifications, NG = non-instrumental gratifications.

Path relation				Path coefficients (effect size f^2)	Confidence intervals (bias-corrected, 95 %)	T-statistics (p-value)
LOC-HOC relation						
	PR	→	IG	0.500*	[0.460, 0.540]	24.374 (< 0.001)
	IQ	→	IG	0.564*	[0.519, 0.622]	21.672 (< 0.001)
	EN	→	NG	0.644*	[0.482, 0.949]	5.653 (< 0.001)
	PI	→	NG	0.648*	[0.459, 0.829]	5.900 (< 0.001)
Hypothesis						
H1	IG	→	ITU	0.394 (0.228)	[0.241, 0.536]	5.235 (< 0.001)
H2	NG	→	ITU	0.258 (0.095)	[0.060, 0.414]	2.835 (0.004)
H3	SN	→	ITU	0.315 (0.209)	[0.168, 0.460]	4.235 (< 0.001)

PR and IQ have large and statistically significant weights regarding their HOC IG. This finding holds for EN and PI and their respective HOC NG, corroborating that each LOC is a critical part of its assigned gratification (Hair et al., 2016). Both gratification types have moderate positive impacts on ITU; however, their effect size is rather different: while IG yields a medium effect, NG can be considered small (see, e.g., Benitez et al., 2020). SN ranges between the gratification types in terms of path coefficient and effect size. Explanatory power is assessed employing the determination coefficient, exhibiting an

R^2 value of 0.640 for ITU (adjusted: 0.629). Cross-validated redundancy is employed to determine predictive relevance using a blindfolding procedure, yielding a Q^2 value of 0.530 for ITU. Values above zero indicate that the path model used to form an endogenous latent variable has predictive relevance (Hair et al., 2014). As Hair et al. (2019) propose, values above 0.50 indicate large predictive relevance. Finally, PLS Predict was used as a complement to gain more insights into predictive performance (Shmueli et al., 2016). A linear model was used as a benchmark. Errors in terms of RMSE and MAE were smaller for the PLS model, and Q^2 values exceeded the benchmark. Results are provided in Appendix D.

5.4 Moderator analyses

A series of analyses were performed to check for moderating effects. Following procedures recommended by Henseler and Chin (2010), orthogonalization and the two-step approach are used. Results presented in this section were derived using orthogonalization. Assessing the impact of age, no moderation effects were detected (AGExIG: path coefficient = 0.117, p = 0.425; AGExNG: path coefficient = -0.119, p = 0.547). Hence, no evidence for H4 and H6 could be found. Gender yields similar results, thus, H5 and H7 were not supported (GENDERxIG: path coefficient = -0.105, p = 0.464; GENDERxNG: path coefficient = -0.091, p = 0.488). Evaluating the influence of privacy concerns (PC), again, no striking results could be detected (PCxIG: path coefficient = 0.081, p = 0.526; PCxNG: path coefficient = -0.212, p = 0.324). In total, Figure 2 summarizes the central findings from PLS-SEM.

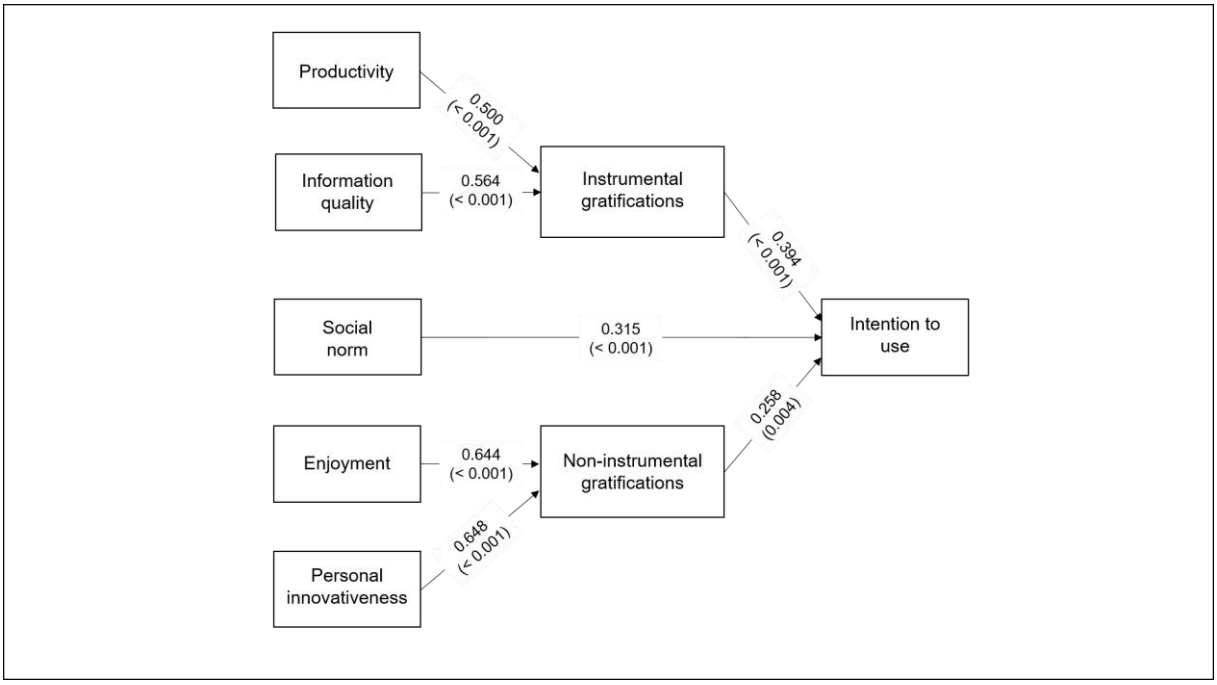

Figure 2: PLS results. Values indicate path coefficients. P-values in parentheses.

Note: Moderating relationships were non-significant and are omitted for better readability.

5.5 Necessary condition analysis

In addition to PLS-SEM, which captures variables' influence in terms of sufficiency, it is worth addressing the model from a necessity point of view. Necessary condition analysis (NCA, Dul, 2016) is applied for this purpose. Consistent with recommendations from the PLS-SEM literature, latent variable scores are estimated using the PLS algorithm and exported as input for NCA (Richter et al., 2020). NCA is not based on distributional assumptions, which renders it an adequate amendment of PLS-SEM. Table 5 presents the findings. Interestingly, SN does not provide any evidence for necessity, while IG and NG yield medium constraints on ITU (Dul, 2016).

Table 5: NCA results.

Note: Observations refer to cases located above the ceiling line. d = effect size, p = p-value derived from a bootstrapping procedure with 10,000 draws.

Condition (X)	Ceiling zone	Observations	Accuracy	d	p
IG	1.979	8	0.921	0.183	< 0.001
NG	2.168	3	0.970	0.184	< 0.001
SN	< 0.001	0	1.000	< 0.001	1

This overview can be complemented with a more granular analysis using the bottleneck technique. Table 6 displays the results. As can be seen, NG imposes constraints on the outcome even for reasonably low levels of Y. However, the overall requirements are fairly moderate: to achieve high outcome levels, demands slowly raise from about one-fifth to one-third and, finally, to about 50 % of NG. In contrast, IG yields more substantial constraints. Although for low outcome levels, no necessity is detected at all, demands quickly increase. At 70 % outcome level, IG and NG are about equal in their requirements. However, they rapidly diverge: about half of IG is necessary to allow 80 % of the outcome to occur, then two-thirds are required for 90 %, and almost the full range is demanded to achieve the highest level of 100 %. Consequently, the bottleneck technique allows a detailed inspection of the effects presented in Table 5.

Table 6: NCA bottleneck technique.

Note: Y denotes the outcome, i.e., ITU. All values in percent.

Y	IG	NG	SN
0	NN	NN	NN
10	NN	NN	NN
20	NN	NN	NN
30	NN	3.8	NN
40	NN	10.2	NN
50	NN	16.5	NN
60	5.3	22.9	NN
70	25.4	29.2	NN
80	45.5	35.6	NN
90	65.6	41.9	NN
100	85.8	48.3	NN

6 Discussion

6.1 Theoretical implications

The study at hand contributes to the literature in several ways. First, research on chatbots in the intra-organizational context is advanced, introducing OACs and giving insights into users' motives and expectations. Findings thus extend our knowledge of office and process automation, respectively. Second, the U&G approach is confirmed to be a fruitful method for the investigation of technology use. In terms of sufficiency, derived from PLS-SEM, IG, and NG as well as social norm positively affect coworkers' ITU. This finding is consistent with related work on technology acceptance, such as implementations of UTAUT and UTAUT2 (Venkatesh et al., 2003; Venkatesh et al., 2012), and identifies OACs as dual-purpose IS (Wu and Lu, 2013). From a necessity perspective, the constraints imposed by IG are striking, which corroborates the extant literature on technology acceptance detecting utilitarian aspects as major drivers (see, e.g., Davis, 1989; Venkatesh et al., 2012; Venkatesh and Davis, 2000). However, the study at hand presents evidence from a novel methodological view.

Hedonic facets yield less strict restrictions but may not be neglected. Hence, the importance of drawing a holistic picture of technology, as is initiated by the concept of dual-purpose IS, is corroborated as a vital advancement of our understanding of technology. Traditional approaches such as the Technology Acceptance Model (Davis, 1989) and UTAUT without additional constructs would not have been able to capture this critical information. Finally, SN was identified as not imposing any constraints. Consequently, an open, vivid, and innovative CWS atmosphere supports coworkers' ITU (i.e., is sufficient, as the PLS results indicate) but is not necessary. For example, PI may lead a coworker to OAC usage free of any social context. PLS-SEM findings support this possibility, with NG yielding a significant positive effect on ITU. However, this result also raises the question of coworker heterogeneity and corroborates the fruitfulness of typologies, such as the utilizer-socializer-learner triad (Bilandzic and Foth, 2013).

Findings further confirm earlier results by Brandtzaeg and Følstad (2017), indicating that motivation to use chatbots comprises both utilitarian intents and a sense of curiosity and novelty. Results from the PLS model show similarly substantial, positive impacts of IG and NG. Consistent with work by McLean and Osei-Frimpong (2019) on in-home voice assistants, instrumental gratifications were found to play a more substantial role than non-instrumental ones; however, hedonic benefits had a significant effect in the study at hand. This result also fits the notion by McQuail (1987) that media use generally exhibits the satisfaction of curiosity and interest as key factors. The difference may occur due to discrepancies in context: the study at hand was conducted in the work context, where individuals may be delighted to find additional hedonic factors in their daily work, while McLean and Osei-Frimpong (2019) investigated consumer settings. Besides, the devices' operation differs in terms of speech versus text. The impact of instrumental gratifications corroborates extant work in the field: previous findings indicate that OAC use helps self-organization, for example, through means of scheduling, but also keeping track of tasks and responsibilities (Toxtli et al., 2018).

Further, social influences appear to play a role in intention formation. Rauschnabel et al. (2018) proposed to take symbolic benefits into account when studying technology and found that individuals may employ gadgets such as smart glasses due to their visibility to others. This notion was adopted in the voice assistant context, where a weak but positive effect was found (McLean and Osei-Frimpong, 2019). The study at hand included social aspects but used a SN perspective instead of visibility or self-expressiveness, consistent with major technology acceptance frameworks such as TRA (Ajzen and Fishbein, 1975, 1980) and TPB (Ajzen, 1985, 1991). This choice was made to fit descriptions of CWS in the extant literature, depicting them as innovation hubs and vivid social atmospheres offering the potential for knowledge exchange, learning, creativity, and innovation (Bouncken and Reuschl, 2018; Garrett et al., 2017; Gerdenitsch et al., 2016), which may impose pressure on individual coworkers to live up to the image of coworking. Consequently, coworkers may employ OAC without compelling reasons, merely to fit in. Research on other innovation-related phenomena such as smartwatches has stressed the importance of purposefully displaying the use of a particular technology that is deemed progressive and desirable (Chuah et al., 2016). However, SN was not found to be a necessity.

Privacy risks do not seem to play a role, as the moderator analysis suggests. In part, this might be the case since OACs typically operate within the application the user is already employing; hence lack of trust in the provider would likely lead to discontinuance of the full software. Still, OACs may be offered by third parties that merely benefit from a halo effect elicited by the familiar software environment. Many tasks, such as project management, can be handled within workstream collaboration tools (either through a command language or through OACs) and from a third-party tool (Toxtli et al., 2018). In this case, the OAC usually connects both environments, i.e., information is stored within the third party's application. That is, privacy concerns may carry weight the more commonplace OACs become.

6.2 Practical implications

To allow users to exploit OACs' full potential, their benefits need to be communicated clearly and delimited in their capability range by vendors. In the particular case of CWS, by CWS providers or support staff. Distinct and salient feature sets might help users find an application appropriate for their current situation. As instrumental gratifications showed the most substantial impact on usage intention, OACs' capabilities to enhance task performance needs to be targeted. For this undertaking, a strong technical focus on high information quality is essential. However, to take users' demands for non-instrumental, hedonic gratifications into account, OACs must not be designed in a purely utilitarian, functional manner but need to provide an enjoyable experience. These two facets – instrumental and non-instrumental gratifications – are both necessary and sufficient conditions for users to form an intention to employ the OAC. Social aspects, on the other hand, were not found to be necessary but have a significant and positive impact in terms of sufficiency. Consequently, ongoing OAC dissemination will create a positive influence on individuals' usage intention by eliciting social pressure due to OAC ubiquity. However,

the results at hand indicate that these gratifications do not constrain usage intention but merely enhance it.

6.3 Limitations and future research

When interpreting the findings presented in this study, several limitations need to be taken into account. The sample size is moderate for gaining first insights; however, results need further corroboration for valid scientific inference. As sampling was conducted in Germany, implicit bearings such as cultural background need to be addressed for generalization. Finally, CWS members were selected as population, hence workers in different environments such as large enterprises may seek different gratifications from OAC usage. Further, global-level tools may serve as OAC in the future, depending on technological advancement and market demands, which would likely lead to additional gratifications and moderator variables.

As chatbots in general and OAC, in particular, are a fast-growing phenomenon, research is likely to embrace the topic in the near future at a high pace. It seems adequate to employ a variety of both qualitative and quantitative methods to gain a holistic understanding. Drawing on experiences during data collection for the study at hand, OAC have merely reached a small fraction of their full potential. They may thus be an exciting candidate for design science research. Findings are set on a rather general level and might be taken to the task-level in future studies. TRA-based models compatible with the study at hand have included the notion of task-technology fit to take this perspective into account (see, e.g., Dishaw and Strong, 1999 for integration with TAM; and Zhou et al., 2010 for integration with UTAUT).

For the CWS context that was used in this study, the capabilities of making coworkers visible and establish connections among them is another interesting research opportunity. Socializing plays a significant role in levering CWS's unique value propositions (Gerdenitsch et al., 2016) and may be supported through means of software applications (Kopplin, 2020). OACs appear to be natural candidates to facilitate this process and help integrate the digital and physical realms.

7 Conclusion

The study at hand investigated the technology acceptance of office-automation chatbots in coworking spaces. A combination of PLS-SEM and NCA was used to shed light on the topic from the perspectives of sufficient and necessary conditions. Social norms positively affect coworkers' intention to use a work-related chatbot but are not a necessary condition. Considering instrumental gratifications, their effects are most substantial both in terms of sufficiency and necessity. Non-instrumental gratifications are vital but second in place. Hence, utilitarian aspects are critically necessary for chatbot usage in the workplace, and hedonic facets may be viewed as supportive but not indispensable.

References

Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. MIS Quarterly, 24(4), 665–694.

Agarwal, R., & Prasad, J. (1998). A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology. Information Systems Research, 9(2), 204–215.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. Action control. Springer, 11–39.

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211.

Ajzen, I., & Fishbein, M. (1975). Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Addison-Wesley.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood cliffs NJ: Prentice–Hall.

Alepis, E., & Patsakis, C. (2017). Monkey says, monkey does: security and privacy on voice assistants. IEEE Access 5, 17841–17851.

Babrow, A. S. (1987). Student motives for watching soap operas. Journal of Broadcasting & Electronic Media, 31(3), 309–321.

Benitez, J., Henseler, J., Castillo, A., & Schuberth, F. (2020). How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research. Information & Management, 57(2), 103168.

Benson, A. D., Johnson, S. D., & Kuchinke, K. P. (2002). The Use of Technology in the Digital Workplace: A Framework for Human Resource Development. Advances in Developing Human Resources, 4(4), 392–404.

Bianchi, F., Casnici, N., & Squazzoni, F. (2018). Solidarity as a byproduct of professional collaboration: Social support and trust in a coworking space. Social Networks, 54, 61–72.

Bilandzic, M., & Foth, M. (2013). Libraries as coworking spaces: Understanding user motivations and perceived barriers to social learning. Library Hi Tech, 31(2), 254–273.

Blagoev, B., Costas, J., & Kärreman, D. (2019). 'We are all herd animals': Community and organizationality in coworking spaces. Organization, 26(6), 894–916.

Bouncken, R. B., Aslam, M. M., & Qiu, Y. (2020). Coworking spaces: Understanding, using, and managing sociomateriality. Business Horizons, 64(1), 119–130.

Bouncken, R. B., Laudien, S. M., Fredrich, V., & Görmar, L. (2018). Coopetition in coworking-spaces: value creation and appropriation tensions in an entrepreneurial space. Review of Managerial Science, 12(2), 385–410.

Bouncken, R. B., & Reuschl, A. J. (2018). Coworking-spaces: how a phenomenon of the sharing economy builds a novel trend for the workplace and for entrepreneurship. Review of Managerial Science, 12(1), 317–334.

Brandtzaeg, P.B., & Følstad, A. (2017). Why People Use Chatbots, in: Kompatsiaris, Y. (Ed.), Internet science. 4th international conference, INSCI 2017, Thessaloniki, Greece, November 22-24, 2017: proceedings, vol. 10673. Springer, Cham, 377–392.

Chau, P. Y. K., & Hui, K. L. (1998). Identifying early adopters of new IT products: A case of Windows 95. Information & Management, 33(5), 225–230.

Cheah, J. H., Sarstedt, M., Ringle, C. M., Ramayah, T., & Ting, H. (2018). Convergent validity assessment of formatively measured constructs in PLS-SEM. International Journal of Contemporary Hospitality Management, 30(11), 3192–3210.

Cheung, C. M. K., & Lee, M. K. O. (2009). Understanding the sustainability of a virtual community: model development and empirical test. Journal of Information Science, 35(3), 279–298.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. Modern Methods for Business Research, 295(2), 295–336.

Chin, W. W. (2010). How to Write Up and Report PLS Analyses, in: Esposito Vinzi, V., Chin, W.W., Henseler, J., Wang, H. (Eds.), Handbook of Partial Least Squares: Concepts, Methods and Applications. Springer Berlin Heidelberg, Berlin, Heidelberg, 655–690.

Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A Partial Least Squares Latent Variable Modeling Approach for Measuring Interaction Effects: Results from a Monte Carlo Simulation Study and an Electronic-Mail Emotion/Adoption Study. Information Systems Research, 14(2), 189–217.

Chiu, C. M., & Huang, H. Y. (2015). Examining the antecedents of user gratification and its effects on individuals' social network services usage: the moderating role of habit. European Journal of Information Systems, 24(4), 411–430.

Chou, M. C., & Liu, C. H. (2016). Mobile instant messengers and middle-aged and elderly adults in Taiwan: Uses and gratifications. International Journal of Human–Computer Interaction, 32(11), 835–846.

Chuah, S. H. W., Rauschnabel, P. A., Krey, N., Nguyen, B., Ramayah, T., & Lade, S. (2016). Wearable technologies: The role of usefulness and visibility in smartwatch adoption. Computers in Human Behavior, 65, 276–284.

Cutler, N. E., & Danowski, J. A. (1980). Process gratification in aging cohorts. Journalism Quarterly, 57(2), 269–276.

Dale, R. (2016). The return of the chatbots. Natural Language Engineering, 22(5), 811–817.

Davenport, T. H., & Kirby, J. (2015). Beyond Automation. Harvard Business Review, 93(6), 58–65.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340.

Dimmick, J., Kline, S., & Stafford, L. (2000). The Gratification Niches of Personal E-mail and the Telephone: Competition, Displacement, and Complementarity. Communication research, 27(2), 227–248.

Dishaw, M. T., & Strong, D. M. (1999). Extending the technology acceptance model with task–technology fit constructs. Information & Management, 36(1), 9–21.

Dul, J. (2016). Necessary condition analysis (NCA) logic and methodology of "necessary but not sufficient" causality. Organizational Research Methods, 19(1), 10–52.

Elliott, W. R., & Rosenberg, W. L. (1987). The 1985 Philadelphia Newspaper Strike: A Uses and Gratifications Study. Journalism Quarterly, 64(4), 679–687.

Ferguson, D. A., & Perse, E. M. (2000). The World Wide Web as a functional alternative to television. Journal of Broadcasting & Electronic Media, 44(2), 155–174.

Ferrara, E., Varol, O., Davis, C. B., Menczer, F., & Flammini, A. (2016). The Rise of Social Bots. Communications of the ACM, 59(9), 96–104.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

Gan, C., & Li, H. (2018). Understanding the effects of gratifications on the continuance intention to use WeChat in China: A perspective on uses and gratifications. Computers in Human Behavior, 78, 306–315.

Gandini, A. (2015). The rise of coworking spaces: A literature review. Ephemera, 15(1), 193.

Wang, X., White, L., Chen, X., Gao, Y., Li, H., & Luo, Y. (2015). An empirical study of wearable technology acceptance in healthcare. Industrial Management & Data Systems, 115(9), 1704–1723.

Garrett, L. E., Spreitzer, G. M., & Bacevice, P. A. (2017). Co-constructing a Sense of Community at Work: The Emergence of Community in Coworking Spaces. Organization Studies, 38(6), 821–842.

Gerdenitsch, C., Scheel, T. E., Andorfer, J., & Korunka, C. (2016). Coworking Spaces: A Source of Social Support for Independent Professionals. Frontiers in Psychology, 7, 581.

GP Bullhound, 2019. Will Slack become the next technology titan? Available at https://www.gpbullhound.com/insights/slack-biggest-disruptor-since-salesforce/.

Gregory, R. W., Kaganer, E., Henfridsson, O., & Ruch, T. J. (2018). IT Consumerization and the Transformation of IT Governance. MIS Quarterly, 42(4), 1225–1253.

Ha, S., & Stoel, L. (2009). Consumer e-shopping acceptance: Antecedents in a technology acceptance model. Journal of Business Research, 62(5), 565–571.

Hair, Jr. J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM). European Business Review, 26(2), 106–121.

Hair, Jr. J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. Journal of Marketing theory and Practice, 19(2), 139–152.

Hair, Jr. J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24.

Hair, Jr, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). A primer on partial least squares structural equation modeling (PLS-SEM). Sage Publications.

Harris, J., Ives, B., Junglas, I. A. (2012). IT Consumerization: When Gadgets Turn Into Enterprise IT Tools. MIS Quarterly Executive, 11(3), 99–112.

Hassenzahl, M., & Tractinsky, N. (2006). User experience-a research agenda. Behaviour & Information Technology, 25(2), 91–97.

Henseler, J., & Chin, W. W. (2010). A Comparison of Approaches for the Analysis of Interaction Effects Between Latent Variables Using Partial Least Squares Path Modeling. Structural Equation Modeling: A Multidisciplinary Journal, 17(1), 82–109.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. Advances in International Marketing, 20, 277–319.

Holsapple, C. W., & Wu, J. (2007). User acceptance of virtual worlds. ACM SIGMIS Database, 38(4), 86.

Hoy, M. B. (2018). Alexa, Siri, Cortana, and more: an introduction to voice assistants. Medical Reference Services Quarterly, 37(1), 81–88.

Hsu, C. L., & Lin, J. C. C. (2008). Acceptance of blog usage: The roles of technology acceptance, social influence and knowledge sharing motivation. Information & Management, 45(1), 65–74.

Huang, J., & Zhou, L. (2018). Timing of web personalization in mobile shopping: A perspective from Uses and Gratifications Theory. Computers in Human Behavior, 88, 103–113.

Huang, M. H., & Rust, R. T. (2018). Artificial Intelligence in Service. Journal of Service Research, 21(2), 155–172.

Ifinedo, P. (2016). Applying uses and gratifications theory and social influence processes to understand students' pervasive adoption of social networking sites: Perspectives from the Americas. International Journal of Information Management, 36(2), 192–206.

Igbaria, M. (1994). An examination of the factors contributing to microcomputer technology acceptance. Accounting, Management and Information Technologies, 4(4), 205–224.

Jarrahi, M. H., Crowston, K., Bondar, K., & Katzy, B. (2017). A pragmatic approach to managing enterprise IT infrastructures in the era of consumerization and individualization of IT. International Journal of Information Management, 37(6), 566–575.

Katz, E., Blumler, J. G., & Gurevitch, M. (1973). Uses and gratifications research. The Public Opinion Quarterly, 37(4), 509–523.

Kela, J., Korpipää, P., Mäntyjärvi, J., Kallio, S., Savino, G., Jozzo, L., & Di Marca, S. (2006). Accelerometer-based gesture control for a design environment. Personal and Ubiquitous Computing, 10(5), 285–299.

Kim, M. J., Lee, C. K., & Contractor, N. S. (2019). Seniors' usage of mobile social network sites: Applying theories of innovation diffusion and uses and gratifications. Computers in Human Behavior, 90, 60–73.

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of e-Collaboration (ijec), 11(4), 1–10.

Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. Information Systems Journal, 28(1), 227–261.

Köhler, C. F., Rohm, A. J., Ruyter, K., & DeWetzels, M. (2011). Return on Interactivity: The Impact of Online Agents on Newcomer Adjustment. Journal of Marketing, 75(2), 93–108.

Kopplin, C. S. (2020). Two heads are better than one: Matchmaking tools in coworking spaces. Review of Managerial Science, 1–25.

Kopplin, C. S., & Baier, D. (2020). How to Construct an Ideal Collaboration Tool for Coworking Spaces: An SP-CBC Application. Archives of Data Science Series A, 6(2).

Köse, D. B., & Hamari, J. (2019). Dual Information Systems: A Review Of Factors Affecting Their Use. Americas conference on information systems. Association for Information Systems.

Kujala, S., Mugge, R., & Miron-Shatz, T. (2017). The role of expectations in service evaluation: A longitudinal study of a proximity mobile payment service. International Journal of Human-Computer Studies, 98, 51–61.

Lee, H. E., & Cho, J. (2017). What motivates users to continue using diet and fitness apps? Application of the uses and gratifications approach. Health Communication, 32(12), 1445–1453.

Lee, H. J., Cho, H. J., Xu, W., & Fairhurst, A. (2010). The influence of consumer traits and demographics on intention to use retail self-service checkouts. Marketing Intelligence & Planning, 28(1), 46–58.

Lee, W. P., Kaoli, C., & Huang, J. Y. (2014). A smart TV system with body-gesture control, tag-based rating and context-aware recommendation. Knowledge-Based Systems, 56, 167–178.

Lemire, M., Paré, G., Sicotte, C., & Harvey, C. (2008). Determinants of Internet use as a preferred source of information on personal health. International Journal of Medical Informatics, 77(11), 723–734.

Li, H., Liu, Y., Xu, X., Heikkilä, J., & Van Der Heijden, H. (2015). Modeling hedonic is continuance through the uses and gratifications theory: An empirical study in online games. Computers in Human Behavior, 48, 261–272.

Liang, T. P., Lai, H. J., & Ku, Y. C. (2006). Personalized Content Recommendation and User Satisfaction: Theoretical Synthesis and Empirical Findings. Journal of Management Information Systems, 23(3), 45–70.

Lohmöller, J. B. (1989). Latent Variable Path Modeling with Partial Least Squares. Physica-Verlag HD, Heidelberg.

Lu, J., Yao, J. E., & Yu, C. S. (2005). Personal innovativeness, social influences and adoption of wireless Internet services via mobile technology. The Journal of Strategic Information Systems, 14(3), 245–268.

Luo, X., Tong, S., Fang, Z., & Qu, Z. (2019). Frontiers: Machines vs. Humans: The Impact of Artificial Intelligence Chatbot Disclosure on Customer Purchases. Marketing Science.

Malik, A., Dhir, A., & Nieminen, M. (2016). Uses and gratifications of digital photo sharing on Facebook. Telematics and Informatics, 33(1), 129–138.

Mark, G., Gudith, D., & Klocke, U. (2008). The cost of interrupted work, in: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. Proceeding of the twenty-sixth annual CHI conference, Florence, Italy. 4/5/2008 - 4/10/2008. ACM, New York, NY, 107.

McLean, G., & Osei-Frimpong, K. (2019). Hey Alexa… examine the variables influencing the use of artificial intelligent in-home voice assistants. Computers in Human Behavior 99, 28–37.

McMillan, R. (2016). Facebook Hopes Chatbots Can Solve App Overload. The Wall Street Journal.

McQuail, D. (1987). Mass communication theory: An introduction. Sage Publications.

Mendelsohn, H. (1964). Listening to radio. People, Society and Mass Communication, 239–248.

Moorthy, E. A., & Vu, K. P. L. (2015). Privacy concerns for use of voice activated personal assistant in the public space. International Journal of Human–Computer Interaction, 31(4), 307–335.

Moriset, B. (2013). Building new places of the creative economy. The rise of coworking spaces. https://halshs.archives-ouvertes.fr/halshs-00914075.

Mun, Y. Y., & Hwang, Y. (2003). Predicting the use of web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. International Journal of Human-Computer Studies, 59(4), 431–449.

Mun, Y. Y., Jackson, J. D., Park, J. S., & Probst, J. C. (2006). Understanding information technology acceptance by individual professionals: Toward an integrative view. Information & Management, 43(3), 350–363.

O'Donohoe, S. (1994). Advertising uses and gratifications. European Journal of Marketing, 28(8/9), 52–75.

Orlikowski, W. J. (2007). Sociomaterial practices: Exploring technology at work. Organization Studies, 28(9), 1435–1448.

Palmgreen, P., & Rayburn, J. D. (1979). Uses and Gratifications and Exposure To Public Television. Communication Research, 6(2), 155–179.

Peart, A. (2019). Elevate Your Enterprise's Chatbot Capabilities To Reach Greater Efficiencies. Forbes. Available at https://www.forbes.com/sites/forbescommunicationscouncil/2019/11/06/elevate-your-enterprises-chatbot-capabilities-to-reach-greater-efficiencies/?sh=1e1e0b205af7.

Phua, J., Jin, S. V., & Kim, J. (2017). Uses and gratifications of social networking sites for bridging and bonding social capital: A comparison of Facebook, Twitter, Instagram, and Snapchat. Computers in Human Behavior, 72, 115–122.

Pikkarainen, T., Pikkarainen, K., Karjaluoto, H., & Pahnila, S. (2004). Consumer acceptance of online banking: an extension of the technology acceptance model. Internet Research, 14(3), 224–235.

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. Journal of Management, 12(4), 531–544.

Press, G. (2019). AI Stats News: 62% Of US Consumers Like Using Chatbots To Interact With Businesses. Forbes. Available at https://www.forbes.com/sites/gilpress/2019/10/25/ai-stats-news-us-consumers-interest-in-using-chatbots-to-interact-with-businesses-rise-to-62/.

Rauschnabel, P. A., He, J., & Ro, Y. K. (2018). Antecedents to the adoption of augmented reality smart glasses: A closer look at privacy risks. Journal of Business Research, 92, 374–384.

Rauschnabel, P. A., Rossmann, A., & tom Dieck, M. C. (2017). An adoption framework for mobile augmented reality games: The case of Pokémon Go. Computers in Human Behavior, 76, 276–286.

Ray, A., Dhir, A., Bala, P. K., & Kaur, P. (2019). Why do people use food delivery apps (FDA)? A uses and gratification theory perspective. Journal of Retailing and Consumer Services, 51, 221–230.

Rese, A., Kopplin, C. S., & Nielebock, C. (2020). Factors influencing members' knowledge sharing and creative performance in coworking spaces. Journal of Knowledge Management, 24(9), 2327–2354.

Reynolds, J. (2018). Workstream Collaboration: What It Is & Why You Need It. Available at https://mattermost.com/blog/why-workstream-collaboration/.

Richter, N. F., Schubring, S., Hauff, S., Ringle, C. M., & Sarstedt, M. (2020). When predictors of outcomes are necessary: Guidelines for the combined use of PLS-SEM and NCA. Industrial Management & Data Systems, 120(2), 2243–2257.

Ringle, C. M., Wende, S., & Becker, J. M. (2015). SmartPLS 3. SmartPLS GmbH.

Ruggiero, T. E. (2000). Uses and gratifications theory in the 21st century. Mass Communication & Society, 3(1), 3–37.

Saad, S., & Abida, F. (2016). Social Interactivity and Its Impact on a User's Approach Behavior in Commercial Web Sites: A Study Case of Virtual Agent Presence. Journal of Marketing Management, 4(2), 63–80.

Schmidt, S., & Brinks, V. (2017). Open creative labs: Spatial settings at the intersection of communities and organizations. Creativity and Innovation Management, 26(3), 291–299.

Schopfel, J., Roche, J., & Hubert, G. (2015). Coworking and innovation: new concepts for academic libraries and learning centres. New Library World, 116(1/2), 67–78.

Sergott, T. (2019). How Conversational Interfaces and Chatbots Are Reshaping Contingent Labor Management. Forbes. Available at https://www.forbes.com/sites/forbestechcouncil/2019/11/06/how-conversational-interfaces-and-chatbots-are-reshaping-contingent-labor-management/?sh=683ee9ea7618.

Shmueli, G., Ray, S., Estrada, J. M. V., & Chatla, S. B. (2016). The elephant in the room: Predictive performance of PLS models. Journal of Business Research, 69(10), 4552–4564.

Slack (2020). An introduction to Slackbot. Available at: https://slack.com/help/articles/202026038-An-introduction-to-Slackbot.

Spinuzzi, C. (2012). Working Alone Together. Journal of Business and Technical Communication, 26(4), 399–441.

Spinuzzi, C., Bodrožić, Z., Scaratti, G., & Ivaldi, S. (2019). "Coworking is about community": but what is "community" in coworking? Journal of Business and Technical Communication, 33(2), 112–140.

Srivastava, R. K., Alpert, M. I., & Shocker, A. D. (1984). A Customer-oriented Approach for Determining Market Structures. Journal of Marketing, 48(2), 32–45.

Stafford, T. F., Stafford, M. R., & Schkade, L. L. (2004). Determining Uses and Gratifications for the Internet. Decision Sciences, 35(2), 259–288.

Stieglitz, S., Brachten, F., & Kissmer, T. (2018). Defining Bots in an Enterprise Context. Thirty Ninth International Conference on Information Systems, San Francisco.

Thüring, M., & Mahlke, S. (2007). Usability, aesthetics and emotions in human–technology interaction. International Journal of Psychology, 42(4), 253–264.

Toxtli, C., Monroy-Hernández, A., & Cranshaw, J. (2018). Understanding Chatbot-mediated Task Management, in: CHI 2018. Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, April 21-26, 2018, Montreal, QC, Canada. the 2018 CHI Conference, Montreal QC, Canada. 4/21/2018 - 4/26/2018. ACM, New York, NY, 1–6.

Van den Broeck, E., Zarouali, B., & Poels, K. (2019). Chatbot advertising effectiveness: When does the message get through? Computers in Human Behavior, 98, 150–157.

Van der Heijden, H. (2004). User acceptance of hedonic information systems. MIS Quarterly, 28(4), 695–704.

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Management Science, 46(2), 186–204.

Venkatesh, V., & Morris, M. G., & Davis, G. B. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27(3), 425.

Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. MIS Quarterly, 36(1), 157.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. Decision Sciences, 39(2), 273–315.

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. MIS Quarterly, 24(1), 115–139.

Waters-Lynch, J., & Potts, J. (2017). The social economy of coworking spaces: a focal point model of coordination. Review of Social Economy, 75(4), 417–433.

Weinberger, M. (2016). Satya Nadella says Microsoft's next big thing will 'fundamentally revolutionize' how people use computers. Business Insider. Available at https://www.businessinsider.in/Satya-Nadella-says-Microsofts-next-big-thing-will-fundamentally-revolutionize-how-people-use-computers/articleshow/53158814.cms.

Weizenbaum, J. (1966). ELIZA---a computer program for the study of natural language communication between man and machine. Communications of the ACM, 9(1), 36–45.

Wixom, B. H., & Todd, P. A. (2005). A Theoretical Integration of User Satisfaction and Technology Acceptance. Information Systems Research, 16(1), 85–102.

Wu, J., & Lu, X. (2013). Effects of extrinsic and intrinsic motivators on using utilitarian, hedonic, and dual-purposed information systems: A meta-analysis. Journal of the Association for Information Systems, 14(3), 1.

Xu, C., Ryan, S., Prybutok, V., & Wen, C. (2012). It is not for fun: An examination of social network site usage. Information & Management, 49(5), 210–217.

Xu, H., & Gupta, S. (2009). The effects of privacy concerns and personal innovativeness on potential and experienced customers' adoption of location-based services. Electronic Markets, 19(2-3), 137–149.

Yoo, Y. (2010). Computing in everyday life: A call for research on experiential computing. MIS Quarterly, 34(2), 213–231.

Zarouali, B., Van den Broeck, E., Walrave, M., & Poels, K. (2018). Predicting consumer responses to a chatbot on Facebook. Cyberpsychology, Behavior, and Social Networking, 21(8), 491–497.

Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. Computers in Human Behavior, 26(4), 760–767.

Appendix

Appendix A: Constructs and indicators

Construct	Items		Based on
Productivity	PR_1	The chatbot responds promptly.	Brandtzaeg and Følstad (2017b)
	PR_2	Using a chatbot reduces effort.	
	PR_3	Using a chatbot saves time.	
	PR_4	The chatbot handles tasks in a more efficient way than I could handle them.	
	PR_5	The chatbot helps me organize my daily work.	
Enjoyment	EN_1	I enjoy using a chatbot.	Kujala et al. (2017)
	EN_2	I use a chatbot when I am bored at work.	
	EN_3	Chatbots help create an appealing working atmosphere.	
	EN_4	I am satisfied with the chatbot.	
Information quality	IQ_1	A chatbot provides me with the most current information.	Wixom and Todd (2005)
	IQ_2	Chatbots supply useful information.	
	IQ_3	In the workplace, a chatbot offers precise data.	
	IQ_4	Chatbots provide correct information for my work.	
Personal innovativeness	PI_1	If I heard about new information technology, I would look for ways to experiment with IS.	Agarwal and Prasad (1998)
	PI_2	Among my peers, I am usually the first to try out new information technologies.	
	PI_3	I like to experiment with new information technologies.	
	PI_4	In general, I am hesitant to try out new information technologies.	
Privacy risk	PD_1	I believe that chatbots may save private information.	Rauschnabel et al. (2017)
	PD_2	Using a chatbot in the workplace invades my privacy.	
	PD_3	Chatbots may collect personal data.	
Social norm	SN_1	My organization expects me to use chatbots.	Gao et al. (2015)
	SN_2	Within my organization, chatbots are part of daily business.	
	SN_3	Chatbots extend my professional network.	
	SN_4	IS is easy to connect to others using a chatbot.	
Intention to use	IN_1	Assuming I have access to a chatbot, I intend to use IS.	Venkatesh and Davis (2000)
	IN_2	Given that I have access to a chatbot, I predict that I would use IS.	
	IN_3	In the future, I plan to use chatbots in the workplace.	

Appendix B: Indicator covariance matrix

	EN1	EN2	EN3	EN4	IQ1	IQ2	IQ3	IQ4	IQ5	ITU1	ITU2	ITU3	PI1	PI2	PI3	PI4	PR1	PR2	PR3	PR4	PR5	SN1	SN2	SN3	SN4
EN1	1.671	0.466	0.795	1.063	1.373	1.235	0.914	0.736	0.891	1.298	1.113	0.963	0.309	0.405	0.302	0.334	0.963	1.010	0.943	0.713	1.043	0.538	0.648	0.575	0.733
EN2	0.466	1.309	0.664	0.385	0.541	0.340	0.096	0.094	0.314	0.208	0.200	0.137	-0.256	-0.203	-0.292	0.009	0.364	0.396	0.233	0.296	0.036	0.243	0.185	0.358	0.326
EN3	0.795	0.664	1.332	0.915	0.863	0.739	0.393	0.298	0.487	0.728	0.552	0.455	0.047	0.142	0.031	-0.025	0.482	0.644	0.620	0.651	0.499	0.397	0.559	0.602	0.562
EN4	1.063	0.385	0.915	1.636	1.096	1.204	0.776	0.697	0.702	1.176	0.981	0.876	0.213	0.298	0.218	0.233	0.598	0.911	0.926	0.841	0.915	0.608	0.812	0.543	0.752
IQ1	1.373	0.541	0.863	1.096	2.114	1.613	0.979	0.815	1.155	1.367	1.307	1.065	0.187	0.197	0.271	0.266	1.295	1.050	1.032	1.042	1.010	0.666	0.992	0.553	0.784
IQ2	1.235	0.340	0.739	1.204	1.613	1.780	1.172	1.011	1.096	1.408	1.278	1.073	0.284	0.301	0.293	0.331	1.043	1.069	1.138	0.979	1.012	0.546	0.858	0.438	0.662
IQ3	0.914	0.096	0.393	0.776	0.979	1.172	1.440	1.108	0.819	1.012	0.771	0.853	0.202	0.126	0.192	0.231	0.836	0.802	0.908	0.903	0.710	0.375	0.645	0.099	0.319
IQ4	0.736	0.094	0.298	0.697	0.815	1.011	1.108	1.424	0.800	0.826	0.643	0.772	0.269	0.201	0.263	0.316	0.771	0.683	0.806	0.613	0.543	0.235	0.511	0.034	0.158
IQ5	0.891	0.314	0.487	0.702	1.155	1.096	0.819	0.800	1.332	0.839	0.783	0.596	0.046	-0.026	0.101	0.236	0.879	0.743	0.773	0.629	0.775	0.335	0.482	0.279	0.609
ITU1	1.298	0.208	0.728	1.176	1.367	1.408	1.012	0.826	0.839	2.150	1.597	1.660	0.484	0.387	0.453	0.342	0.973	0.911	0.923	0.936	1.048	0.776	1.140	0.689	0.946
ITU2	1.113	0.200	0.552	0.981	1.307	1.278	0.771	0.643	0.783	1.597	1.973	1.504	0.503	0.365	0.480	0.388	0.979	0.832	0.779	0.733	0.900	0.732	1.074	0.577	0.862
ITU3	0.963	0.137	0.455	0.876	1.065	1.073	0.853	0.772	0.596	1.660	1.504	2.008	0.629	0.435	0.567	0.307	0.923	0.782	0.914	0.955	0.867	0.713	1.068	0.547	0.628
PI1	0.309	-0.256	0.047	0.213	0.187	0.284	0.202	0.269	0.046	0.484	0.503	0.629	1.059	0.927	0.931	0.279	0.341	0.337	0.349	0.345	0.350	0.121	0.319	0.060	-0.031
PI2	0.405	-0.203	0.142	0.298	0.197	0.301	0.126	0.201	-0.026	0.387	0.365	0.435	0.927	1.486	0.857	0.402	0.196	0.327	0.349	0.374	0.451	0.201	0.345	0.221	-0.052
PI3	0.302	-0.292	0.031	0.218	0.271	0.293	0.192	0.263	0.101	0.453	0.480	0.567	0.931	0.857	1.049	0.306	0.340	0.366	0.394	0.328	0.351	0.114	0.335	0.016	-0.059
PI4	0.334	0.009	-0.025	0.233	0.266	0.331	0.231	0.316	0.236	0.342	0.388	0.307	0.279	0.402	0.306	1.035	0.310	0.158	0.152	0.072	0.125	0.207	0.362	0.062	0.052
PR1	0.963	0.364	0.482	0.598	1.295	1.043	0.836	0.771	0.879	0.973	0.979	0.923	0.341	0.196	0.340	0.310	1.677	0.970	0.888	0.814	0.729	0.395	0.556	0.297	0.507
PR2	1.010	0.396	0.644	0.911	1.050	1.069	0.802	0.683	0.743	0.911	0.832	0.782	0.337	0.327	0.366	0.158	0.970	1.663	1.495	0.980	1.000	0.337	0.446	0.307	0.426
PR3	0.943	0.233	0.620	0.926	1.032	1.138	0.908	0.806	0.773	0.923	0.779	0.914	0.349	0.349	0.394	0.152	0.888	1.495	1.665	1.103	1.050	0.252	0.440	0.206	0.251
PR4	0.713	0.296	0.651	0.841	1.042	0.979	0.903	0.613	0.629	0.936	0.733	0.955	0.345	0.374	0.328	0.072	0.814	0.980	1.103	1.741	0.902	0.613	0.794	0.215	0.295
PR5	1.043	0.036	0.499	0.915	1.010	1.012	0.710	0.543	0.775	1.048	0.900	0.867	0.350	0.451	0.351	0.125	0.729	1.000	1.050	0.902	1.859	0.464	0.558	0.403	0.536
SN1	0.538	0.243	0.397	0.608	0.666	0.546	0.375	0.235	0.335	0.776	0.732	0.713	0.121	0.201	0.114	0.207	0.395	0.337	0.252	0.613	0.464	1.305	1.095	0.579	0.801
SN2	0.648	0.185	0.559	0.812	0.992	0.858	0.645	0.511	0.482	1.140	1.074	1.068	0.319	0.345	0.335	0.362	0.556	0.446	0.440	0.794	0.558	1.095	1.957	0.761	1.022
SN3	0.575	0.358	0.602	0.543	0.553	0.438	0.099	0.034	0.279	0.689	0.577	0.547	0.060	0.221	0.016	0.062	0.297	0.307	0.206	0.215	0.403	0.579	0.761	1.246	1.126
SN4	0.733	0.326	0.562	0.752	0.784	0.662	0.319	0.158	0.609	0.946	0.862	0.628	-0.031	-0.052	-0.059	0.052	0.507	0.426	0.251	0.295	0.536	0.801	1.022	1.126	1.662

Appendix C: Fornell-Larcker criterion

	PR	IQ	SN	EN	PI	ITU
PR	0.818					
IQ	0.763	0.853				
SN	0.374	0.433	0.830			
EN	0.686	0.715	0.554	0.778		
PI	0.328	0.217	0.158	0.198	0.821	
ITU	0.633	0.682	0.604	0.639	0.388	0.922

Appendix D: PLS Predict results

Note: LM = linear model

Indicator	PLS RMSE	PLS MAE	PLS Q^2	LM RMSE	LM MAE	LM Q^2
ITU_1	0.952	0.739	0.588	1.131	0.836	0.418
ITU_2	0.990	0.808	0.516	1.130	0.883	0.368
ITU_3	1.059	0.832	0.455	1.183	0.930	0.320

Essay 6: A Funnel Perspective on Technology Acceptance and Links to Preference

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Abstract

User acceptance of information technology has been a key issue within information systems research since the establishment of the technology acceptance model in the 1980s. All subsequently proposed acceptance models draw on the same theoretical foundation, the Theory of Reasoned Action, assuming that the notion of technology acceptance is captured by technology usage and its predecessor usage intention. However, extant models have been criticized for falling short with regard to aspects such as the conceptualization of acceptance and use behavior and the intention-behavior linkage, among others. Thus, we attempt to tackle these problems by merging insights of established consumer research with technology acceptance measurement to create a new framework: a funnel perspective with different sets of alternatives is developed spanning an information technology's lifecycle and helping to integrate different measures and structural models. Technology acceptance is reframed as an ongoing process of constant reevaluation. The iterative process nature provides links between adoption, continuance, and discontinuance phenomena, and relates individuals' technology assessment to preference measurement.

Keywords technology acceptance; technology use; set of alternatives; technology lifecycle; funnel perspective; preference measurement

1 Introduction

User acceptance of information technology (IT) as a major and persistent challenge for decision-makers has led to a steadily growing body of literature and yielded a variety of often-tested models. Thereby, most technology acceptance models drew on the theoretical skeleton of the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975), and particularly the emergence of the subsequent technology acceptance model (TAM) (Davis, 1985, 1989) triggered the advent of the vast field of technology acceptance research. Today, we look back on almost four decades of research with a myriad of publications providing unifications, novel perspectives, and covering a wide range of application areas. Without any doubt, technology acceptance models are among the most remarkable accomplishments within information systems (IS) literature.

Nevertheless, few voices have been raised demanding a paradigm shift within technology acceptance measurement by criticizing the ambiguous conceptualization of acceptance (Schwarz and Chin, 2007), the uncritically accepted intention-behavior relation (Bagozzi, 2007), and the operationalization of use behavior lacking a multiplicity of dimensions (Bagozzi, 2007; Burton-Jones and Straub, 2006; Sun, 2012), among others. Indeed, most IS publications are mere replications or applications of earlier models, displaying their feasibility without adding much new insight or in-depth understanding of technology acceptance and technology use behavior.

Within this paper, we seek to briefly outline the vast field of technology acceptance research with a focus on theoretical development and aim at deriving theoretical conclusions from the current state of knowledge to identify meaningful opportunities for further evolution. More specifically, we intend to incorporate elements of consumer buying behavior research (see, e.g., Howard and Sheth 1969) into technology acceptance literature as a starting point to tackle the outlined problems concerned with technology acceptance measurement. We hence seek to contribute to the extant body of technology acceptance literature by providing a classificatory framework, i.e., analytical theory, answering the question of 'what is it that we are studying' (Gregor, 2006; Soliman and Rinta-Kahila, 2020).

The remainder of this paper is organized as follows: Section 2 elucidates reflections on technology acceptance measurement. Our original framework is composed and explained in Section 3. Section 4 discusses our theoretical contribution and provides guidance on how to use and combine our proposed framework. The paper ends with concluding remarks.

2 Reflections on Technology Acceptance Measurement

To gather a thorough understanding of technology acceptance models, it is helpful to trace back their roots to the TRA (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) and Theory of Planned Behavior (TPB, Ajzen, 1985, 1991). Preceding attitude-behavior models and notably, the identification of inconsistencies in the attitude-behavior relation (LaPiere, 1934; Wicker, 1969) provided a fruitful path for further research models within social psychology literature in the late 1960s to overcome this bivariate discrepancy. The TRA thus added two additional constructs and assumes that subjective norm and attitude influence behavior via a mediating cognitive link, i.e., behavioral intention. The subsequent TPB further included an individual's perception of being in charge of his or her behavior in order to describe settings with incomplete volitional control (i.e., perceived behavioral control, Ajzen, 1991). Hence, in essence, TRA and TPB describe an individual's behavior as the last step in a process chain comprising attitude and intention formation as predecessors, both of which are subject to several influences themselves (Fishbein and Ajzen, 1975). Behaviors, i.e., actions, are 'reasoned' in the sense that they are the outcome of a sound developmental process, and intentions can be accurately predicted from attitudes.

All major technology acceptance models – such as TAM (Davis, 1985, 1989), TAM2 (Venkatesh and Davis, 2000), UTAUT (Venkatesh et al., 2003), or UTAUT2 (Venkatesh et al., 2012) – adopted or further developed the mechanisms proposed within the TRA and TPB. For example, within TAM, the effects of attitude, subjective norm, and perceived behavioral control on behavioral intention were replaced with perceived usefulness and perceived ease of use, whereas the intention-behavior linkage remained. As a result of their simplicity and ease of operationalizability, technology acceptance models became the most influential and commonly applied theories to elucidate an individual's acceptance of IT across a variety of different application contexts. Albeit the models' parsimony is considered to be their major strength (Davis, 1989), which in turn triggered their popularity, it is – on the other hand – their sore point leaving room for criticism. Indeed, the majority of the extant research drawing on TRA and TPB based models rather broadened the models in terms of adding predictor variables and applying it in different contexts instead of deepening it in terms of adding explanatory power (Bagozzi, 2007). In the following, we critically reflect three major issues concerning technology acceptance measurement.

2.1 Conceptualization of Use Behavior

In most TRA and TPB based models, actual use behavior is a rather underdeveloped variable as it is frequently captured as a self-report measure by inquiring the individual's use frequency (Adams et al., 1992; Davis et al., 1989; Gefen and Straub, 1997; Szajna, 1996) or amount of time spent using the system (Adams et al., 1992; Taylor and Todd, 1995). The lack of a consistent conceptualization, in turn, implies further problems:

First, it is particularly critical since subsequent variables of interest – such as performance in the organizational context – have been found to be rather not driven by frequency or duration of use (Burton-Jones and Straub, 2006; Jasperson et al., 2005), but by adaption behavior which is not considered by current approaches (Schwarz et al., 2014; Sun, 2012; Sundaram et al., 2007).

Second, use behavior's abstractness is problematic due to the dependency between intention to use and use behavior: a fundamental property of both TRA and TPB is that behavior may only be predicted from intentions that either correspond to or are compatible with this behavior (Ajzen, 1991), being a result of the theories' parsimony. Thus, in the context of technology acceptance research, the measure for intention to use needs to 'fit' the behavior it proceeds. This dependency demands to change both constructs whenever one wishes to shed light on a specific facet of use behavior. Accordingly, the rather general conceptualization of use behavior requires intention to use to capture rather general notions of usage tendency. However, the simplified operationalization of use behavior lacks a multiplicity of perspectives and hence, undermines the variable's explanatory power, as well as multi-faceted complexity (Bagozzi 2007): as use behavior, can comprise an extensive list of different use patterns (e.g., feature substituting, feature repurposing, trying new features; Sun, 2012), it can be granulated further, and this would require investigating

multiple different concepts of use behavior (e.g., replacement, unanticipated use, and extended use for the respective use patterns) and in turn, intention to use. Besides, all established technology models examine variables that drive initial use behavior. While this may be an essential first indicator towards an IS' success, it does not necessarily lead to long-term success unless the use is continued (Bhattacherjee, 2001; Kim and Malhotra, 2005). Moreover, motives for discontinued use may be of businesses' interest but are still underresearched (Furneaux and Wade, 2011; Rezazade Mehrizi et al., 2019). Incorporating these facets of different use behaviors in a research model would further require including several intention variables. In turn, this would lead to an increasingly complex model contradicting the models' basic idea of parsimony.

Third, as most studies measure use behavior in terms of self-reported use frequency with behavior-anchored scales, the measurement may be subject to common method variance due to high item characteristics effects (Sharma et al., 2009). Common method variance may further be enhanced by concurrent measurement of both independent and dependent variables, i.e. when conducting a cross-sectional study (Sharma et al., 2009). Albeit efforts have been made to reduce the measurement context effects, e.g., with temporal separation between the measurements by conducting a longitudinal study (Adams et al., 1992; Davis et al., 1989; Szajna, 1996; Taylor and Todd, 1995; Venkatesh and Morris, 2000), problems regarding self-reported use behavior remain and thus, it should only serve as a relative indicator (Legris et al., 2003).

Overall, the inconsistencies in the conceptualization of use behavior led research frequently to skip the variable, albeit it is a key construct in the different technology acceptance models (Gefen, 2003; Koufaris, 2002; Mathieson, 1991).

2.2 Intention-Behavior Relation

Drawing on a more holistic perspective, the intention-behavior dependency itself is probably the most controversial relationship in all models stemming from TRA and TPB. Although behavioral intention seems to be an adequate starting point to predict an individual's behavior for many use scenarios, most people exhibit a discrepancy between their intentions and their subsequent behavior (Abraham et al., 1999; Bagozzi, 1992; Orbell & Sheeran, 1998). Meta-analyses of TRA and TPB studies prove that intention only explained 28 % of the variance in use behavior on average (10 meta-analyses examined, Sheeran, 2002) and that the correlation of the intention-behavior linkage is only around 0.44 (28 studies examined, Sheeran and Orbell, 1999) and 0.47 (185 studies examined, Armitage and Conner, 2001). Thus, it seems questionable whether intention is indeed a silver bullet for the prediction of behavior.

At its core, inconsistencies in the intention-behavior relation may either stem from intenders who do not transform their intention into subsequent action, or non-intenders who do take subsequent action (Abraham et al., 1999). While the latter group requires targeting intention formation by

exploring situational factors to overcome cognitive aversion towards adopting new behaviors, the former group requires investigating cognitive changes beyond intention formation. Therefore, social psychologists commonly distinguish between intention formation and intention implementation (Ajzen, 1996; Beckmann and Kuhl, 1984; Kendzierski, 1990): after deliberating wishes and desires, an individual evaluates feasibility and desirability. In case a wish is highly desirable but still feasible, this process results in goal intention formation. An effective plan, i.e., implementation intention, is then formed concretizing efforts to initiate relevant actions. It commits the individual to a course of actions when certain situational factors or environmental conditions are met, and vice versa, the performance of the intended behavior does not follow in case these conditions are not met (Gollwitzer, 1990; Gollwitzer, 1993). As the gap in time between intention formation and subsequent behavior can be large, several external, psychological, or instrumental obstacles are likely to occur (Bagozzi, 2007). However, parsimonious technology acceptance models cannot depict these differing types of intention and intervening environmental conditions.

From another perspective, the "presence of choice […] can be expected to diminish the ability of accurately predicting behavior using a measure of intention to perform a single behavior" (Sheppard et al., 1988, p. 327). Choice, however, has not been taken into consideration in models stemming from TRA and TPB. According to Sheppard et al. (1988), two options to include choice exist: (1) individuals compare their intentions towards different alternatives and select the one exhibiting the strongest intention for subsequent behavior and (2) attitudes as well as subjective norms for all alternatives are compared and the option yielding the highest value is chosen. In the latter case, intention and actual behavior are only formed for the winning alternative. However, in the former case, various intentions are formed: for example, after initial use, an individual can choose between ongoing use (i.e., continuance behavior) via continuance intention (Bhattacherjee, 2001; Bhattacherjee and Lin, 2014; Lankton and McKnight, 2012) or discontinuance behavior via discontinuance intention, respectively (Furneaux and Wade, 2011; Turel, 2015).

Extant social psychology and IS research addressed intention-behavior inconsistencies by assuming behavioral intention to be only a determinant of short-term usage, whereas past use behavior is considered to be a key predictor for sustained use behavior (Bagozzi and Kimmel, 1995; Conner and Armitage, 1998; Norman and Smith, 1995; Venkatesh et al., 2000). More specifically, for initial use behavior and during initial stages of use experience, deliberated cognitions (i.e., attitude, subjective norm, and perceived behavioral control) and conscious intention may play an important role. However, with increasing experience and routine, past use is considered to be a proxy for habit (i.e., subliminal (quasi-)automatic processes) and a reliable predictor for future use behavior (Heckhausen and Beckmann, 1990). It was even found to override an individual's conscious intention (Heckhausen and Beckmann, 1990; Ouellette and Wood, 1998). This relation between past behavior and future behavior is not only limited to habitual activities but has been

further proven to apply to volitional activities (Bagozzi et al., 1992). Nevertheless, it remains questionable whether repeated behavior indeed can be considered an automatism in terms of habit. Future use behavior would then be subject to the same set of factors at any point in time (explaining all variance except for measurement error). It seems rather plausible that individuals reevaluate their use behavior (e.g., continuance or discontinuance, respectively) after initial usage at specific points in time.

2.3 Conceptualization of Acceptance

Acceptance research has been seeking factors to facilitate IT implementation in businesses since its spread in the 1970s and 1980s (Legris et al., 2003). Since the origins of the TAM, researchers viewed acceptance as an innovation's usage in its specific application context, and it is usually considered a dichotomous, yes-or-no decision (Davis, 1989; Schwarz and Chin, 2007; Venkatesh et al., 2003; Venkatesh et al., 2012; Venkatesh and Davis, 2000).

More specifically, actual system use is considered to be a proxy for acceptance (Davis, 1989; Venkatesh and Davis, 1996) and, in the IS field, it is the "ultimate test" to evaluate predictors' capability of capturing acceptance and "acceptance models lead to the prediction of usage" (Lallmahomed et al., 2013, p. 2776). This use-based view holds for prominent models such as TAM and UTAUT: their causal chain is commonly employed as occurring once-in-a-lifetime, equalizing initial adoption/usage with acceptance. This is particularly emphasized considering that acceptance and adoption are frequently used interchangeably or equivalently within IS literature (Davis, 1989; Davis et al., 1989; Gefen and Straub, 2000; Venkatesh and Davis, 2000; Venkatesh and Morris, 2000). The main question is whether acceptance indeed is a once-in-a-lifetime phenomenon or rather a constant corollary process comprising an individual's behavioral interaction with technology over time (Schwarz and Chin, 2007).

In order to answer this question, varying attempts to open the black box of acceptance have been made, finding that novel perspectives and alternative approaches need to be provided but also indicating that technology acceptance should be understood as a continuous process (Schwarz et al., 2014). More specifically, the demand for a paradigm shift is steadily increasing to broaden the understanding of technology acceptance in order to reflect its multidimensionality beyond initial usage (Schwarz and Chin, 2007). Technology acceptance is not limited to the initial adoption stage – instead, it may occur throughout the entire technology's lifecycle, where other use patterns such as learning, substituting, or repurposing prevail, and an individual reassesses his or her acceptance (Schwarz and Chin, 2007; Sun, 2012). Further, considering the termination stage, recent work on the occurrence of IS discontinuance behavior urges to consider the abandonment of a particular technology during any point in time, which opposes notions of an organic termi-

nation phase leading to discontinuance (Soliman and Rinta-Kahila, 2020). This demand is consistent with different phenomena located along an individual's use cycle of a technology, e.g., he or she may stop using a technology during the adoption phase after testing it (Rogers, 1962). Moreover, there may be an iterative link in a technology's lifecycle in case it is readopted after temporary termination of use, i.e., temporary discontinuance (Soliman and Rinta-Kahila 2020).

In essence, notions of technology acceptance need to be advanced to integrate post-adoption stages: as the adoption process requires individuals to pass through a series of consecutive phases (Rogers, 1962), the decision to not become an adopter takes places after initial usage and as such may be framed as an absence of acceptance. Further, in case of successful initial adoption, an individual's assessment of the particular technology continues throughout the lifecycle, and thus, the individual reevaluates his or her acceptance of a technology continuously. It appears likely that non-acceptance may also occur at later points in time. Also, a technology's non-acceptance may be reevaluated from time to time yielding readoption (in case of a positive evaluation) and, thus, acceptance. Hence, (initial) adoption always implies acceptance, but acceptance is only partially and in few cases equivalent to (initial) adoption (and analogously for non-acceptance and non-adoption). That is, (initial) adoption Ad_t of technology t is a proper subset of acceptance A_t (and analogously for non-acceptance $\overline{A_t}$ and non-adoption $\overline{Ad_t}$) $Ad_t \subsetneq A_t$ (and $\overline{Ad_t} \subsetneq \overline{A_t}$ respectively).

3 Funnel View on Acceptance

3.1 Funnel Construction

To trigger a paradigm shift in technology acceptance research, we propose a funnel view as a guiding framework. The literature on consumer behavior is identified to flesh out the concept of a set of alternatives (SOA). SOAs stem from research on buying behavior (see, e.g., Howard and Sheth 1969), where they have been developed to gain an understanding of consumer decision processes. They were advanced from a completely rational perspective (i.e., any alternative yields an inherent utility that an individual is entirely aware of and that is used for decision-making calculations) to a view of bounded rationality characterized by information processing limits and perceptions (Bettman et al., 1998). In parallel to technology acceptance models, constructs intention to buy and actual purchase behavior are employed, with intention to buy used as a predictor of actual purchase behavior (Howard and Sheth, 1969). In fact, they share many commonalities with established technology acceptance frameworks, particularly theoretical foundations in attitude-based models (Ryan and Bonfield, 1975), and aspects of both fields have been combined in extant research (see, e.g., Priester et al., 2004). The study at hand employs the concept of SOAs for the field of technology acceptance. It is important to note that the setup of a funnel does not

imply that the framework assumes rational decision-making at every funnel section. Instead, findings from the extant literature on technology acceptance – for example, the impact of habit – are integrated. The funnel is proposed as a descriptive guideline that illuminates the process of technology acceptance.

Although many concepts have been around for a rather long time, they have been proven to be valuable for current top-tier research (see, e.g., Bogomolova, 2010; Felix, 2012; Grant et al., 2010; Kim et al., 2018; Wang et al., 2013). Table 1 provides an overview of SOA notions that have been proposed in the consumer context. This knowledge base is used as a starting point for constructing a technology acceptance-specific funnel. To do so, the different funnel structures are assessed and compared to unify equivalently conceptualized funnel sections and provide a complete picture of possible behavior patterns. This means that the literature elaborating on SOA is scanned for 'unique' notions that need be integrated with other funnel structure for a holistic framework.

Table 1: Extant conceptualizations of SOAs.

Author(s)	SOA notion(s)	Rejected alternatives
Brown and Wildt (1992)	Available set: all options available	Included
	Awareness set: options known to the customer	Included
	Consideration set: options acceptable for purchase	Excluded
Howard and Sheth (1969)	Evoked set: options a consumer has used, has on hand, would consider using	Excluded
Lapersonne et al. (1995)	Comparison set: other options in the awareness set may affect decisions although they are not themselves considered for choice	Included
Narayana and Markin (1975)	Total set: all options available	Included
	Awareness set: all options known to the customer	Included
	Unawareness set: options not known to the customer	Excluded
	Inert set: options considered not to yield advantage	Excluded
	Inept set: options not given any consideration	Included
Roberts and Lattin (1991)	Consideration sets as subsets of awareness sets	Excluded
Shocker et al. (1991)	Universal set: all options available	Included
	Knowledge set: all options known to the customer	Included
	Consideration set: goal-satisfying option salient or accessible on a particular occasion	Excluded
	Choice set: final consideration set immediately prior to choice	Excluded

Author(s)	SOA notion(s)	Rejected alternatives
Silk and Urban (1978)	Relevant set: options a consumer has used, has on hand, would consider using, would definitely not use	Included
Simon (1955)	Set of behavioral alternatives: all options available	Included
	Considered subset: options a customer will consider	Excluded
Wright and Barbour (1977)	Consideration set: options a customer will consider	Excluded

Depending on the conceptualization, rejected alternatives may be included or excluded. Most authors propose several sets that are linked, while others add specific perspectives, such as the comparison set suggested by Lapersonne et al. (1995), which includes alternatives that are not considered for choice, but still influence an individual's behavior. Table 1 leads to the conclusion that, in general, the assessment of alternatives and narrowing down the universe of options go hand in hand and constitute a funnel of consecutive SOAs. To integrate these findings, conceptualizations are compared, similar to the developmental process of UTAUT (Venkatesh et al., 2003) which analyzed an unified a total of eight technology acceptance-related models. Hence, in the following, the various perspectives on SOAs are confronted with each other to derive a parsimonious, unified funnel. Again, this funnel perspective needs to be undergirded with theoretical foundations, as merely transferring the whole entity of SOAs and decision-making theory from the consumer context lacks the adaptation to the technology setting. The study at hand provides suitable notions in the following sections; still, the funnel view is intended to serve as a starting point for advancing the field and does not constitute a theory in itself. Starting with the topmost level, notions of a universal, total, or behavioral set of alternatives have been postulated, comprising all available alternatives, regardless of whether they are known to an individual. The next funnel segment contains all options that an individual is aware of; hence, the denomination 'awareness set' is chosen. Its counterpart, thus, is the unawareness set, which is constituted by all options from the total set that are not part of the awareness set (i.e., unawareness set = total set – awareness set). This motion along the funnel shows that set-theoretic calculations can be made to examine relations between SOAs.

As the awareness set contains all alternatives an individual knows, it can be further detailed to yield information about the individual assessment of each option. This evaluation may be a rational procedure but also an automatism due to a previously formed habit. However, it appears reasonable to capture this step as a distinct SOA as opposed to merging it with others that are located further down the funnel. In empirical research, it might be the case that individual funnel

segments are merged, e.g., to reproduce a consumer's perception which does not necessarily reflect a purely rational approach. From a theoretical perspective, yet, it is deemed more fruitful to employ a detailed funnel segmentation that serves as a granular basis for further research.

Consequently, the next funnel segment needs to take different evaluation outcomes into account. For this purpose, concepts such as consideration sets, relevant sets, evoked sets, and considered subsets can be employed. All of these denote an SOA that comprises favorable options. Evoked set and relevant set add facets of usage, as they explicitly can contain alternatives that have been used before or that are on hand. To provide an umbrella term, 'consideration set' is selected for this purpose.

In addition to favorable alternatives, the awareness set also comprises options that are regarded as unattractive. Hence, lateral sets besides the consideration set need to be conceptualized to capture these rejected alternatives. Narayana and Markin (1975) provide a nuanced distinction of inert and inept sets that are consistent with this requirement. While the inert set comprises alternatives that are not deemed advantageous, these options are not outright declared as rejected. Consequently, the inert set offers a more granular perspective on non-rejected alternatives and, as such, is added to the model: candidates within the consideration set are assessed favorable and may be readily used, and options in the inert set are subject to inactivity that needs to be overcome. When this inertia is resolved, the respective options move into the consideration set. Hence, the inert set may be viewed as a comparison set that can influence the consideration set without including candidates for immediate choice itself, consistent with the notion mentioned by Lapersonne et al. (1995). Particularly in the technology acceptance field, where automatisms may play a critical role, this comparison might disrupt the equilibrium of habit and stimulate the user to reassess his or her choices (i.e., the comparison set might induce a 'wake-up call').[1] Research may, of course, examine whether the inept set, which will be addressed in the following paragraph, can serve as a comparison set as well.

The inept set, then, includes all alternatives from the awareness set that have been rejected (i.e., inept set = awareness set – consideration set – inept set). In their original conceptualization, the three sets on this hierarchical level were proposed as exhibiting a positive (consideration set), neutral (inert set), and negative valence (inept set), respectively (Narayana & Markin, 1975). Both the composition of the awareness set and the consideration set may be influenced by contextual factors such as external alternatives (Shocker et al., 1991).

The delineation of the consideration set, i.e., alternatives that are favorable and may be readily used, anticipates the last funnel segment, which needs to capture actual use behavior. Literature

[1] We would like to thank an anonymous reviewer for pointing out that this notion needs to be addressed explicitly.

proposed the term ‘choice set’ for this final section preceding the execution of an act. An alternative that has been selected from the choice set is, then, employed for actual use. Hence the outcome of an individual’s handling of the choice set – whether in the form of rational decision-making or as the result of a habit – can be directly observed as the user’s behavior.

This division of consideration set (i.e., generally favorable alternatives) and choice set (i.e., alternatives that are pondered immediately prior to action) is consistent with the attitude-intention-behavior chain proposed in TRA (Fishbein and Ajzen, 1975) and TPB (Ajzen, 1985, 1991), where attitude is described as “evaluative response” (Fishbein, 1963, p. 233). In fact, research on consumer behavior, the origin from which the funnel perspective is derived, and technology acceptance research both can be traced back to attitude-behavior considerations (Davis, 1989; Ryan and Bonfield, 1975; Venkatesh et al., 2003; Wilkie and Pessemier, 1973). It may be noted that the notion of a comparison set, which has been discussed in the context of the consideration, inert, and inept sets, could also be located within (or even assumed to be equivalent to) the choice set. For a definitive positioning, empirical research is required in the future.

In total, the funnel provides a complete chain from the total set to the choice set. However, as the conceptualizations of the evoked set and relevant set mentioned, facets of actual usage may be found in funnel segments above the choice set. This notion provides a natural backlink for iterations: after carrying out a particular action, an individual has traveled the whole funnel. When the next action needs to be undertaken, he or she does not need to start with the total set again but may proceed from the hierarchical level of the inert, inept, and consideration set. This property is consistent with Turley and LeBlanc (1995) proposing an iterative link from actual behavior back to the evaluative stage and with Shocker et al. (1991) suggesting a ‘feedback’ link for future behavior. For example, when a habit has been formed, a user may travel the loop consideration set – choice set – consideration set until an external stimulus interrupts this equilibrium. Figure 1 depicts the complete funnel.

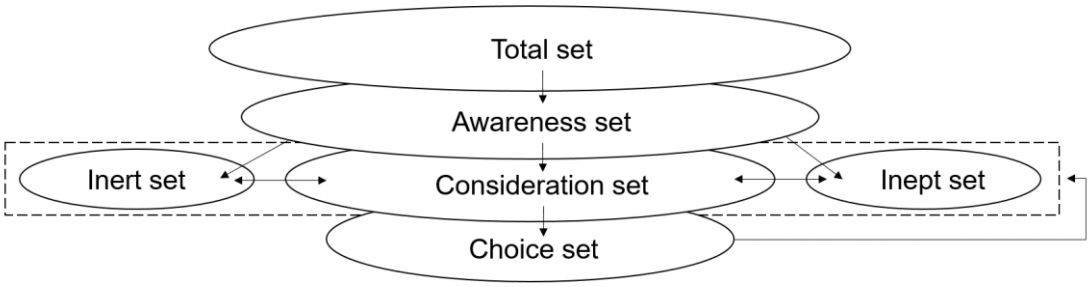

Figure 1: SOA funnel, based on Narayana and Markin (1975), Shocker et al. (1991), and Turley and LeBlanc (1995).

Note: Movement between inert set and the inept set is possible (Narayana & Markin, 1975); however, due to clarity, the path is not depicted in the Figure.

SOAs also give insight that rejected technologies have at least been acknowledged as being potential candidates for the task, but are deemed unattractive for some reason and drop out as the user proceeds through the funnel. This acknowledgment may be a rational assessment as well as the automatic denial of a novel alternative due to a cemented habit. Hence, individuals may differ in their degree of conscious information processing, and intra-individual differences may occur over time when automatisms may be formed.

A particularly interesting funnel segment is the choice set located at the bottom of the funnel. It is conceptualized to contain favorable alternatives, and its temporal placement is set immediately before actual behavior (Shocker et al., 1991). Hence, the question for the interplay of acceptance and preference arises. Recent work suggests that individuals may employ a variety of strategies for making a choice, which typically aims at reducing the complexity of the choice situation (Bettman et al., 1998). Contextual factors such as the decision's framing critically impact the outcome of the choice, e.g., it is highly non-trivial whether a choice is framed as a gain or as a loss (Kahneman and Tversky, 1979). These notions on the context-sensitivity of preferences indicate that an alternative's motion from the consideration set to the choice set is, at least to some extent, contingent on the environmental conditions surrounding the decision. Consequently, behavioral differences in mandatory and voluntary settings likely correspond to the formation of the choice set, as individuals need to be capable of justifying their decision (Bettman et al., 1998). An asymmetric relation between consideration set and the choice set is also consistent with findings that judgment and choice are not per se equivalent, i.e., one alternative yielding a more favorable evaluation than another does not necessarily lead to the choice of this option; rather judgment may be treated as "an aid to choice" (Einhorn and Hogarth, 1981, p. 73). Particularly in mandatory settings, the choice decision may be regarded as simple (i.e., there is no freedom of choice), and thus the formation of a consideration set may be bypassed (Kardes et al., 1993). This fits findings on consideration sets of size one, where no evaluation is necessary (Lapersonne et al., 1995). The notion of 'local consideration sets' further allows including environmental factors, such as individuals being at work or at the store, which is proposed to yield significant consequences on set composition (Simonson et al., 1993). Finally, the possibility that the choice set consists of more than one alternative, albeit only one option is chosen, is consistent with notions from consumer behavior viewing behavioral intention as a mediator (Ryan and Bonfield, 1975). Hence, it may be proposed that the composition of the consideration set largely depends on an individual's attitude, while the composition of the choice set is contingent on behavioral intentions.

3.2 Implications and Further Reflections

It is questionable whether appearing in one consideration set should be regarded as equivalent to appearing in all consideration sets that can be served by the technology. As technology is commonly versatile and may be applied in various scenarios, each discrete scenario can be modeled to possess an own funnel. Hence, a technology that is favorable from the perspective of a user's perception may appear in one consideration set (i.e., is linked to a single particular use scenario) but can also employed for several scenarios (i.e., appear in several consideration sets).

Appearing only in some consideration sets means that a variety of functions may remain unused, and this view of acceptance does not tell us about settings and scenarios in which the technology is deliberately not used. For example, an individual may use a smartphone for many tasks such as text messaging, sending an e-mail, and browsing the web (and hence, display use behavior), but not for banking, as he or she regards a smartphone as inferior to other channels for that specific job (such as visiting a bank in person). In this case, the question is if we can evaluate acceptance in a binary sense as being globally present or globally absent. In the example mentioned above, use behavior is fragmented, yet still at hand. However, the individual deliberately does not take full advantage of the technology's features, indicating a lack of valuable information when only a single use case is investigated. This poses the question whether technology acceptance should only focus on asking 'why' – i.e., why is a technology used or not used, which implies a dichotomization – or incorporate a 'what' question that precedes the 'why' , i.e., which features are used and why are they used, and which features remain unused and what are the reasons. Particularly in organizational settings, where usage may be mandatory and the technology under investigation is the only option to perform a particular task, asking 'why' omits valuable information and might not reflect actual user perceptions but the result of an external coercion. For an investigation of use behavior, this view may be adequate; however, for a technology acceptance investigation, it is too coarse and may lead to incorrect conclusions.

In this vein, we propose to view technology acceptance in a different light depending on whether an individual considers a technology for a small number of sets or all adequate sets. Hence, depending on the research context, a single funnel may be constructed (which corresponds to a single use scenario), or several funnels are employed. In the case of a single funnel, the researcher may specify the scenario to reflect a particular research question but can also employ an abstract scenario such as 'Is the technology under investigation used as intended by the organization?'. Such an abstract framing allows the examination of technology acceptance in a binary sense, which provides an interface to earlier research, and further enables the researcher to incorporate context in the form of alternatives located within the different SOAs. For example, a binary answer to the exemplary question stated above, consistent with the extant literature on technology acceptance research, may yield 'no' as a result. Predominant models such as TAM and UTAUT

would then display regression coefficients (or similar values, contingent upon the analysis method of choice) for a set of potential factors, such as perceived usefulness (TAM) or facilitating conditions (UTAUT). It appears reasonable to ask whether this insight answers the 'why' considering the technology under investigation is not used. In part, this may be the consequence of regression-based analyses treating factors from a sufficiency perspective. The exemplary, fictitious examination may yield a positive and significant influence of perceived usefulness (TAM) or facilitating conditions (UTAUT) on intention to use. Hence, these factors are found to be sufficient in terms of being able to increase the dependent variable's value by the proportion of their regression coefficients. Still, the absolute magnitude of the dependent variable reveals that the organization's employees do not use the technology. The employed model neither answers the 'why' of this finding nor does it provide a 'what' in the sense of what employees do instead to accomplish their tasks. The funnel perspective, thus, provides a more general, more abstract view, and, as such, naturally allows the inclusion of necessary condition analyses to complement the sufficiency perspective. Consequently, the funnel describes the 'what' and concomitantly provides a foundation for investigating the 'why'.

A perspective of 'partitions' is used for this purpose. By partitions, delimitable functional areas such as making a call or sending a text message are denoted. Each partition serves a particular end and is built for a range of use scenarios. Partitions may be set on an arbitrary (but meaningful) hierarchical level dependent on the context of the particular examination. For example, an e-mail client may be partitioned on a very abstract level into 'handling e-mail traffic', 'organizing schedules', and 'booking meeting rooms'. A more granular investigation may focus on e-mail traffic, and establish partitions such as 'sending', 'receiving', 'forwarding', 'drafting', and 'attaching files'. Each partition is characterized by a set of attributes and consequences, and some attributes may be more feasible to evaluate than others (Bettman et al., 1998). Consequently, further reflections on acceptance from a funnel-based view are based on two notions: partitions and use scenarios. In the first step, use scenarios will be treated as fixed, i.e., no changes are considered. An individual may only evaluate partitions he or she knows, hence the awareness set acts as a starting point. For each partition in the awareness set, we denote whether the individual assesses its value proposition as credible (i.e., 1) or not (i.e., 0). That is, we note whether a specific partition is part of the consideration set. Accumulated over all partitions, i.e., all members of the awareness set, Equation (1) is derived

$$A_{\mathrm{bt}} \coloneqq \begin{cases} 1 \text{ if } \sum_{\mathrm{i}}^{n_{\mathrm{f}}} x_{\mathrm{i}} > 0 \\ 0 \text{ otherwise} \end{cases} \quad \text{with } x_{\mathrm{i}} \in \{0,1\} \qquad (1)$$

where A_{bt} depicts basic acceptance of a technology t, and $n_f \in N_f$ stands for the number of familiar technology partitions, i.e., partitions that can be evaluated (N_f denoting all existing partitions).

The variable x states whether the respective partition is member of the consideration set (i.e., denoted as 1) or not (i.e., denoted as 0). To conform to the condition of being non-zero, it is sufficient that one partition appears in the consideration set. The sum increases as more partitions become members of this set, and a frugal evaluation of acceptance can be derived. Whenever the non-zero condition is satisfied, acceptance behavior is existent. However, use scenarios have been fixed for this inspection. In order to take them into account, a second sum is included, leading to Equation (2)

$$A_{\mathrm{vbt}} \coloneqq \begin{cases} 1 \text{ if } \sum_{\mathrm{j}}^{\mathrm{m}} \sum_{\mathrm{i}}^{\mathrm{n_f}} x_{\mathrm{ji}} > 0 \\ 0 \text{ otherwise} \end{cases} \quad \text{with } x_{\mathrm{i}} \in \{0,1\} \text{ and } j \in \mathbb{N} \qquad (2)$$

where A_{vbt} is a versatilely displayed basic acceptance of a technology t, and j the consideration set for the respective use scenario. When use scenarios are included, additional examinations may be considered. The double sum allows several different outcomes, which will be assessed in the following. Mirroring (1), one partition may be considered for one use scenario. This configuration satisfies the non-zero condition and leads to the same conclusion as (1). However, different configurations are possible: (a) one partition may be considered for several use scenarios; (b) more than one partition may be considered for the same use scenario, and (c) more than one partition may be considered for several use scenarios. From this observation, it can be derived that

$$A_{\mathrm{vbt}} \coloneqq \begin{cases} 1 \text{ if } \sum_{\mathrm{j}}^{\mathrm{m}} \sum_{\mathrm{i}}^{\mathrm{n_f}} x_{\mathrm{ji}} > 1 \\ 0 \text{ otherwise.} \end{cases} \quad \text{with } x_{\mathrm{i}} \in \{0,1\} \text{ and } j \in \mathbb{N} \qquad (3)$$

Changing the condition from being non-zero to being larger than 1 means that configurations leading to the same result as (1) are excluded. Consequently, all configurations satisfying (3) constitute a different type of assessment in contrast to (1). To gain more granular insights into these configurations, a 2x2 matrix comprising partitions and use scenarios may be arrayed. This notion, similar to the versatility index of a product by Ratneshwar and Shocker (1991), which denotes the total number of use contexts an alternative, is perceived appropriate. While the compilation of the matrix is merely an alternative, more intuitive, representation of the equation's value set, its erection imposes the necessity to derive conceptualizations for its individual cells.

It is important to note that the matrix is a more compact illustration of the funnel perspective. For example, the upper-left cell, corresponding to one partition and one use scenario, is equivalent to the funnel depicted in Figure 1: one use scenario means that only one funnel is required to model the setting, and one partition means that no functional segmentation of the technology under investigation is necessary. This case, consequently, allows the conclusion that users exhibit acceptance; however, the available information is limited, as a functional segmentation into several partitions and an examination of different use scenarios could be carried out. Hence, this cell is

termed ‘basic acceptance’, denoting the circumstance of a positive assessment while acknowledging a situation of limited information. When keeping the use scenario constant, i.e., maintaining a single funnel for modeling, while investigating several partitions, a positive evaluation of these discrete partitions would mean that, at least for the scenario of study, they are equivalent and interchangeable. This case, while easily derived from the equations, appears strange at first, and an empirical finding corresponding to that case might indicate some sort of issue. For example, it might reveal that an organization has invested in redundant technologies or IS guidelines are ambiguous or unclear so that individuals employ various solutions.

The second row of the matrix advances the perspective from a single funnel corresponding to a single use scenario (or context) to a multi-context setting. An individual applying only one partition, i.e., one discrete functional entity of the technology, for several purposes, one might call this finding a ‘specialized’ acceptance, as the user’s focus regarding the technology’s capacities is very narrow while the range of application is rather wide. The addendum ‘extensive’ is used to differentiate the observation from the limited-information case of basic acceptance. The fourth and final cell, corresponding to a combination of several partitions (i.e., a research setting with several funnels representing several discrete use scenarios or contexts) and multiple partitions is free of the narrow focus of specialized acceptance. Consequently, it might be denominated non-specialized; and the addendum ‘extensive’ once again refers to the fact that the investigation incorporates a broad range of information compared to the basic acceptance cell.

Table 2: Variation of partitions and use scenarios.

		Partitions	
		One	More than one
Use scenarios	One	Basic acceptance	(equivalent partitions)
	More than one	Specialized (extensive) acceptance	Nonspecialized (extensive) acceptance

The partition-by-uses (PBU) matrix shares commonalities with use-diffusion patterns identified by Shih and Venkatesh (2004), who differentiate the dimensions ‘variety of use’ and ‘rate of use’ (segmented into high and low each) to array a 2x2 matrix. These patterns are described as “typology of uses, or, derivatively, typology of users” (Shih and Venkatesh, 2004, p. 60). In Table 2, the dimension ‘use scenarios’ is similar to variety of use (Shih and Venkatesh state that “variety of use refers to the different ways the product is used”, p. 60). Rate of use may be depicted via

the iterative link connecting actual use and evaluation. The matrix is also consistent with work by Jasperson et al. (2005), finding that organizations may actively seek to enrich user behavior in terms of usage variety in order to achieve economic benefits and that individuals commonly shape their usage in the post-adoption phase as they gain more experience and understanding of the technology's capabilities. Furthermore, the PBU consideration appears similar to the products-by-uses matrix elicited by Ratneshwar and Shocker (1991) and may serve as an intuitive tool for acceptance illustration.

It seems reasonable that individuals exhibiting basic acceptance over a longer period may seek to try additional partitions or experiment with different partitions for their use scenario. Extant literature suggests that adaptations in use behavior are a common phenomenon and comprise actions such as substituting or repurposing previously used functionality (Desouza et al., 2007; Parthasarathy and Bhattacherjee, 1998; Sun, 2012). We thus might think of the basic acceptance matrix cell as serving as a 'penguin acceptance' for some persons, as individuals will become more familiar with the technology over time and may extend their usage as a result.

The matrix depicted in Table 2 is focused on a particular technology and omits the use of a time axis for clarification purposes. However, this perspective may be broadened by introducing a time dimension, as the funnel perspective depicts a process. Figure 2 exhibits the funnel's embedding within time. Here, an individual yields a particular technology, for simplicity denominated by its core capacity, 'Partition A', as a member of his or her consideration set (t_1). Upon encountering an adequate use scenario, the technology moves into the choice set (t_2). This movement may be carried out subconciously: for example, in a mandatory setting, the individual does not have the opportunity to make an alternative choice; alternatively, a formed habit may elicit an automatism to employ the technology without further rational decision-making. Afterwards, as there is no more immediate need to practically apply the technology, it moves back into the consideration set, ceteris paribus (t_3). This loop is repeated as long as the equilibrium state is maintained. An external stimulus, such as a fatal error, the deployment of a new technology, and the like, may interrupt the equilibrium, and thus halts the automatic loop progression. This 'wake-up call' leads to a re-evaluation, which, depending on the situational context, may comprise a rational re-assessment of the available alternatives (i.e., the members of the awareness, inert, and inept set) but also a mere replacement by another technology, e.g., when an organization implements a new mandatory IS. In any case, the equilibrium is disrupted, and the individual is forced to become aware of his or her disposition.

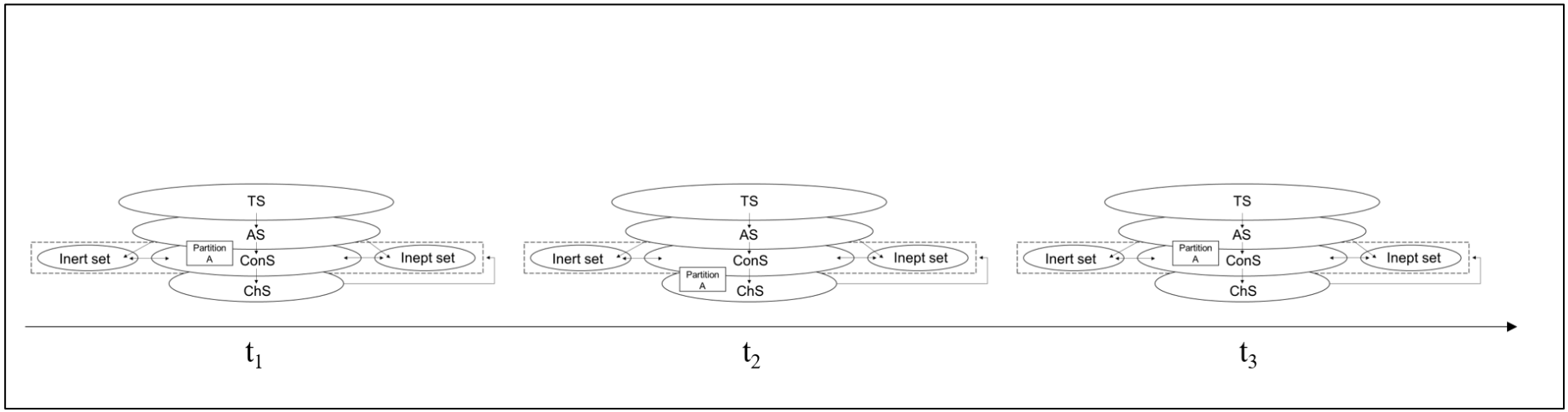

Figure 2: The funnel throughout time.

Note: TS = total set, AS = awareness set, ConS = consideration set, ChS = choice set. The technology under investigation, here, for simplicity, described by its core capacity, 'Partition A', becomes part of the consideration set in t_1. When facing a scenario where the technology is applicable – be it a rational choice or mere habit – the user employs the technology (t_2). Finally, after the concrete operation, the technology moves back into the consideration set (t_3), as no external influence disrupted the equilibrium. This loop may continue mechanically until a shock interrupts the flow and a re-assessment of the available alternatives is stimulated.

The (optimal) enhancement of describing IS in terms of different functional partitions mimics a real-world situation where an individual has a number of options to employ for a task at hand, as it allows the comparison of individual functional areas to alternatives. Viewed from a perspective that any technology is a bundle of partitions, most partitions (unless they are highly innovative) have substitutes. Assume an individual seeks to contact a colleague to schedule a meeting, and we want to investigate the acceptance of phones in the office environment. This technology could be substituted by a phone from a competitor, which would be a rather homogenous substitute, or differently laid-out instruments such as instant messaging or e-mailing, which would be more heterogenous substitutes. The technology under investigation, as well as its substitutes, compose an individual's SOA for this specific task. Hence, the funnel perspective may be switched from regarding a specific technology and how an individual handles it to considering a goal-derived perspective, where alternatives within a set may be nominally different. This appears reasonable, as alternatives are selected for the benefits they provide (see, e.g., Srivastava et al. (1984); later elaborately discussed by Vargo and Lusch (2004)). It should also be noted that, also the funnel constitutes a process, it does not enforce a distinction between process and variance models. On the contrary, it may be used as a tool to take any of both perspectives, or – as proposed by Burton-Jones et al. (2015) – a more flexible approach. The option to include relevant alternatives allows for 'what' questions as well as asking 'why'; e.g., the reason a technology under investigation is not used as intended may be the presence of a dominant alternative, which is not revealed in a monadic setting recording user perceptions of this single technology. When switching perspectives from product alternatives to intended purposes, the funnel view turns out to be helpful. Shocker et al. (1991, p. 183) provide an initial foundation for this perspective in their work:

> "A goal such as gift-giving may include diverse items such as cameras, watches, pens, etc. as alternatives. These options satisfy criteria such as 'the recipient would be expected to enjoy them' and they fall within a desired price range."

For a technology under investigation, it is likely easy to identify a multiplicity of intended purposes and use scenarios, respectively. Luckily, as Shocker et al. (1991) note, when employing the intended usage construct, i.e., purpose or use scenario, considering a rather small fraction of potential purposes may be sufficient as these serve as representative anchors and elicit additional situations within participants. In fact, when use scenarios are fixed, respondents were found to exhibit a high degree of homogeneity in their perceptions (Srivastava et al., 1981). Furthermore, aggregation of individual evaluations may help to define a common usage relevance (Shocker et al., 1991). Consequently, funnel segments may include options from different nominal classes, as alternatives only need to be adequate for the usage (Barsalou, 1985; Park and Smith, 1989; Shocker et al., 1991), leading to 'substitution-in-use' (see, e.g., Ratneshwar and Shocker 1991). This perspective allows viewing acceptance with respect to "a set of usage contexts" (Ratneshwar and Shocker 1991, p. 282; see also Srivastava et al. 1984), which brings research from the abstract level of systems to the detailed realm of functionalities as has been demanded for many years

(Burton-Jones and Straub, 2006; Jasperson et al., 2005; Sun, 2012). It is also consistent with the demand to reconceptualize system use by Burton-Jones and Straub (2006) and the feature-centric notion by Griffith and Northcraft (1994) and Griffith (1999), and provides an interface to the conceptualizations derived by Schwarz and Chin (2007) and Schwarz et al. (2014).

Accordingly, the funnel perspective implies that a technology can be in the same set along with nominally different alternatives, such as whiteboards, post-it notes, and telephones, but also that on a partition level, the technology under investigation may be part of some sets, but not others, as displayed in Table 2. For example, when forwarding information to a colleague, from this goal-directed perspective, an e-mail client may compete with a personal visit, an instant message, and a phone call. From a technology perspective, i.e., regarding the different partitions that make up the e-mail client, we may observe that sending and receiving e-mails appear in a user's consideration sets, but using task management functionality and calendar tools is not. The user's colleague, however, may employ the same e-mail client for managing his or her schedule but also may disregard the task management option. Both users actively engage with the technology; however, they do so different in scope.

This goal-perspective is supported by consumer research on consideration sets. For example, Hauser and Wernerfelt (1990) illustrate high-variance alternatives, i.e., alternatives that provide high utility for some occasions but not for others. The notion of 'occasions' fits the conceptualization by Shocker et al. (1991) for substitution-in-use, showing that depending on an individual's current goal, rather different alternatives may be considered equally adequate candidates. Ratneshwar and Shocker (1991) employ the notion of substitution-in-use, and state "the working assumption is that consumers perceive and judge products as means to achieving the ends inherent in the usage contexts described by the researcher" (p. 282) and further view ends and usages as equivalent.

4 Discussion

4.1 Theoretical Contribution

Despite the persistent popularity of extant technology acceptance models since their spread in the 1970s and 1980s, voices demanding a paradigm shift within technology acceptance measurement have been raised. As SOAs, as well as transitions between funnel sections, are well-studied in consumer literature, and measurement approaches for examining different sets have been discussed for many years (Hauser, 2014; Hauser and Wernerfelt, 1990; Shocker et al., 1991), we draw on these insights and incorporate them into technology acceptance research. In contrast to previous models of technology acceptance (such as TAM (Davis, 1985, 1989), TAM2 (Venkatesh and Davis, 2000), UTAUT (Venkatesh et al., 2003), or UTAUT2 (Venkatesh et al., 2012)), our proposed funnel perspective does not engage in explaining the 'why' right away, but gives an overview of the 'what' and helps understanding transitions that are not clear in the 'causal', i.e., structural models, and paves the way for a concomitant investigation of the 'why'. For example, the question 'why is a certain technology not used?' (following early

technology acceptance research as carried out in Davis (1985)) may be reframed to 'why is a certain technology part of the consideration set, but does not make it to the choice set?'. The reframing provides space for reconceptualizing focal phenomena, such as technology acceptance and technology use behavior, as demanded by Venkatesh et al. (2016). It allows to order different data collection process along a time axis, and may provide a tool that helps researcher clarify the boundary conditions of their model. For example, a variance model may be modified to capture context-dependent variables, and this specification may be improved when an anchoring within the bigger picture (i.e, the funnel) is considered.

The inclusion and exclusion of inert or inept sets, which may be, e.g., shadow IT in a concrete research setting, might initiate refinement of the model, respectively. Hence, the funnel perspective provides a guiding framework that supports the selection of the relevant variables for a study's objective, and links notions of adoption, continuance, and discontinuance by offering a natural temporal order. Continuance may be conceptualized as being present from the point of the second iteration, i.e., when the technology has been in use and thus moves across the funnel, and has become an element of the consideration set again. Discontinuance, accordingly, can be viewed as the technology dropping out of the consideration set, i.e., it appears in the iteration when the alternative does not make it into the consideration set but is passed on to become an element of the inert set. This time sensitivity is consistent with approaches such as the two-stage model proposed by Bhattacherjee and Premkumar (2004). This property comes in particularly handy considering the blurred distinction between adoption and acceptance in the literature (Davis, 1989; Davis et al., 1989; Gefen and Straub, 2000; Venkatesh and Davis, 2000; Venkatesh and Morris, 2000), and the lack of a consistent conceptualization of acceptance.

It also offers a new perspective on technology acceptance: complementing the work by Schwarz et al. (2014) that acceptance is present throughout the usage lifecycle of a technology, and considering acceptance and the notions by Soliman and Rinta-Kahila (2020) regarding the existance of discontinuance behavior at any point in time, the term 'technology acceptance' is suggested to be defined as the inclusion of a technology within the consideration set. Technology acceptance is assumed to be present as long as this equilibrium state is maintained. It is established when the technology under investigation has proceeded to the consideration set, and ends with its exclusion from the consideration set. From this conceptualization, it can be derived that at a later point in time, the technology may move back into the consideration set. Hence, one might conclude there may be a phenomenon such as 're-adoption', which might yield similar properties to the adoption process that is well-established.

These conceptualizations further lead to the insight that a funnel also naturally meets with IS lifecycle schemes such as the exposure-adoption-continuance-discontinuance chain provided in Soliman and Rinta-Kahila (2020). Exposure refers to alternatives entering the awareness set, and at the end of this stage, an individual needs to decide for adoption or rejection, moving the alternative in one of the three pools of inert, consideration, and inept sets. In the case of a positive decision, the adoption stage is reached, which comprises implementation and initial use, after which an assessment is conducted to opt

for continuance or discontinuance, respectively (Soliman and Rinta-Kahila, 2020). That is, one (i.e., the first) transit through the funnel, from total to choice set, corresponds to exposure and adoption. Any subsequent iteration depends on user assessment and determines whether the technology at hand is further used (i.e., the alternative moves from the choice set back into the consideration set), or its use is discontinued (i.e., the alternative moves either in the inert or the inept set, and hence cannot transit to the choice set anymore). Discontinuance, in consequence, is, by default, modeled as the final stage of the IS user lifecycle, consistent with conceptualizations in the field (Swanson and Dans 2000). However, the model also permits movements between inert and inept set, respectively, and consideration set, leaving room for further exploration and advancements on the nature of discontinuance (as initiated by Pollard (2003); Turel (2016)), such as temporary discontinuance with subsequent readoption (Soliman and Rinta-Kahila, 2020). In particular, it supports the 'acceptance-discontinuance anomaly', i.e., "some users discontinue IS use after accepting it initially" (Bhattacherjee 2001, p. 352; alternative enters the consideration set in the first iteration, but does not make it to the choice set). Overall, the funnel constitutes a suitable framework for guiding and locating research projects, fitting demands risen by Bagozzi (2007, p. 250) for a "unified approach to understanding and explaining technology adoption/acceptance/rejection".

From the perspective of decision-makers, the insight that a newly introduced technology, say a knowledge management system, is underused, may pose severe challenges for traditional technology acceptance research. When confronted with items measuring constructs such as perceived usefulness and perceived ease of use, employees may assess the system as quite adequate and helpful, but simultaneously exhibit low use behavior or low intention to use. Drawing on a funnel perspective, the situation is reframed and may yield results that show a lack of awareness for the new system (i.e., for many employees the technology did not make it from the total set into the awareness set), and user preference for less laborious alternatives such as using notepads and e-mails (i.e., the technology did exceed the awareness set, but instead of transitioning to the consideration set, it became an element of the inert set). Furthermore, an alternative that once made it to the awareness set and went down all the way into the consideration set provides a natural link to preference, which determines if and how regular the alternative appears in the choice set.

Besides the conceptualization of acceptance, a major issue concerning technology acceptance measurement is the abstractness of the use behavior variable. As use behavior can span an extensive list of different use patterns (Sun, 2012), its rather one-dimensional conceptualization undermines the variable's complexity (Bagozzi, 2007). With respect to our funnel perspective, we propose to consider technologies as bundles of partitions. This fits the notion of features in use as proposed by Sun (2012, p. 455), which describes "the basket of system features that are ready to be used by a particular user to accomplish tasks" (which is consistent with goal-setting), and further excludes features "that are not readily usable, such as those features that are unfamiliar or unknown". As funnel segments commonly

contain more than one alternative (or partition, respectively), technology acceptance research is supported with a conceptional guideline that comprises the traditional monadic approach, but also serves as a basis to advance to a comparative approach (i.e., take the goal-setting perspective into account as demanded by Bagozzi (2007)). Also, a funnel with its inherent substitution-in-use trait (Ratneshwar and Shocker 1991) facilitates contextual considerations, which in turn may make meta-analyses and comparisons more feasible.

Further, as Venkatesh et al. (2016) note, tasks have been studied on a rather abstract level, such as organizational tasks and knowledge contribution, and the established technology acceptance frameworks lack insights on a more detailed level. The relevance of including tasks, which in the study at hand is inherent in the PBU, is viewed as a crucial contextual factor, and conceptualizing technology use behavior at the feature level is identified as a fruitful path for the future. This fits Jasperson et al. (2005), highlighting that "users employ quite narrow feature breadths, operate at low levels of feature use, and rarely initiate technology- or task-related extensions of the available features" (p. 526), and Hong et al. (2014), which emphasize that context in the IS field "refers to the characteristics and usage contexts of the technology artifact" (p. 112). Hence, the framework presented in this paper may serve as a unified basis for both studies employing a certain task type as context, and investigations examining user behavior across a variety of different tasks. Consequently, the PBU matrix may also be used to summarize and integrate findings studying the same kind of technology.

Also, the funnel perspective takes the intention-behavior gap (e.g., Bagozzi 2007) into account: after having formed a consideration set, choice does not need to follow immediately, but may be postponed or not carried out at all (Einhorn and Hogarth, 1981; Turley and LeBlanc, 1995). As choices bring along a particular type of definitiveness, not all favorable evaluations may be translated into actions, and the status quo may be the preferred choice (Corbin, 1980; Samuelson & Zeckhauser, 1988), which may be depicted as an alternative being part of the consideration set, but not the choice set. A preference for the status quo may also be expected to yield differences between consumer settings exhibiting a high degree of voluntariness and organizational settings characterized by a high degree of mandatoriness (i.e., the individual has a strict corridor for decision-making and subsequent action).

Further, the funnel perspective allows flexibility in the social context, which, following demands by Venkatesh et al. (2016), needs to be integrated with technology acceptance research, and comprises both formal and informal settings such as "project teams, functional unit, business division, and the entire organization" and "user communities and other informal social networks" (p. 345). The funnel perspective allows this flexibility in perspective and may be created for individuals as well as for teams or whole organizations.

4.2 Multidisciplinary Linkages

With the funnel-based view distinguishing between use scenarios and granulating technologies into bundles of partitions, several linkages to related research fields are uncovered and provide guidance on how to use and combine our proposed framework. For example, when considering different partitions, one can draw on similarity indices as proposed by Tversky (1977), which regard common and distinctive features for calculation. These indices may be used in a similar manner as recommender systems in webshops, postulating that creating acceptance for rather similar technologies may be easier than for very distinct ones. Similarity considerations may also serve as a predictive tool in terms of translating earlier findings from similar alternatives to novel candidates. This might also provide an additional link to preferences, as "typicality and preference are highly associated" (Ratneshwar and Shocker, 1991, p. 283). The relation of versatility, typicality, and preference proposed by Ratneshwar and Shocker (1991) may also serve as a starting point, suggesting that the more versatile an alternative is (i.e., the more partitions it holds), the more use scenarios exist, and the more likely it is that the alternative is considered an adequate solution for achieving a certain goal, which in turn is deemed to render the alternative more favorable or preferable compared to others.

In consumer literature, which is used to construct the funnel, measuring size, content, and generation of consideration sets has been a topic of study for several decades (Hauser, 2014; Hauser and Wernerfelt, 1990; Shocker et al., 1991). A significant benefit is the ability to establish quantitative models for prediction (Hauser and Wernerfelt, 1990), which is helpful for decision-makers to ponder whether to implement new technology. Further, the inclusion of heuristics on the user side (Hauser, 2014) allows integrating constructs such as habit on a temporal axis, i.e., the more funnel iterations have been carried out, the more time has passed, which provides a systematic basis for structural model adaptations over time. For example, Hauser and Wernerfelt (1990) present a model of evaluation costs, concluding that limitation in alternatives is a rational response. This cost perspective may provide connectors for notions such as habit and lock-in effects; e.g., for high costs, consideration sets are proposed to be small, and for high variance alternatives, consideration sets are expected to be rather large (Hauser and Wernerfelt 1990). Additionally, consideration sets may contain one or more candidates (e.g., Hauser and Wernerfelt 1990), i.e., situations of both mandatory (one candidate for choice only) and voluntary use (one or more candidates) can be mapped. Depending on the context, an actual choice may be the "best or the least objectionable option available at the time" (Turley and LeBlanc 1995, p. 31). Studies have found perceptions to be essential influences of choice (Baker et al., 1986; Punj and Srinivasan, 1989), providing strong links between a funnel perspective of technology acceptance and the rich body of literature on TRA and TPB based research. Further, information has been found to be distorted in order to support the image that has been created through earlier evaluation (Elliott and Roach, 1991), suggesting the existence of path dependencies over time. That is, a user assessing a technology as exhibiting rather low ease of use may draw on that expectation in future choice situations, and is likely to display similar

perceptions when measured at different points in time.

Complementing settings of early technology acceptance research examining user rejection of IS applications, Sutton (1987) investigated reevaluation of alternatives that have been rejected, finding that reevaluation per se is rather unlikely and reevaluated alternatives rarely make it into the consideration set. For the IS field, this implies that once users have exhibited resistance, it may be significantly harder to implement successfully (or elicit user acceptance, respectively) a novel technology. As Swait and Ben-Akiva (1987) and Ratneshwar and Shocker (1991) note, constraints are important factors influencing which candidates move into a specific set. Hence, in addition to rather positive factors such as performance expectancy, hedonic motivation, and facilitating conditions (e.g., UTAUT2, Venkatesh et al. 2012), it seems fruitful to integrate perspectives of constraints limiting the choice space, i.e., not only beneficial characteristics of a target technology may impact acceptance, but also mere availability of choices (in many scenarios, it may be better to have an arbitrary solution rather than no solution at all). Constraints on a personal level also "relate to individual tastes and preferences" (Shocker et al. 1991, p. 187), naturally opening a path for combining acceptance and preference studies. A particularly interesting notion is that of a 'comparison set', which contains alternatives of the awareness set that have no chance of being moved into the consideration set, but interact with other candidates and thus influence actual consideration set composition (Lapersonne et al., 1995; Shocker et al., 1991). Overall, as SOAs are idiosyncratic in the way that each individual holds his or her own set (Howard & Sheth, 1969; Silk and Urban, 1978), they may be used for clustering and market segmentation and serve as a basis for further insight on the individual user level.

5 Conclusion

Without any doubt, most technology acceptance models constitute remarkable accomplishments within IS research. Literature drawing on TRA or TPB based models mushroomed throughout the last decades. The structural models served as a guideline explaining acceptance in various contexts or were extended with additional predictors. However, there is barely research shedding a different light on technology acceptance to address these models' weaknesses. Within this paper, we attempted to reflect on the status quo of technology acceptance research and its sore points. We intend to extend rather than substitute existing technology acceptance findings by picking up these neglected aspects to trigger a new direction within research by proposing a funnel-based framework: for technology acceptance research, different types of SOAs may be helpful. Commonly, SOAs are viewed as forming a funnel of sequential reduction of alternatives (see, e.g., Narayana and Markin 1975). Technologies further down the funnel have been seriously evaluated (Hauser and Wernerfelt, 1989). SOAs also give insight that rejected technologies have at least been acknowledged as being potential candidates for the task, but are deemed unattractive for some reason and drop out as the user proceeds through the funnel. In the case of a choice set (see, e.g., Shocker et al. 1991), all of the choice candidates have been accepted, as all are close competitors

for being used, and user preferences determine the final selection. Accordingly, sequential sets of alternatives and the respective consumer choice processes have been rooted in the preference literature for a long period (see, e.g., Ratneshwar and Shocker 1991).

A particularly interesting aspect for future research is the relation of inert set and consideration set. The main question that arises is, ‘what is this inertia sheeting the inert set’? A fruitful approach might be the perspective of voluntary versus mandatory settings: in a mandatory context, e.g., when an organization enforces strict guidelines, it appears likely that alternatives an individual has assessed favorably may not be usable due to restrictions, and hence form an inert set. Moreover, the boundary between consideration set and choice set stimulates further research: Potential differences depending on the voluntariness of the setting can be examined. For example, in a mandatory context, it may be reasonable to view an alternative to be part of the inert or inept set, and also find the alternative in the choice set due to external drive. In this case, the particular technology should be regarded as lacking acceptance, as its application is forced, and its adequacy is actually denied by the individual (otherwise, the technology would be part of the consideration set). Future research should also embrace longitudinal studies to determine the contents and changes of different SOA. In order to shed light on circumstances leading to modifications, methods such as the Critical Incident Technique (Flanagan, 1954) may be particularly helpful.

References

Abraham, C., Sheeran, P., Norman, P., Conner, M., De Vries, N., & Otten, W. (1999). When Good Intentions Are Not Enough: Modeling Postdecisional Cognitive Correlates of Condom Use. Journal of Applied Social Psychology, 29(12), 2591–2612.

Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived Usefulness, Ease of Use, and Usage of Information Technology: A Replication. MIS Quarterly, 16(2), 227–247.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. Action Control, 11–39.

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211.

Ajzen, I. (1996). The social psychology of decision making. In Higgins E. T. & Kruglanski A. W. (Eds.), Social psychology: Handbook of basic principles, 297–325. Guilford Press.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Prentice Hall.

Armitage, C. J., & Conner, M. (2001). Efficacy of the Theory of Planned Behaviour: A meta-analytic review. The British Journal of Social Psychology, 40(4), 471–499.

Bagozzi, R. (2007). The Legacy of the Technology Acceptance Model and a Proposal for a Paradigm Shift. Journal of the Association for Information Systems, 8(4), 244–254.

Bagozzi, R. P. (1992). The Self-Regulation of Attitudes, Intentions, and Behavior. Social Psychology Quarterly, 55(2), 178–204.

Bagozzi, R. P., Baumgartner, H., & Yi, Y. (1992). State versus Action Orientation and the Theory of Reasoned Action: An Application to Coupon Usage. Journal of Consumer Research, 18(4), 505 – 518.

Bagozzi, R. P., & Kimmel, S. K. (1995). A comparison of leading theories for the prediction of goal-directed behaviours. The British Journal of Social Psychology, 34(4), 437–461.

Baker, W., Hutchinson, J., Moore, D., & Nedungadi, P. (1986). Brand familiarity and advertising: effects on the evoked set and brand preference. Advances in Consumer Research, 13, 637–642.

Barsalou, L. W. (1985). Ideals, central tendency, and frequency of instantiation as determinants of graded structure in categories. Journal of Experimental Psychology: Learning, Memory, and Cognition, 11(4), 629–654.

Beckmann, J., & Kuhl, J. (1984). Altering information to gain action control: Functional aspects of human information processing in decision making. Journal of Research in Personality, 18(2), 224–237.

Bettman, J. R., Luce, M. F., & Payne, J. W. (1998). Constructive Consumer Choice Processes. Journal of Consumer Research, 25(3), 187–217.

Bhattacherjee, A., & Premkumar, G. (2004). Understanding Changes in Belief and Attitude toward Information Technology Usage: A Theoretical Model and Longitudinal Test. MIS Quarterly, 28(2), 229–254.

Bhattacherjee, A. (2001). Understanding information systems continuance: an expectation-confirmation model. MIS Quarterly, 351–370.

Bhattacherjee, A., & Lin, C.-P. (2014). A unified model of IT continuance: three complementary perspectives and crossover effects. European Journal of Information Systems, 24(4), 364–373.

Bogomolova, S. (2010). Life after death? Analyzing post-defection consumer brand equity. Journal of Business Research, 63(11), 1135–1141.

Bronnenberg, B. J., & Vanhonacker, W. R. (1996). Limited Choice Sets, Local Price Response and Implied Measures of Price Competition. Journal of Marketing Research, 33(2), 163–173.

Burton-Jones, A., McLean, E. R., & Monod, E. (2015). Theoretical perspectives in IS research: from variance and process to conceptual latitude and conceptual fit. European Journal of Information Systems, 24(6), 664–679.

Burton-Jones, A., & Straub Jr, D. W. (2006). Reconceptualizing system usage: An approach and empirical test. Information Systems Research, 17(3), 228–246.

Conner, M., & Armitage, C. J. (1998). Extending the theory of planned behavior: A review and avenues for further research. Journal of Applied Social Psychology, 28(15), 1429–1464.

Corbin, R. M. (1980). Decisions that might not get made. Cognitive Processes in Choice and Decision Behavior, 47–67.

Davis, F. D. (1985). A technology acceptance model for empirically testing new end-user information systems: Theory and results (PhD Thesis, Massachusetts Institute of Technology).

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13(3), 319–340.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. Management Science, 35(8), 982–1003.

Desouza, K. C., Awazu, Y., & Ramaprasad, A. (2007). Modifications and innovations to technology artifacts. Technovation, 27(4), 204–220.

Einhorn, H. J., & Hogarth, R. M. (1981). Behavioral decision theory: Processes of judgement and choice. Annual Review of Psychology, 32(1), 53–88.

Elliott, K. M., & Roach, D. W. (1991). Are consumers evaluating your products the way you think and hope they are? Journal of Consumer Marketing, 8(2), 5–14.

Felix, R. (2012). Brand communities for mainstream brands: the example of the Yamaha R1 brand community. Journal of Consumer Marketing, 29(3), 225–232.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention and behaviour: An introduction to theory and research. Addison-Wesley.

Fishbein, M. (1963). An Investigation of the Relationships between Beliefs about an Object and the Attitude toward that Object. Human Relations, 16(3), 233–239.

Flanagan, J. C. (1954). The critical incident technique. Psychological Bulletin, 51(4), 327.

Furneaux, B., & Wade, M. R. (2011). An exploration of organizational level information systems discontinuance intentions. MIS Quarterly, 35(3), 573–598.

Gefen, D. (2003). TAM or just plain habit: A look at experienced online shoppers. Journal of Organizational and End User Computing (JOEUC), 15(3), 1–13.

Gefen, D., & Straub, D. W. (1997). Gender Differences in the Perception and Use of E-Mail: An Extension to the Technology Acceptance Model. MIS Quarterly, 21(4), 389–400.

Gefen, D., & Straub, D. (2000). The Relative Importance of Perceived Ease of Use in IS Adoption: A Study of E-Commerce Adoption. Journal of the Association for Information Systems, 1(1), 1–30.

Gollwitzer, P. M. (1990). Action phases and mind-sets. In E. T. Higgins & R. M. Sorrentino (Eds.), Handbook of motivation and cognition: Foundations of social behavior 53–92. Guilford.

Gollwitzer, P. M. (1993). Goal Achievement: The Role of Intentions. European Review of Social Psychology, 4(1), 141–185.

Grant, R., Clarke, R. J., & Kyriazis, E. (2010). Research needs for assessing online value creation in complex consumer purchase process behavior. Journal of Retailing and Consumer Services, 17(1), 53–60.

Gregor, S. (2006). The nature of theory in information systems. MIS Quarterly, 30(3), 611–642.

Griffith, T. L. (1999). Technology features as triggers for sensemaking. Academy of Management Review, 24(3), 472–488.

Griffith, T. L., & Northcraft, G. B. (1994). Distinguishing Between the Forest and the Trees: Media, Features, and Methodology in Electronic Communication Research. Organization Science, 5(2), 272–285.

Hauser, J. R. (2014). Consideration-set heuristics. Journal of Business Research, 67(8), 1688–1699.

Hauser, J. R., & Wernerfelt, B. (1989). The Competitive Implications of Relevant-Set/Response Analysis. Journal of Marketing Research, 26(4), 391–405.

Hauser, J. R., & Wernerfelt, B. (1990). An evaluation cost model of consideration sets. Journal of Consumer Research, 16(4), 393–408.

Heckhausen, H., & Beckmann, J. (1990). Intentional action and action slips. Psychological Review, 97(1), 36–48.

Hong, W., Chan, F. K. Y., Thong, J. Y. L., Chasalow, L. C., & Dhillon, G. (2014). A framework and guidelines for context-specific theorizing in information systems research. Information Systems Research, 25(1), 111–136.

Howard, J. A., & Sheth, J. N. (1969). The theory of buyer behavior. New York: J. Wiley.

Jasperson, Carter, & Zmud (2005). A Comprehensive Conceptualization of Post-Adoptive Behaviors Associated with Information Technology Enabled Work Systems. MIS Quarterly, 29(3), 525–557.

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. Econometrica, 47(2), 263–291.

Kardes, F. R., Kalyanaram, G., Chandrashekaran, M., & Dornoff, R. J. (1993). Brand Retrieval, Consideration Set Composition, Consumer Choice, and the Pioneering Advantage. Journal of Consumer Research, 20(1), 62–75.

Kendzierski, D. (1990). Decision Making Versus Decision Implementation: An Action Control Approach to Exercise Adoption and Adherence1. Journal of Applied Social Psychology, 20(1), 27–45.

Kim, H. W., Kankanhalli, A., & Lee, S. H. (2018). Examining Gifting Through Social Network Services: A Social Exchange Theory Perspective. Information Systems Research, 29(4), 805–828.

Kim, S. S., & Malhotra, N. K. (2005). A Longitudinal Model of Continued IS Use: An Integrative View of Four Mechanisms Underlying Postadoption Phenomena. Management Science, 51(5), 741–755.

Koufaris, M. (2002). Applying the Technology Acceptance Model and Flow Theory to Online Consumer Behavior. Information Systems Research, 13(2), 205–223.

Lallmahomed, M. Z. I., Rahim, N. Z. A., Ibrahim, R., & Rahman, A. A. (2013). Predicting different conceptualizations of system use: Acceptance in hedonic volitional context (Facebook). Computers in Human Behavior, 29(6), 2776–2787.

Lankton, N. K., & McKnight, H. D. (2012). Examining two expectation disconfirmation theory models: assimilation and asymmetry effects. Journal of the Association for Information Systems, 13(2), 1.

Lapersonne, E., Laurent, G., & Le Goff, J. J. (1995). Consideration sets of size one: An empirical investigation of automobile purchases. International Journal of Research in Marketing, 12(1), 55–66.

LaPiere, R. (1934). Attitudes Versus Actions. Social Forces, 11, 230–237.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. Information & Management, 40(3), 191–204.

Mathieson, K. (1991). Predicting User Intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. Information Systems Research, 2(3), 173–191.

Narayana, C. L., & Markin, R. J. (1975). Consumer Behavior and Product Performance: An Alternative Conceptualization. Journal of Marketing, 39(4), 1–6.

Norman, P., & Smith, L. (1995). The theory of planned behaviour and exercise: An investigation into the role of prior behaviour, behavioural intentions and attitude variability. European Journal of Social Psychology, 25(4), 403–415.

Orbell, S., & Sheeran, P. (1998). 'inclined abstainers': A problem for predicting health-related behaviour. The British Journal of Social Psychology, 37(2), 151–165.

Ouellette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. Psychological Bulletin, 124(1), 54–74.

Park, C. W., & Smith, D. C. (1989). Product-Level Choice: A Top-Down or Bottom-Up Process? Journal of Consumer Research, 16(3), 289–299.

Parthasarathy, M., & Bhattacherjee, A. (1998). Understanding Post-Adoption Behavior in the Context of Online Services. Information Systems Research, 9(4), 362–379.

Pollard, C. (2003). Exploring Continued and Discontinued Use of IT: A Case Study of OptionFinder, a Group Support System. Group Decision and Negotiation, 12(3), 171–193.

Priester, J. R., Nayakankuppam, D., Fleming, M. A., & Godek, J. (2004). The A 2 SC 2 Model: The Influence of Attitudes and Attitude Strength on Consideration and Choice. Journal of Consumer Research, 30(4), 574–587.

Punj, G., & Srinivasan, N. (1989). Influence of Expertise and Purchase Experience on the Formation of Evoked Sets. Advances in Consumer Research, 16(1), 507–514.

Ratneshwar, S., & Shocker, A. D. (1991). Substitution in Use and the Role of Usage Context in Product Category Structures. Journal of Marketing Research, 28(3), 281–295.

Mehrizi, M. H. R., Modol, J. R., & Nezhad, M. Z. (2019). Intensifying to Cease: Unpacking the Process of Information Systems Discontinuance. MIS Quarterly, 43(1), 141–165.

Roberts, J. H., & Lattin, J. M. (1991). Development and Testing of a Model of Consideration Set Composition. Journal of Marketing Research, 28(4), 429–440.

Rogers, E. M. (1962). Diffusion of innovations. Simon and Schuster.

Ryan, M. J., & Bonfield, E. H. (1975). The Fishbein Extended Model and Consumer Behavior. Journal of Consumer Research, 2(2), 118–136.

Samuelson, W., & Zeckhauser, R. (1988). Status quo bias in decision making. Journal of Risk and Uncertainty, 1(1), 7–59.

Schwarz, A., & Chin, W. (2007). Looking forward: Toward an understanding of the nature and definition of IT acceptance. Journal of the Association for Information Systems, 8(4).

Schwarz, A., Chin, W. W., Hirschheim, R., & Schwarz, C. (2014). Toward a process-based view of information technology acceptance. Journal of Information Technology, 29(1), 73–96.

Sharma, R., Yetton, P., & Crawford, J. (2009). Estimating the Effect of Common Method Variance: The Method—Method Pair Technique with an Illustration from TAM Research. MIS Quarterly, 33(3), 473–490.

Sheeran, P. (2002). Intention—Behavior Relations: A Conceptual and Empirical Review. European Review of Social Psychology, 12(1), 1–36.

Sheeran, P., & Orbell, S. (1999). Implementation intentions and repeated behaviour: Augmenting the predictive validity of the theory of planned behaviour. European Journal of Social Psychology, 29(2-3), 349–369.

Sheppard, B. H., Hartwick, J., & Warshaw, P. R. (1988). The Theory of Reasoned Action: A Meta-Analysis of Past Research with Recommendations for Modifications and Future Research. Journal of Consumer Research, 15(3), 325–343.

Shih, C. F., & Venkatesh, A. (2004). Beyond Adoption: Development and Application of a Use-Diffusion Model. Journal of Marketing, 68(1), 59–72.

Shocker, A. D., Ben-Akiva, M., Boccara, B., & Nedungadi, P. (1991). Consideration Set Influences on Consumer Decision-Making and Choice: Issues, Models, and Suggestions. Marketing Letters, 2(3), 181–197.

Silk, A. J., & Urban, G. L. (1978). Pre-Test-Market Evaluation of New Packaged Goods: A Model and Measurement Methodology. Journal of Marketing Research, 15(2), 171–191.

Simon, H. A. (1955). A Behavioral Model of Rational Choice. The Quarterly Journal of Economics, 69(1), 99–118.

Simonson, I., Nowlis, S., & Lemon, K. (1993). The Effect of Local Consideration Sets on Global Choice between Lower Price and Higher Quality. Marketing Science, 12(4), 357–377.

Soliman, W., & Rinta-Kahila, T. (2020). Toward a refined conceptualization of IS discontinuance: Reflection on the past and a way forward. Information & Management, 57(2), 103167.

Srivastava, R. K., Alpert, M. I., & Shocker, A. D. (1984). A Customer-oriented Approach for Determining Market Structures. Journal of Marketing, 48(2), 32–45.

Srivastava, R. K., Leone, R. P., & Shocker, A. D. (1981). Market Structure Analysis: Hierarchical Clustering of Products Based on Substitution-in-Use. Journal of Marketing, 45(3), 38–48.

Sun (2012). Understanding User Revisions When Using Information System Features: Adaptive System Use and Triggers. MIS Quarterly, 36(2), 453–478.

Sundaram, S., Schwarz, A., Jones, E., & Chin, W. W. (2007). Technology use on the front line: how information technology enhances individual performance. Journal of the Academy of Marketing Science, 35(1), 101–112.

Sutton, R. J. (1987). Using empirical data to investigate the likelihood of brands being admitted or readmitted into an established evoked set. Journal of the Academy of Marketing Science, 15(3), 82–89.

Swait, J., & Ben-Akiva, M. (1987). Incorporating random constraints in discrete models of choice set generation. Transportation Research Part B: Methodological, 21(2), 91–102.

Szajna, B. (1996). Empirical evaluation of the revised technology acceptance model. Management Science, 42(1), 85–92.

Taylor, S., & Todd, P. A. (1995). Understanding information technology usage: A test of competing models. Information Systems Research, 6(2), 144–176.

Turel, O. (2015). Quitting the use of a habituated hedonic information system: a theoretical model and empirical examination of Facebook users. European Journal of Information Systems, 24(4), 431–446.

Turel, O. (2016). Untangling the complex role of guilt in rational decisions to discontinue the use of a hedonic Information System. European Journal of Information Systems, 25(5), 432–447.

Turley, L. W., & LeBlanc, R. P. (1995). Evoked sets: a dynamic process model. Journal of Marketing Theory and Practice, 3(2), 28–36.

Tversky, A. (1977). Features of similarity. Psychological Review, 84(4), 327.

Vargo, S. L., & Lusch, R. F. (2004). Evolving to a New Dominant Logic for Marketing. Journal of Marketing, 68(1), 1–17.

Venkatesh, V., Morris, M. G., & Ackerman, P. L. (2000). A Longitudinal Field Investigation of Gender Differences in Individual Technology Adoption Decision-Making Processes. Organizational Behavior and Human Decision Processes, 83(1), 33–60.

Venkatesh, V., Morris, M. G., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. MIS Quarterly, 27(3), 425–478.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. MIS Quarterly, 36(1), 157–178.

Venkatesh, V., & Davis, F. D. (1996). A Model of the Antecedents of Perceived Ease of Use: Development and Test. Decision Sciences, 27(3), 451–481.

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Management Science, 46(2), 186–204.

Venkatesh, V., & Morris, M. G. (2000). Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behavior. MIS Quarterly, 24(1), 115–139.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2016). Unified theory of acceptance and use of technology: A synthesis and the road ahead. Journal of the Association for Information Systems, 17(5), 328–376.

Wang, H., Wei, Q., & Chen, G. (2013). From clicking to consideration: A business intelligence approach to estimating consumers' consideration probabilities. Decision Support Systems, 56, 397–405.

Wicker, A. W. (1969). Attitudes versus Actions: The Relationship of Verbal and Overt Behavioral Responses to Attitude Objects. Journal of Social Issues, 25(4), 41–78.

Wilkie, W. L., & Pessemier, E. A. (1973). Issues in Marketing's use of Multi-Attribute Attitude Models. Journal of Marketing Research, 10(4), 428–441.

Wright, P., & Barbour, F. (1977). Phased Decision Strategies: Sequels to an Initial Screening (Research Paper No. 353). Stanford University.

Part Two: Sustainability in Consumption

Essay 7: Bridge the gap: Consumers' purchase intention and behavior regarding sustainable clothing

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Abstract

With the textile industry satisfying steadily increasing consumption levels, excessive usage of valuable natural resources provokes a major environmental footprint: 118 billion cubic meters of water are expected to be utilized for global clothing production in 2030. Therefore, consumers' clothing consumption behavior needs to be shifted towards a more sustainable one. While green purchase behavior in general is well understood, research still lacks a comprehensive approach to explain consumers' purchase behavior of sustainable clothing. To provide a holistic framework which determines the main antecedents of purchase behavior of sustainable clothing and further, to shed light on the gap between purchase intention and subsequent purchase behavior of such clothes, we extended the Theory of Reasoned Action (TRA) approach with well-established constructs from green literature (i.e., perceived environmental knowledge and environmental concerns) and novel constructs derived from prior exploratory findings (i.e., greenwashing concerns, perceived economic risk, and perceived aesthetic risk). Four hundred sixtyfour participants were inquired to assess these constructs in the context of sustainable clothing. Our findings indicate that attitude towards sustainable clothing has the highest impact on purchase intention. However, this relation is negatively influenced by consumers' greenwashing concerns. Moreover, we find evidence that consumers' perceived aesthetic risk negatively impacts the intention-behavior relation, whereas perceived economic risk has no significant effect on this relation.

Keywords sustainable clothing consumption; intention-behavior gap; theory of reasoned action; purchase behavior; purchase intention; sustainability

1 Introduction

Steadily increasing consumption levels and consumer demand over the past decades led businesses to yield technological advances allowing for mass production and considering resources as ever inexhaustible (Csikszentmihalyi, 2000; Niinimäki and Hassi, 2011). Conventional business models primarily aim for profit maximization by satisfying growing demand disregarding the environmental facet of their actions. This phenomenon is particularly salient in the clothing industry, where manufacturing shifted to lower-cost countries with poor working conditions, price and quality of garments declined, and clothing's life cycle shortened to react to fast changing consumers' preferences and contemporary styles (Goworek et al., 2012). The demand for such fast fashion risen by the current 'throwaway society' and the subsequent growing market supply implies extreme obsolescence as well as a loss of intrinsic value

of garments (Morgan and Birtwistle, 2009) and in turn, results in even more impulse purchasing and excessive waste of valuable resources (Achabou and Dekhili, 2013). The textile industry's environmental footprint negatively affects groundwater, air, and soil: its global environmental stress is expected to be around 2791 million tons of CO2 emissions, 118 billion cubic meters consumed water, and 148 million tons of textilewaste in 2030 (GFA and BCG, 2017).

Due to increasing awareness of the clothing industry's resource intensity and its subsequent negative environmental impact, literature explored drivers and inhibitors of sustainable clothing consumption. However, due to a lacking industry standard, sustainable clothing is not uniformly defined and terms like eco-conscious and eco-friendly (Hiller Connell, 2010; Laitala and Boks, 2012), ethical (Goworek et al., 2012; Joergens, 2006), green (D'Souza et al., 2007), and organic (Hustvedt and Dickson, 2009) are utilized interchangeably. Notwithstanding its different designations, there is consensus within literature on the conceptualization of sustainable clothing consumption behavior: it implies pro-environmental actions at every stage of the garment's life cycle from pre-purchase and purchase to post-purchase comprising its acquisition, storage, usage and care, maintenance, as well as discard (Bianchi and Birtwistle, 2012; Jacoby et al., 1977; Lundblad and Davies, 2016). Consequently, literature investigated how to minimize the negative environmental impact of the single stages. Thereby, sustainable behavior during the pre-purchase and purchase stages requires consumers to either purchase clothes made of environmentally preferable, recycled, upcycled, or biodegradable fibers manufactured under fair working conditions, or purchase garments from second-hand stores or sharing economies (Allwood et al., 2008; Armstrong et al., 2016; Goworek et al., 2012). Mostly, research focused on environmental issues occurring in the post-purchase stage by proposing strategies to prolong clothes' lifespans such as reusing (i.e., repairing, cleaning), recycling, and donation (Armstrong et al., 2016; Goworek et al., 2018; Laitala and Boks, 2012).

Albeit several concepts for sustainable clothing consumption have been proposed, most consumers still exhibit an intention-behavior gap regarding sustainable consumption, i.e., although they pretend a pro-environmental attitude and intention, they do not translate this into sustainable actions (Kollmuss and Agyeman, 2002; Young et al., 2009), particularly when it comes to the purchasing of sustainable clothes. Preliminary exploratory studies provide a number of aspects inhibiting green purchase behavior and its intention formation, respectively: interviews and focus group studies found limited knowledge (Harris et al., 2016; Hiller Connell, 2010; Joergens, 2006), the lack of environmental concerns (Hustvedt and Dickson, 2009), economic aspects (Hustvedt and Dickson, 2009; Joergens, 2006), unaesthetic appearance and fashion trend sensitivity (Hiller Connell, 2010; Lang et al., 2013), and high search costs (i.e., perceived time and effort; Ellen, 1994) to be the main barriers for consumers to engage in sustainable consumption behavior.

Nevertheless, research still lacks a holistic framework investigating purchase intention as well as actual purchase behavior of sustainable clothing by integrating these preceding findings. Similarly to prior

work investigating purchase behavior of sustainable products in general, we thus draw on the Theory of Reasoned Action (TRA, Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) and extend it by employing well-known constructs from green literature as well as novel constructs derived from preceding exploratory findings. Thereby, we contribute to the body of knowledge by providing a thorough and comprehensive determination of established as well as unexplored, potential antecedents of consumer decision-making towards sustainable clothing consumption and further, by shedding light on the unexplored bivariate inconsistency between purchase intention and purchase behavior of sustainable clothes.

The remainder is structured as follows: The subsequent section reviews related work on sustainable clothing consumption and derives relevant constructs from prior findings as well as corresponding hypotheses. Section 3 describes the data collection, descriptive statistics, and items utilized in our questionnaire. Section 4 outlines the measurement and structural model evaluation. Section 5 discusses our contribution to the existing body of literature, managerial implications, enumerates limitations, and provides guidance for future research.

2 Related work and hypotheses

2.1 Purchase intention and purchase behavior

Across a variety of research fields such as entrepreneurial behavior (Kautonen et al., 2013, 2015; Shirokova et al., 2016), health-related behaviors (e.g., see Godin and Kok (1996) for a metaanalytic review), online purchase behavior (George, 2004; Pavlou and Fygenson, 2006), or ethical decisions (Shaw et al., 2000), behavioral intentions have been found to be immediate predictors of actual behaviors (Armitage and Conner, 2001; Bird, 1988; Locke and Latham, 2002). Thereby, scholars mostly exploited the insights of the TRA (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) and its subsequent extension, the Theory of Planned Behavior (TPB, Ajzen, 1985, 1988, 1991) to draw on the proposed intention-behavior relation and to investigate the antecedents of such behavioral intentions.

An essential impulse for the development of the TRA and the TPB, respectively, were preceding attitude-behavior models and more specifically, the identification of inconsistencies mentioned by – among others – LaPiere (1934) and Wicker (1969) indicating that an individual's attitude only weakly predicts actual behavior. This discrepancy provided a fruitful path for subsequent models in the late 1960s, combining these constructs with other factors to elucidate the attitude-behavior relation. Inter alia, the TRA (Fishbein and Ajzen, 1975) identified two additional constructs to overcome the bivariate inconsistency. First, a favorable attitude towards a specific behavior might not be translated into actual behavior due to a lacking social pressure from the individual's significant others or vice versa, the social pressure not to perform the behavior. Thus, in contrast to attitude capturing the personal influence on behavior, Fishbein and Ajzen (1975) suggested that measures of subjective norm capture the social influence on behavior. Second, attitude and subjective norm are assumed to affect behavior via a mediating cognitive link, i.e., the intention to perform the behavior. Behavioral intention captures motivational factors influencing the individual's behavior and reflects the amount of effort the individual is willing to exert (Ajzen,

1991). Thus, behavioral intention is considered to be the most immediate predictor of behavior with respect to the TRA and behavioral intention, in turn, is determined by attitude and subjective norm. Thereby, attitude is determined by behavioral beliefs (i.e., an individual's belief about the likelihood of the behavior's consequences) and subjective norm is determined by normative beliefs (i.e., an individual's belief about what relevant others think about the behavior).

The TRA was initially developed to predict volitional behavior, i.e., behavior over which the individual has control (Webb and Sheeran, 2006) or behavior which does not require skills, abilities, opportunities, or the cooperation of others (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975). However, this formulation was accused of creating a false dichotomy since most behavior is neither entirely volitional nor entirely involitional but ranges in between (Liska, 1984). Addressing this issue, Ajzen (1985, 1988, 1991) added the concept of perceived behavioral control to the TRA yielding the TPB. Figure 1 depicts the TRA and the TPB.

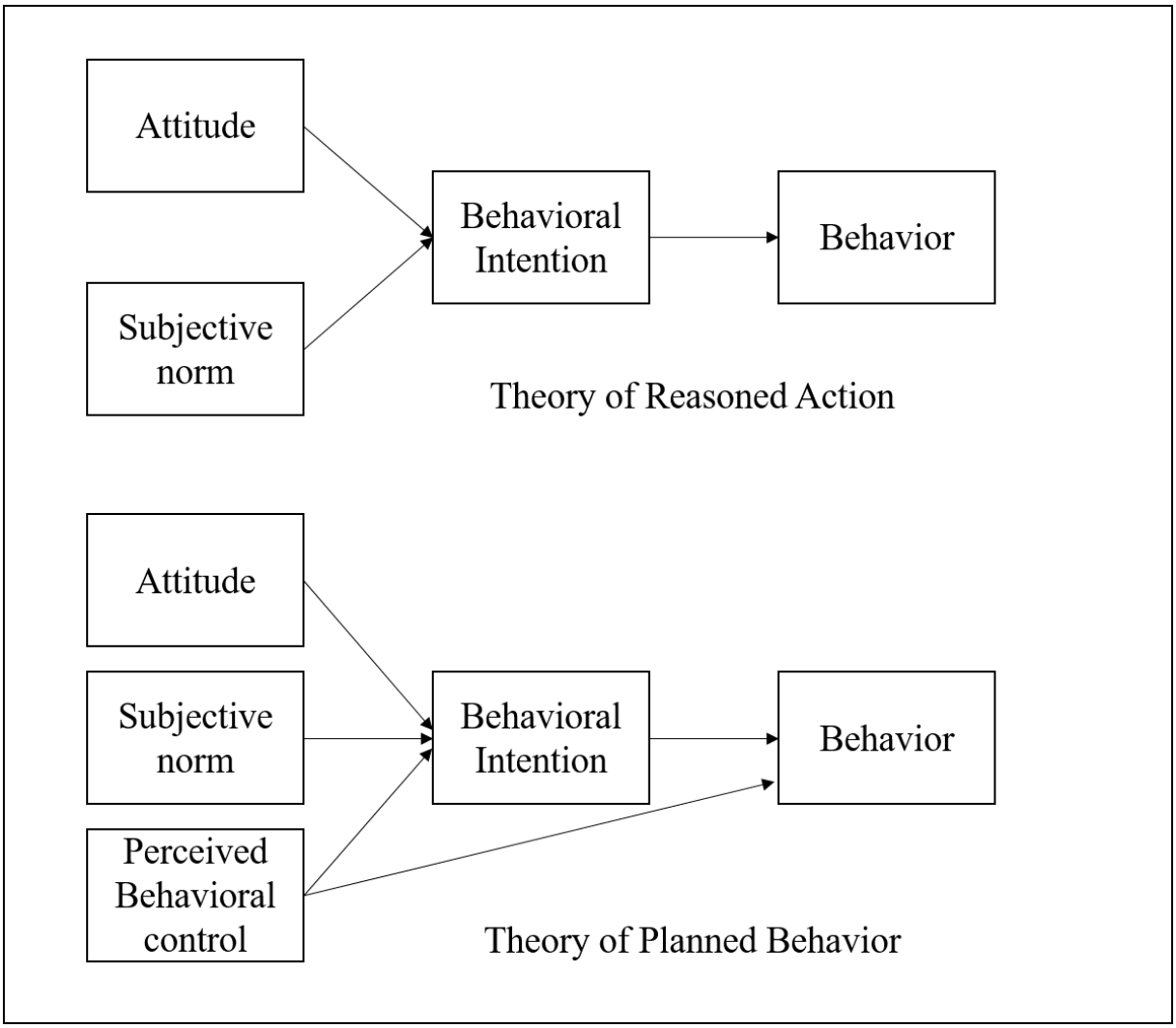

Figure 1: Theory of Reasoned Action and Theory of Planned Behavior.

Drawing on a sustainability context, both the TRA and the TPB were applied and further extended to investigate pro-environmental behaviors such as recycling (Cheung et al., 1999; Echegaray and

Hansstein, 2017;Wang et al., 2016), sustainable food consumption (Sparks and Shepherd, 1992; Vermeir and Verbeke, 2008), purchase behavior of energy-efficient products (Ha and Janda, 2012; Tan et al., 2017), purchase behavior of green cosmetic products (Hsu et al., 2017; Kim and Chung, 2011), or green purchase behavior in general (Chan, 2001; Kautish et al., 2019; Maichum et al., 2016; Paul et al., 2016; Taufique and Vaithianathan, 2018). Nevertheless, literature providing a comprehensive understanding of the determinants of consumers' purchase behavior for sustainable clothing is still scarce. We thus derive purchase intention, purchase behavior, attitude, and subjective norm from the TRA and the TPB as a basic framework for our model to investigate the phenomenon of sustainable clothing consumption:

H1. Purchase intention for sustainable clothes has a positiveimpact on actual purchase behavior.

H2. Attitude towards sustainable clothes has a positive impact on purchase intention.

H3. Subjective norm has a positive impact on purchase intention for sustainable clothes.

2.2 Intention-behavior gap

Albeit intention is a good reference point to predict an individual's actual behavior, most people exhibit a substantial gap between their intentions and their subsequent behavior (Abraham et al., 1999; Bagozzi, 1992; Orbell and Sheeran, 1998). This intention-behavior gap was further identified in terms of sustainable consumption behavior, i.e., albeit consumers pretend to have pro-environmental intentions, they frequently struggle to translate them into green actions (Hughner et al., 2007; Kollmuss and Agyeman, 2002; Pickett-Baker and Ozaki, 2008; Young et al., 2009). Formally, meta-analyses of studies applying TRA and TPB found the intention-behavior correlation to be only 0.47 (185 studies, Armitage and Conner, 2001) and 0.44 (28 studies, Sheeran and Orbell, 1998) on average. Further, a meta-analysis of 10 meta-analyses indicated that intention accounted for only 28% of the variance in behavior on average (Sheeran, 2002), leaving substantial proportions of variance in behavior unexplained. Sheeran (2002) particularly identified – among others – properties of behavioral intentions and intention type to influence the degree of consistency between intentions and behavior.

Considering properties of behavioral intentions, prior research modeled different moderators intending to elucidate the intention-behavior discrepancy (see, e.g., Sheeran (2002), Sheeran and Abraham (2003), or Webb and Sheeran (2006) for comprehensive reviews). It is assumed that people's intentions possess different dimensions or properties and thus, they might differ in the quality of their motivation or strength of their intention, respectively (Sheeran, 2002). Different properties affect the predictive ability of their intentions on actual behavior. For example, temporal stability of intentions (Sheeran and Orbell, 1998), past behavior (Kashima et al., 1993), self-schemas (Kendzierski and Whitaker, 1997), or anticipated regret (Sheeran and Orbell,1999) are dimensions which might vary among individuals and thus affect predictive ability of their intentions, exhibiting a moderating effect on the intention-behavior relation.

Another line of research distinguished between different intention types occurring during different phases of the intention-behavior relation. Thereby, the lack of correspondence between behavioral patterns predicted by intentions and measures of actual behavior may be caused by two different groups: (1) intenders who do not transform their intention into subsequent action and (2) non-intenders who do take subsequent action (Abraham et al., 1999). The latter group requires exploring situational factors overcoming cognitive aversion to adopt new behaviors and thus, targeting intention formation. In contrast, the former group requires investigating cognitive changes other than those influencing intention formation (Abraham et al., 1999). Hence, it became common among social psychologists to distinguish between intention formation (or making a decision, respectively) and intention implementation (Ajzen, 1996; Beckmann and Kuhl, 1984; Kendzierski, 1990). Thereby, it was suggested that the intention-behavior relation encompasses four consecutive action phases (Gollwitzer, 1993): the (1) pre-decisional, (2) post-decisional but pre-actional, (3) actional, and (4) evaluative phases. Gollwitzer (Gollwitzer, 1990, 1993) detected obstacles preventing the successful realization of one's intentions to occur during the two preactional phases aligning with the mentioned distinction between intenders and non-intenders. Intentions associated with each of these two pre-actional phases can help to overcome these obstacles (Gollwitzer, 1990, 1993): The first pre-decisional phase involves deliberating wishes or desires and a consideration of desirability and feasibility of pursuing a goal. In case the wish is highly desirable and still feasible, the phase results in goal intention formation (or making the decision to perform a behavior respectively; i.e., 'I intend to do X'). During the post-decisional but still pre-actional phase, an effective plan is formed specifying efforts to promote the initiation of relevant actions (i.e., 'I intend to do X in situation Y'). This plan is called implementation intention and commits the individual to a specific course of action underlying certain environmental conditions or situational factors (Gollwitzer, 1993). When these conditions are met, the performance of the intended behavior follows (and vice versa in case they are not met). Such situational factors or environmental conditions during the post-decisional (but still pre-actional) phase can thus strongly influence the intention-behavior relation and even inhibit the successful realization of an intended behavior.

With respect to the underlying sustainable clothing context, exploratory research identified several potential inhibitors to sustainable clothing consumption employing focus groups and interviews. First, sustainable apparel is frequently perceived as unfashionable or unstylish by consumers (Hiller Connell, 2010; Joergens, 2006) and does not match the perception of their lifestyle (Connolly and Prothero, 2003). They consider the appearance of sustainable fashion as unattractive and thus, it neither meets their wardrobe needs nor meets their aesthetic needs in contrast to conventional clothes. Harris et al. (2016) named the stigma and stereotypes associated with the design to be the key barriers to the mainstreaming of sustainable clothes. Second, consumers perceive the price of sustainable clothing (or sustainable products in general) as not comparable to conventional clothes (or conventional products, respectively; Ali et al., 2011; Bray et al., 2011; Hustvedt and Dickson, 2009; Joergens, 2006; Young et

al., 2009). Economic factors are found to have a strong influence on an individual's decisions and behavior (Kollmuss and Agyeman, 2002). Since only few technological advances have been made regarding the mass production of sustainable fashion, they often carry higher prices than conventional apparel, and thus are perceived as unaffordable to many consumers (Hiller Connell, 2010). Reflecting these insights regarding sustainable clothing in the light of prior intention-behavior findings, perceptions of aesthetic risk as well as economic risk might influence or even hinder the performance of an actual behavior after initial intention formation. That is, it is considerable that even though individuals initially form an intention towards sustainable clothing consumption, motivational quality differs among the individuals (Sheeran, 2002) and thus, high perceived aesthetic risk or economic risk might impact intention strength negatively during the post-decisional (or preactional respectively) phase. We thus hypothesize:

H4. Perceived aesthetic risk negatively moderates the relationship between purchase intention and purchase behavior of sustainable clothes.

H5. Perceived economic risk negatively moderates the relationship between purchase intention and purchase behavior of sustainable clothes.

2.3 Perceived environmental knowledge

Aside from the well-known constructs in the TRA and TPB, literature brought up several contextual factors which affect the purchase intention of individuals towards sustainable clothing embracing the traditional TRA and TPB approaches. Generally, behavioral literature reported a positive correlation between knowledge and actual behavior (Hoch and Deighton, 1989; Park et al., 1994). Reflecting these findings in a sustainability context, the measure of perceived environmental knowledge has been found to be an essential prerequisite of behavioral intention (or more specifically, purchase intention of sustainable products; Chan, 2001; Kumar et al., 2017; Kwong and Balaji, 2016; Mostafa, 2006; Wang et al., 2014; Yadav and Pathak, 2016). Thereby, perceived environmental knowledge can be considered as an individual's "knowledge of facts, concepts, and relationships concerning the natural environment and its major ecosystems" (Fryxell and Lo, 2003). It is the state of individuals' knowledge about environment, the awareness of environmental issues, and the consciousness about consequences of human actions on the environment (do Paço and Reis, 2012; Kwong and Balaji, 2016). Within exploratory literature, consumers with greater environmental knowledge were found to be more likely to engage in eco-conscious clothing consumption (Harris et al., 2016; Hiller Connell, 2010). More specifically, consumers who are knowledgeable on environmental issues and impacts perceive a stronger responsibility towards environment and need for sustainable development (Fryxell and Lo, 2003) and further, are rather able to assess the environmental impact of conventional products. Thus, they may exhibit a higher purchase intention for sustainable products in order to meet their responsibilities.

Further, extant research substantiated the impact of perceived environmental knowledge as a cognitive component on green attitude formation (Jaiswal and Kant, 2018; Kumar et al., 2017; Maichum et al.,

2016; Mostafa, 2007; Yadav and Pathak, 2016; Zhao et al., 2014). Knowledge enables consumers to differentiate the attributes and environmental impact of sustainable products from conventional products which in turn yields a positive, favorable attitude formation towards sustainable products (Kwong and Balaji, 2016; Pinto et al., 2011). Hence, we derive the following hypotheses:

H6. Perceived environmental knowledge has a positive impact on purchase intention for sustainable clothes.

H7. Perceived environmental knowledge has a positive impact on attitude towards sustainable clothes.

2.4 Environmental concern

Environmental concern (in some cases referred to as ecological affect) is an individual's extent of concern and emotional attachment towards environmental issues, environmental threats, and environmental protection, respectively (Chan, 2001; Crosby et al., 1981; Pinto et al., 2011). It is the individual's sense of responsibility and involvement regarding environmental protection (Dagher and Itani, 2014). Traditionally, environmental concern was considered to be a unidimensional construct ranging from unconcerned about the environment at the low end to concerned at the high end (Milfont and Duckitt, 2004). More sophisticated approaches assumed environmental concern to consist of concern for the self (egoistic), other people (altruistic), and the biosphere (biospheric; Schultz, 2000). Notwithstanding the different conceptualizations of environmental concern, it established as a key construct within green behavioral literature: consistent empirical evidence has been found to support the relationship between environmental concern and purchase intention of sustainable products (Hartmann and Apaolaza-Ibanez, 2012; Kwong and Balaji, 2016; Mostafa, 2006; Park and Lin, 2018; Prakash and Pathak, 2017) and actual purchase behavior (Lee et al., 2014).

Further, environmental concern focuses on an individual's affective evaluation of environmental issues (Newton et al., 2015). Since an individual's attitude comprises both cognitive as well as affective components to capture its knowledge and beliefs (Petty et al., 1991), prior research assumed environmental concerns to form an individual's attitude towards sustainable products aside from environmental knowledge (Chan, 2001; Jaiswal and Kant, 2018; Maichum et al., 2016; Mostafa, 2007; Yadav and Pathak, 2016). Consequently, we hypothesize that:

H8. Environmental concern has a positive impact on purchase intention for sustainable clothes.

H9. Environmental concern has a positive impact on attitude towards sustainable clothes.

2.5 Greenwashing concern

At its core, greenwashing is an organization's deceptive and misleading use of green marketing or green claims about the environmental impact of its products and practices in order to shape an overly positive public image and foster its reputation (Lyon and Maxwell, 2011; Lyon and Montgomery, 2015; Marquis

et al., 2016). Greenwashers either choose to withhold negative information regarding their environmental impact or only partially disclose such information, and may even spread false positive information since they expect stakeholders to punish poor environmental performance (Lyon and Maxwell, 2011). Due to its increasing relevance in society, greenwashing has become a research hotspot in recent years (Bowen and Aragon-Correa, 2014; Seele and Gatti, 2017; Siano et al., 2017).

Research on the potential impact of an organization's greenwashing activities on consumers' green purchase intention and purchase behavior within the TRA and TPB frameworks is still sparse. Zhang et al. (2018) found consumers' greenwashing perception to negatively impact green purchase intention. Similarly, Kwong and Balaji (2016) found green skepticism to influence green purchase intention indirectly via environmental concern as well as environmental knowledge. This aligns with the findings of Mostafa (2006) who found consumers' skepticism towards environmental claims to be negatively related to green purchase intention.

We can thus assume a consumer's extent of suspicion towards an organization's intentional non-disclosure of negative environmental information or further, intentional disclosure of false positive environmental information about its products and practices, to affect the variables in the TRA and TPB framework. As stated in the preceding sections, the evaluative constructs attitude, subjective norm, perceived environmental knowledge as well as environmental concern are well-established immediate predictors of one's purchase intention towards sustainable products. Regarding an organization's environmental impact, consumers presume to be imperfectly informed due to non-transparent disclosure activities (Lyon and Maxwell, 2011). Thus, on the one hand, consumers are not fully aware of the true environmental impact of the considered product, and may have the suspicion that false positive claims are spread and negative environmental information is not disclosed. On the other hand, consumers cannot be completely sure whether and to which extent their greenwashing suspicions are legitimate. Due to this uncertainty regarding legitimation (in contrast to environmental concerns, for example), we assume a consumer's greenwashing concerns to influence the impact of attitude, subjective norm, perceived environmental knowledge, and environmental concern on purchase intention rather than having a direct effect on purchase intention. Therefore, we deduce the following hypotheses:

H10. Greenwashing concern negatively moderates the relationship between perceived environmental knowledge and purchase intention for sustainable clothes.

H11. Greenwashing concern negatively moderates the relationship between attitude towards sustainable clothes and purchase intention for sustainable clothes.

H12. Greenwashing concern negatively moderates the relationship between environmental concern and purchase intention for sustainable clothes.

H13. Greenwashing concern negatively moderates the relationship between subjective norm and purchase intention for sustainable clothes.

Table 1 summarizes the findings of extant literature on constructs and their relations derived for our study. Figure 2 displays the final research model.

Table 1: Extant (green) literature's findings on constructs and their relations.

Construct(s)	Description and relation(s)	Reference(s)
Attitude, Subjective norm, Purchase intention, Purchase behavior	Within the TRA and TPB, an individual's attitude and social influence on the individual are assumed to affect behavior via a mediating cognitive link, i.e., behavioral intention to perform the behavior	(Ajzen 1985, 1988, 1991; Ajzen and Fishbein 1980a; Fishbein and Ajzen 1975b; Chan 2001b; Jaiswal and Kant 2018a; Kautish et al. 2019; Maichum et al. 2016; Paul et al. 2016; Taufique and Vaithianathan 2018; Yadav and Pathak 2016b, 2017)
Perceived environmental knowledge	An individual's perceived environmental knowledge (awareness of environmental issues and consequences of human actions on environment) has been found to influence (1) purchase intention of sustainable products and (2) attitude towards sustainable products in prior studies	(Chan 2001b; Jaiswal and Kant 2018a; Kollmuss and Agyeman 2002b; Kumar et al. 2017a; Kwong and Balaji 2016; Maichum et al. 2016; Mostafa 2006; Wang et al. 2014; Yadav and Pathak 2016b; Zhao et al. 2014; Mostafa 2007)
Environmental concern	An individual's environmental concerns (sense of responsibility and involvement regarding environmental protection or issues) have been found to influence (1) purchase intention of sustainable products and (2) attitude towards sustainable products in prior studies	(Yadav and Pathak 2016b; Jaiswal and Kant 2018a; Mostafa 2006; Hartmann and Apaolaza-Ibáñez 2012; Paul et al. 2016; Kwong and Balaji 2016; Prakash and Pathak 2017b; Park and Lin 2018a; Chan 2001b; Maichum et al. 2016; Mostafa 2007)
Greenwashing concern	An individual's extent of suspicion towards an organization's intentional non-disclosure of negative environmental information or intentional disclosure of false positive environmental information about its products and practices is assumed to affect the variables in the TRA and TPB framework. Due to imperfect information the individual can only be uncertain regarding the legitimation of its suspicions and thus, we assume greenwashing concerns to influence the relation between purchase intention and (1) attitude, (2) subjective norm, (3) perceived environmental knowledge, and (4) environmental concern	(Zhang et al. 2018b; Kwong and Balaji 2016; Mostafa 2006)
Perceived economic risk, Perceived aesthetic risk	Albeit individuals pretend to have pro-environmental intentions, they frequently struggle to translate them into green actions. To elucidate the intention-behavior gap, we draw on exploratory literature's findings and assume perceived economic risk and perceived aesthetic risk to influence the purchase intention-purchase behavior relation	(Hughner et al. 2007a; Young et al. 2009; Bray et al. 2011; Ali et al. 2011a; Joergens 2006b; Hustvedt and Dickson 2009a; Hiller Connell 2010; Connolly and Prothero 2003; Harris et al. 2016c)

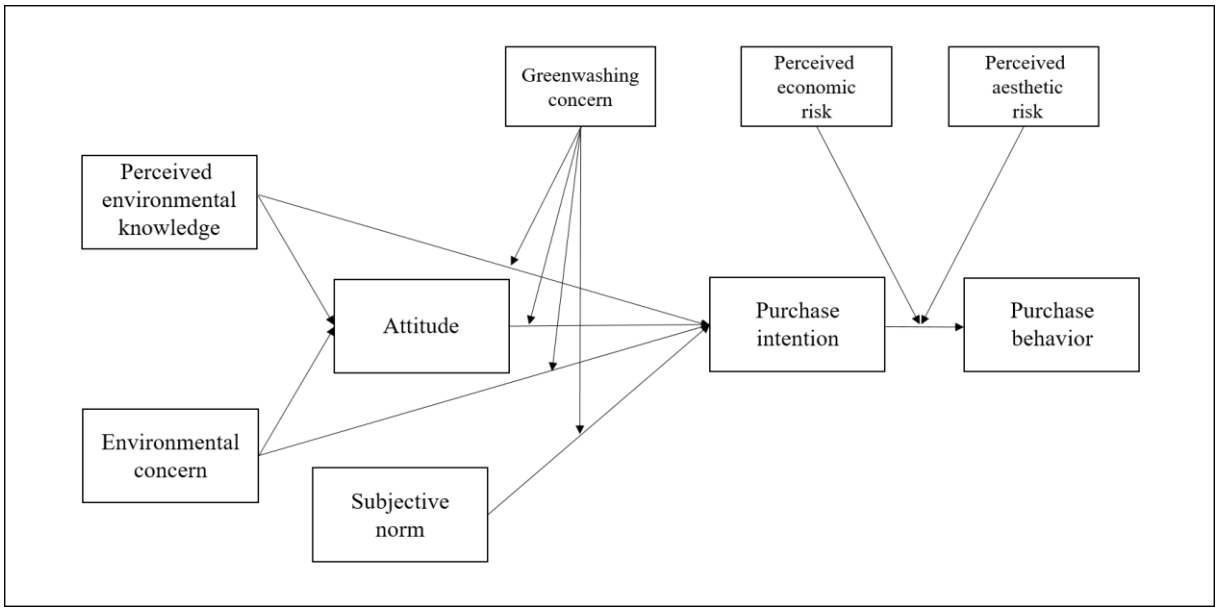

Figure 2: Research model.

3 Methodology

3.1 Data collection and descriptive statistics

To analyze the underlying constructs and their relations, an online questionnaire was developed using Qualtrics. Before conducting the main study, the questionnaire was pretested with 11 experienced participants to assess completeness, wording, clarity, structure, and appropriateness of the measurement items. After implementing minor modifications, the final questionnaire consisted of three major sections. We gained deeper insights into the participants' consumption behavior and perception of sustainability with four introductory questions: Participants were asked about their purchase frequency of clothing (items per month), their general perception of sustainability, their consumption frequency of sustainable products, and their general attitude towards sustainable products. In the main part, we first provided a scientific definition of sustainable clothing by describing the 'from cradle to grave' principle (i.e., the negative environmental impact of clothes has to be minimized throughout every consumption phase from acquisition through use and care to disposal in order to be deemed sustainable). Then, items measuring the constructs subjective norm (SN), attitude towards sustainable clothing (ATT), environmental concern (EC), perceived environmental knowledge (PEK), greenwashing concern (GC), perceived aesthetic risk (PAR), perceived economic risk (PER), purchase intention (PI), and actual purchase behavior (PB) were presented. The last part inquired participants' demographics, i.e., gender, age, income, education level, employment status, and living conditions.

Data were gathered by spreading the self-administered questionnaire online across various social media channels and forums over the course of four weeks from March 26, 2020 to April 22, 2020 as we intended to target German online shoppers. The online context of our study can be deemed suitable with the international e-commerce market comprising 3153.43m users worldwide in 2019 and more specifically, with the fashion segment yielding the highest revenue (i.e., 528,122.9m US dollar) among all

market segments (Statista, 2020). A total of 553 responses was recorded. Eighty-nine (i.e., 16.09%) incomplete responses were excluded and thus, 464 responses were considered for further analysis.

Table 2 outlines the sample's descriptive statistics und characteristics. Among the participants, 70.26% (n = 326) were female. Age ranged from 15 to 77 with a mean of 30.49 years. Most participants were between 20 and 29 years old (n = 274, 59.05%). Only 22.63% of the participants had a monthly income higher than 2001 Euros (n = 105). Thus, our sample mainly comprises online shoppers with low or medium income. The majority of the participants was employed (n = 208, 44.83%). Further, most participants' highest education level was a high school diploma or below (n = 347, 74.78%). Participants with a bachelor's degree or above constituted a smaller proportion among the respondents (n = 108, 23.27%).

Table 2: Descriptive statistics (n=464).

Demographics/Characteristics	Specifications	Counts	Proportion (in %)
Age	≤19 years	40	8.62
	20-29 years	274	59.05
	30-39 years	42	9.05
	40-49 years	43	9.27
	≥50 years	65	14.01
Gender	Female	326	70.26
	Male	137	29.53
	Diverse	1	0.21
Monthly income	≤1000 Euros	179	38.58
	1001-2000 Euros	136	29.31
	2001-3000 Euros	80	17.24
	≥3001 Euros	25	5.39
	No information provided	44	9.48
Education	High school or below	347	74.78
	Bachelor's degree	77	16.59
	Master's degree or above	31	6.68
	Other	9	1.94
Employment status	Student	160	34.48
	Self-Employed	8	1.72
	Employee	208	44.83
	Housewife/Househusband	13	2.80
	Unemployed	1	0.21
	Retiree	11	2.37
	Other	63	13.58
Purchase frequency of clothes per month	Less than one garment	168	36.21
	1-2 garments	215	46.34
	3-5 garments	71	15.30
	6-7 garments	6	1.29
	More than seven garments	4	0.86
Consumption frequency of sustainable products	Never	5	1.08
	Rarely	105	22.63
	Occasionally	267	57.54
	Mostly	86	18.53
	Always	1	0.21

Demographics/Characteristics	Specifications	Counts	Proportion (in %)
Overall attitude towards sustainable products	Very negative	1	0.21
	Negative	1	0.21
	Neutral	91	19.61
	Positive	247	53.23
	Very positive	124	26.72

Regarding their average purchase frequency of clothes, most participants indicated to buy one or two garments (n = 215, 46.34%) or even less than one garment per month (n = 168, 36.21%). Two hundred sixty-seven participants (57.54%) stated to purchase sustainable products occasionally, whereas only 86 participants (18.53%) indicated to buy sustainable products predominantly. However, most participants' overall attitude towards sustainable products was positive (n = 371, 79.95%).

3.2 Measurement items

All constructs were measured using multiple items on a five-point Likert-type scale (1 = 'Strongly disagree' to 5 = 'Strongly agree'). The items contained an explicit key expression reflecting the specific construct. All items were derived from the literature and thus based on scales that have been previously validated. Since literature on sustainable clothing purchase behavior is still sparse, we drew on green purchase behavior literature for the established constructs and adapted the items to our context accordingly. Measures for greenwashing concern, perceived aesthetic risk, and perceived economic risk were based on previous exploratory findings or were derived by further development of related scales. Table 3 provides the items of each construct.

We assessed the participants' attitude towards sustainable clothes by adopting the measures of Park and Lin (2018) and further, by marginally adapting the scale from Chan (2001) stemming from Li (1997). Subjective norm was measured using the scale from Vermeir and Verbeke (2008). Items for perceived environmental knowledge were adapted from Ellen et al. (1997). Measures for environmental concern were formed by adapting scales from Lee (2008) and Dunlap et al. (2000). For the measurement of greenwashing concern, we generally based our items on the greenwashing perception or skepticism constructs of Chen and Chang (2013), Mohr et al. (1998), and Zhang et al. (2018), but we assume greenwashing to be an affective construct reflecting the consumer's suspicion of false environmental claims and simultaneously, consumer's uncertainty whether and to which extent his or her greenwashing suspicions are legitimate. This uncertainty in turn is being expressed in concerns. The measures for perceived aesthetic risk were operationalized from prior exploratory findings by Hiller Connell (2010) and Joergens (2006). Regarding the scale of perceived economic risk, we drew on Park and Lin (2018). The first endogenous variable, purchase intention towards sustainable clothing, was measured using four items derived from Park and Lin (2018) and Kumar et al. (2017). Measures for the second endogenous variable, purchase behavior towards sustainable clothing, were adopted from Lee (2008) and Schlegelmilch et al. (1996).

Table 3: Constructs, items, and references.

Construct	Item		Reference(s)
Attitude (ATT)	ATT1	Generally, I have a favorable attitude towards the sustainable version of clothes.	(Chan 2001b; Li 1997; Park and Lin 2018a)
	ATT2	I am positive minded towards buying second hand clothes.	
	ATT3	I like the idea of buying sustainable clothes instead of conventional clothes to contribute to environmental protection.	
Subjective norm (SN)	SN1	My friends expect me to buy sustainable clothes.	(Vermeir and Verbeke 2008)
	SN2	My family expects me to buy sustainable clothes.	
	SN3	People who are important to me expect me to buy sustainable clothes.	
Perceived environmental knowledge (PEK)	PEK1	I know how to behave sustainably.	(Ellen et al. 1997)
	PEK2	I know how I could lower the ecological harm with my behavior.	
	PEK3	I understand how I could reduce the negative environmental consequences of my behavior.	
	PEK4	I understand how to protect the environment in the long-term.	
Environmental concern (EC)	EC1	I am concerned about the environmental development.	(Dunlap et al. 2000; Lee 2008)
	EC2	I am concerned about the long-term consequences of unsustainable behavior.	
	EC3	I often think about the potential negative development of the environmental situation.	
	EC4	I am concerned that humanity will cause a lasting damage towards the environment.	
Greenwashing concern (GC)	GC1	I am concerned that sustainable clothes are not produced of environmentally friendly materials.	(Mohr et al. 1998; Zhang et al. 2018b; Chen and Chang 2013)
	GC2	I am concerned that sustainable clothes are not manufactured under sustainable conditions.	
	GC3	I am concerned that the organization is only pretending its green image.	
Perceived aesthetic risk (PAR)	PAR1	Sustainable clothing does not meet my aesthetic needs.	(Hiller Connell 2010; Joergens 2006b)
	PAR2	Sustainable clothing does not match my clothing style.	
	PAR3	Sustainable clothing does not meet my taste in clothing.	
Perceived economic risk (PER)	PER1	In my opinion, sustainable clothing is more expensive than conventional clothing.	(Park and Lin 2018a)
	PER2	I am worried about not getting my money's worth if I buy sustainable clothes instead of conventional clothes.	
	PER3	I think I would have to spend more for the sustainable version of a garment.	
Purchase intention (PI)	PI1	I consider purchasing sustainable clothes.	(Park and Lin 2018a; Kumar et al. 2017a)
	PI2	I intend to buy sustainable clothes instead of conventional clothes in the future.	
	PI3	I might possibly buy sustainable clothes in the future.	
	PI4	I would consider to buy sustainable clothes if I happen to see them in a(n) (online) store.	
Purchase behavior (PB)	PB1	I choose to buy exclusively sustainable clothes.	(Lee 2008; Schlegelmilch et al. 1996)
	PB2	I buy sustainable clothes instead of conventional clothes if the quality is comparable.	
	PB3	I purchase sustainable clothes even if they are more expensive than conventional clothes.	
	PB4	When buying clothes, I pay attention that they are sustainable.	

4 Results

4.1 Measurement model evaluation

Following the two-step analysis approach used in partial least squares structural equation modeling (PLS-SEM), model evaluation starts with the outer or measurement model. The algorithm is set to path weighting scheme, allowing 300 iterations at maximum and using a stop criterion of 10^{-7}. Results converged after two iterations. Outer loadings are checked employing a threshold of 0.708 (Hair et al., 2019), finding that all indicators survive. Construct reliability and validity are assessed drawing on composite reliability (CR) and average variance extracted (AVE), however, Cronbach's a is also provided due to the measure's high profile. All values exhibit satisfying values. Table 4 summarizes the results. The indicators' covariance matrix is provided in Table A1 in the Appendix.

Table 4: Assessment of convergent validity and internal consistency.

Note: ATT = attitude towards sustainable clothing, AVE = average variance extracted, CR = composite reliability, EC = environmental concern, GC = greenwashing concern, PAR = perceived aesthetic risk, PEK = perceived environmental knowledge, PER = perceived economic risk, PI = purchase intention for sustainable clothes, PB = purchase behavior, SD = standard deviation, SN = subjective norm.

Latent variable	Indicators	Mean (SD)	Cronbach's α	CR	AVE
PAR	3	2.761 (1.012)	0.924	0.952	0.868
PER	3	3.465 (0.873)	0.777	0.862	0.675
ATT	3	3.752 (0.816)	0.757	0.860	0.674
EC	4	4.195 (0.613)	0.826	0.884	0.657
PEK	4	3.952 (0.588)	0.809	0.875	0.636
GC	3	3.392 (0.920)	0.865	0.917	0.786
PI	4	3.665 (0.777)	0.891	0.925	0.757
PB	4	2.689 (0.889)	0.854	0.901	0.696
SN	3	2.685 (0.969)	0.852	0.909	0.770

Next, discriminant validity is checked. Cross-loadings, the Fornell-Larcker criterion (Fornell and Larcker, 1981), and heterotrait-monotrait ratio (HTMT, Henseler et al., 2015) are employed for analysis. Cross-loadings and Fornell-Larcker tabulation are provided in Tables A2 and A3 in the Appendix and HTMT results are displayed in Table 5. Considering HTMT, all pairings except for PI and ATT pass the conservative threshold of 0.85, while PI and ATT still meet the rather liberal value of 0.90 (Henseler et al., 2015). In order to derive 95 percent confidence intervals, a bootstrapping procedure drawing 10,000 samples is conducted. The critical value of 1 is excluded from all intervals, further corroborating discriminant validity. The bootstrapping run further corroborates that lower and upper limits for Cronbach's a and CR do not overshoot 0.70 and 0.95, respectively.

Table 5: Assessment of discriminant validity.

Note: ATT = attitude towards sustainable clothing, EC = environmental concern, GC = greenwashing concern, PAR = perceived aesthetic risk, PEK = perceived environmental knowledge, PER = perceived economic risk, PI = purchase intention for sustainable clothes, PB = purchase behavior, SN = subjective norm.

	PAR	PER	ATT	EC	PEK	GC	PI	PB	SN
PAR									
PER	0.257								
ATT	0.554	0.113							
EC	0.257	0.105	0.642						
PEK	0.133	0.067	0.412	0.352					
GC	0.044	0.096	0.162	0.169	0.089				
PI	0.534	0.099	0.875	0.573	0.409	0.171			
PB	0.491	0.202	0.696	0.405	0.376	0.114	0.727		
SN	0.075	0.060	0.281	0.311	0.179	0.090	0.228	0.375	

Assessment of the measurement model indicates absence of measurement problems. Construct reliability and validity and discriminant validity could be established.

4.2 Structural model evaluation

Moving on to evaluating the structural model, variance inflation factors (VIFs) are checked. Values are rather low, ranging from 1.066 to 1.444. Consequently, VIFs meet the conservative threshold of 3 for absence of collinearity issues (Hair et al., 2016) and the threshold of 3.3 for common method bias (Kock, 2015). Next, R^2 values are checked, exhibiting 0.300 for ATT, 0.575 for PI, and 0.451 for PB (R^2 Adjusted: 0.297 for ATT, 0.567 for PI, and 0.445 for PB). Overall, in-sample predictive power can be considered moderate (Hair et al., 2019; Rigdon, 2012). As one of our main aims is to shed light on the intention-behavior gap and the moderating influences of PAR and PER, R^2 as measure for "explanatory modeling efforts" (Shmueli et al., 2016, p. 4555) is favored as quality criterion and preferred to Q^2. Due to completeness, however, a blindfolding procedure is used to derive Q^2 values for the endogenous constructs, yielding values of 0.195 for ATT, 0.425 for PI, and 0.306 for PB, respectively. These can be considered medium to large and indicate (pseudo) out-of-sample prediction ability (Hair et al., 2019). Having ensured that all measures work correctly, hypotheses are tested using a bootstrapping procedure with 10,000 subsamples. Point estimators as well as 95 percent confidence intervals are derived. Table 6 displays the results.

Table 6: Hypotheses testing.

Note: Asterisk (*) indicates moderating effect. ATT = attitude towards sustainable clothing, EC = environmental concern, GC = greenwashing concern, PAR = perceived aesthetic risk, PEK = perceived environmental knowledge, PER = perceived economic risk, PI = purchase intention for sustainable clothes, PB = purchase behavior, SN = subjective norm.

Hypothesis				Path coefficients (effect size f^2)	Confidence intervals (bias-corrected, 95%)	T-statistics (p-value)
H1	PI	→	PB	0.594 (0.457)	[0.514, 0.669]	15.089 (< 0.001)
H2	ATT	→	PI	0.599 (0.565)	[0.526, 0.672]	16.129 (< 0.001)
H3	SN	→	PI	0.013 (< 0.001)	[-0.050, 0.076]	0.421 (0.674)
H4	PAR*	→	PI → PB	-0.107 (0.022)	[-0.171, -0.042]	3.270 (0.001)
H5	PER*	→	PI → PB	0.027 (0.001)	[-0.036, 0.089]	0.844 (0.399)
H6	PEK	→	PI	0.098 (0.019)	[0.030, 0.165]	2.814 (0.005)
H7	PEK	→	ATT	0.192 (0.048)	[0.094, 0.283]	3.965 (< 0.001)
H8	EC	→	PI	0.146 (0.034)	[0.067, 0.226]	3.576 (< 0.001)
H9	EC	→	ATT	0.459 (0.276)	[0.361, 0.550]	9.489 (< 0.001)
H10	GC*	→	PEK → PI	-0.049 (0.005)	[-0.118, 0.013]	1.449 (0.147)
H11	GC*	→	ATT → PI	-0.108 (0.019)	[-0.194, -0.016]	2.401 (0.016)
H12	GC*	→	EC →PI	0.088 (0.013)	[0.004, 0.173]	2.038 (0.042)
H13	GC*	→	SN → PI	0.013 (< 0.001)	[-0.052, 0.075]	0.394 (0.693)

All hypotheses except for H3, H5, H10, H12, and H13 could be supported. PEK was found to positively impact both ATT and PI and EC showed the same influences. PI exhibits a moderate positive effect on PB. Moderators GC, PAR, and PER yield mixed results. PAR indeed does have a negative impact on the relation between PI and PB. However, this relation could not be supported for PER. GC's influence, which was hypothesized to moderate impacts on PI, could be confirmed for only one path, namely ATT to PI. While its negative influence on the ATT-PI relation appears reasonable, GC's positive effect on the EC-PI path, which was also detected, is counterintuitive. However, as the 95 percent confidence interval (i.e., [0.004, 0.173]) suggests, the lower interval boundary is very close to zero and therefore, the statistical significance may be a mathematical artifact. No evidence of GC affecting the relations of PEK and PI as well as SN and PI was found. Confidence intervals, which may also be interpreted as compatibility intervals spanning ranges particularly compatible with the data (Greenland, 2019), and f^2 values emphasize striking positive impacts of PI on PB and ATT on PI. ATT appears to be the major driver of PI, while EC has a higher influence on ATT compared to PEK. Assessing the hypothesized moderating effects, both confidence intervals and f^2 values indicate rather weak (Cohen, 1988), however statistically convincing impacts. Figure 3 summarizes the results from structural model evaluation.

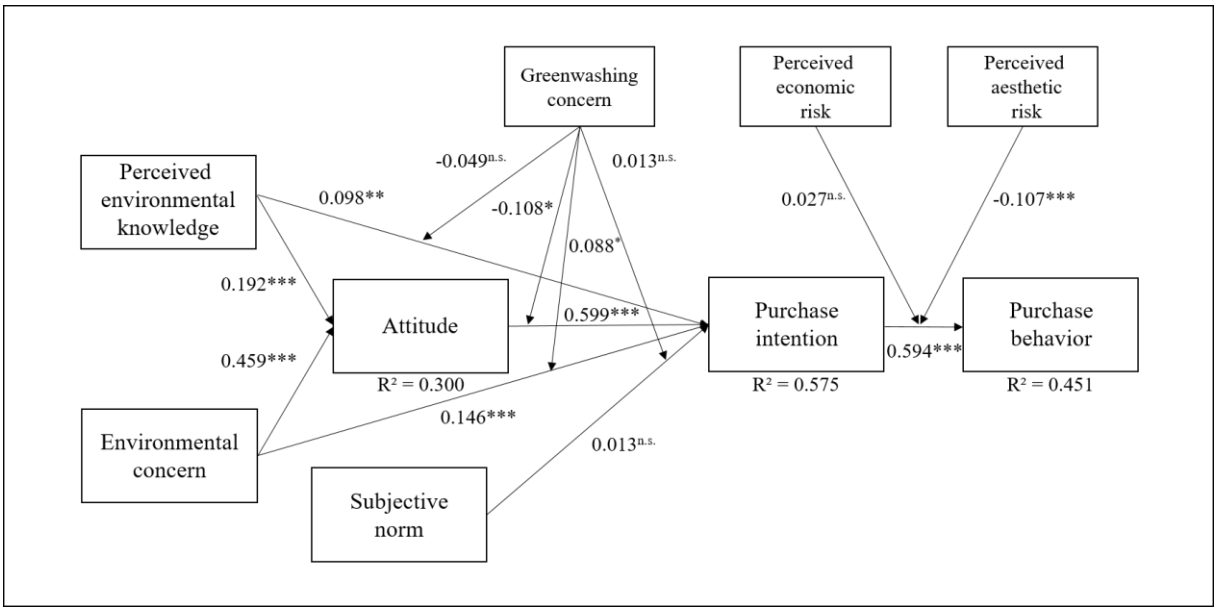

Figure 3: Structural model evaluation.
Note: * = p < 0.05, ** = p < 0.01, *** = p < 0.001, n.s. = not significant.

5 Discussion

5.1 Theoretical contribution

While green purchase behavior is well elucidated by preceding literature (Chan, 2001; Jaiswal and Kant, 2018; Kautish et al., 2019; Kumar et al., 2017; Maichum et al., 2016; Paul et al., 2016; Taufique and Vaithianathan, 2018; Yadav and Pathak, 2016, 2017) with frameworks like TRA and TPB, research on sustainable clothing purchase behavior is sparse. To contribute to the existing body of literature by providing a holistic framework which determines the main antecedents of purchase intentions for sustainable clothing and further, by shedding light on the gap between purchase intention and subsequent purchase behavior of such clothes,we extended the TRA with well-established constructs from green literature (i.e., perceived environmental knowledge and environmental concerns) and novel constructs derived from prior exploratory findings (i.e., greenwashing concerns, perceived economic risk, and perceived aesthetic risk). Extant sustainable clothing literature drew on exploratory approaches (Harris et al., 2016; Hiller Connell, 2010; Joergens, 2006) or investigated purchase intention and purchase behavior separately (Park and Lin, 2018), whereas this study is one of the first in the sustainable clothing context intending to explain purchase intention, actual purchase behavior, and the intention-behavior gap with an extended TRA model.

Thereby, hypotheses derived from the TRA were corroborated in the context of sustainable clothing except for the relation between subjective norm and purchase intention. Our results thus mostly align with findings of preceding literature in the context of green purchase behavior in general (Chan, 2001; Jaiswal and Kant, 2018; Kumar et al., 2017; Yadav and Pathak, 2016). Also, the lack of evidence for the impact of subjective norm on purchase intention has already been found in green purchase behavior literature (Kumar et al., 2017; Park and Lin, 2018).

Greenwashing concerns indeed appear to influence consumer decisions on the intention-formation level as they were found to moderate the relation between attitude and purchase intention. In contrast, Zhang et al. (2018) modeled greenwashing perception as an immediate antecedent of green purchase intention and Kwong and Balaji (2016) found green skepticism to impact environmental knowledge and concerns. This study presumes greenwashing concerns to incorporate a consumer's suspicion about an organization's greenwashing activities but due to imperfect information the consumer can only be uncertain regarding the legitimation of his or her suspicions and thus, we assume (and partially confirmed) greenwashing concerns to impact the relation between purchase intention and its antecedents rather than having a direct effect on purchase intention.

We further yield new insights by elucidating that perceived aesthetic risk affects the relation between purchase intention and actual purchase behavior negatively, which represents a starting point to bridge the frequently identified gap (Kollmuss and Agyeman, 2002; Young et al., 2009) between the two variables. We show that sustainable clothing is apparently still associated with certain stereotypes implying an unfashionable perception among consumers which hinders the purchasing of such clothes despite successful initial intention formation. Moreover, we were not able to find evidence that perceived economic risk has an impact on the intention-behavior relation of sustainable clothing. Thus, we cannot confirm preceding exploratory findings from the early 2000s (Hiller Connell, 2010; Hustvedt and Dickson, 2009; Joergens, 2006) indicating that consumers perceive sustainable clothing as more unaffordable than conventional clothes.

5.2 Practical implications

Our findings regarding the determinants of consumers' purchase intention and purchase behavior of sustainable clothing provide several implications. Apart from clothing (online) retailers and manufacturers, several stakeholders (e.g., the government accomplishing its climate targets) might be interested in enhancing the purchase intention and further, purchase behavior of sustainable clothing. Particularly, findings regarding potential impacts of perceived aesthetic and economic risk on the intention-behavior relation and the influence of greenwashing concerns yield new and valuable insights.

Impacts of aesthetic and economic risks on the intention-behavior relation show the relevance of aesthetic worries over economic ones: Consumers' perceived economics risk towards sustainable clothing did not have an impact on the relationship between consumers' purchase intention and purchase behavior of sustainable clothes. As modern consumer environments provide a variety of data sources (e.g., platforms for exchange of experience such as social media, blogs, online reviews, and comparison websites), it may be rather easy for potential customers to collect and analyze information subjectively deemed necessary to make a decision. Hence, an individual's perceived risk of economic drawbacks may be attenuated in away that once a purchase intention has been formed, it is translated into a behavior without regarding economic risk as a potential barrier.

From a managerial point of view, actions to mitigate the impact of consumers' greenwashing concerns and perceived aesthetic risk might yield more promising effects. The identified moderating effects of greenwashing concerns indicate that consumers' growing concerns about an organization withholding its negative environmental impact or even spreading false environmental claims significantly reduces consumers' intention to buy from that vendor. More specifically, greenwashing concerns influenced the impact of the participants' attitude towards sustainable clothing on their purchase intention for sustainable clothes. High transparency standards and established as well as renowned certificates may help to reduce imperfect information, i.e., consumers' uncertainty regarding the legitimation of their suspicion regarding the organization's disclosure activities. Moreover, clothing retailers may publish an annual sustainability report certified by independent auditors to verify the authenticity of their disclosed environmental claims. Government may impose strict penalties when false information is disclosed. Further, consumers that are able to retrace a product's fabrication process possess sufficient information for rational decision making and may decide which manufacturing step is the most important to them depending on their individual preferences. For example, while one consumer may emphasize ecological impacts of the manufacturing process itself such as water and energy use, working conditions, or CO_2 emissions, another might focus on the product's materials and their environmental impact during exploitation, manufacturing, and disposal such as pesticide use, materials' recyclability or biodegradability, and origin. Thus, clothing retailers are recommended to allow their customers to track the product's material origin and the manufacturing process.

Since we found consumers' perceived aesthetic risk to negatively influence the intention-behavior relation, several measures can be implemented to proactively avoid the subsequent potential gap between purchase intention and purchase behavior. Mitigating aesthetic risk also refers to transparency, yet in a slightly different way. Consumers need the possibility to get a true-to-life idea of the product before purchase, which may be carried out drawing on technological implementations such as 360 degree images, videos, and close-up images of details. Further, reviews from previous customers (which may be enhanced through means of videos and images) help getting an overview of the product in an everyday context from other consumers. Apparently, since consumers still perceive sustainable clothing as unfashionable not meeting their aesthetic needs, consumers' minds need to be shifted towards a more modern perception of such garments. Clothing retailers and manufacturers can overcome stereotypes and stigmata associated with sustainable clothes by cooperating, e.g., with influencers or celebrities who promote and wear environmentally friendly apparel and thus, serve as a role model and nudge consumers towards the adoption of such clothing consumption behavior.

Further, since attitude towards sustainable clothes was found to have the largest impact on subsequent purchase intention, consumers' attitude needs to be shifted. Perceived environmental knowledge and particularly, environmental concerns were found to be essential cognitive and affective components

forming consumers' attitudes. Hence, society's environmental knowledge and concerns need to be further enhanced with broad public campaigns to make consumers aware of environmental problems.

5.3 Limitations and future research

The study at hand was conducted examining clothing as example for sustainable products. Future investigations may assess the roles of greenwashing concerns and aesthetic as well as economic risks in other contexts to draw a generalized picture of the constructs' effects. Further research on economic risk may help to evaluate whether it does indeed not have a striking impact on the buying process or whether it is rather context-dependent. Particularly in online shopping scenarios, it is easy for potential customers to review a variety of alternative offers, to check for the best price over a myriad of vendors and distributors, and to incorporate public feedback into their decision-making. Further, the study was conducted in Germany and economic risks might be perceived as more severe in other countries. Moreover, as stated in earlier studies (Li, 1997), environmental concerns and environmental knowledge might vary by country. As we did not refer to a specific manufacturer or clothing company in our study, some constructs and, particularly, greenwashing concerns may have appeared somewhat abstract to the respondents and thus, this may have influenced the results regarding greenwashing concerns.

As for all scientific studies, several methodological limitations need to be addressed. First, while the sample size is considerably large to draw statistical conclusions, it was collected by distributing the questionnaire across multiple social media channels. Hence, we cannot be sure whether the sample population is a representative instance of the target population that is interested in buying sustainable clothing. Constructs were measured using Likert-type scales for self-reporting. In the context of sustainability, which may be subject to social desirability and peer pressure, participants' evaluation of environmental knowledge and environmental concerns may be biased towards the high end.

6 Conclusion

With sustainability being an increasingly socially relevant issue, the textile industry, which causes a substantial environmental footprint, needs to experience a paradigm shift. Thereby, identifying consumers' motives for buying sustainable clothing constitutes a major challenge. Our study provides insights into the main antecedents of purchase behavior of sustainable clothing and further sheds light on the gap between purchase intention and subsequent purchase behavior. Therefore, we extended the TRA with well-established constructs from green literature (i.e., perceived environmental knowledge and environmental concerns) and novel constructs derived from prior exploratory findings (i.e., greenwashing concerns, perceived economic risk, and perceived aesthetic risk). Four hundred sixty-four participants evaluated these constructs in the context of sustainable clothing. Our findings show that attitude towards sustainable clothing has the highest impact on purchase intention and that consumers' greenwashing concerns negatively moderate this relation. We prove that consumers' perceived aesthetic risk negatively impacts the intention-behavior relation. Thus, a shift within consumers' mindset is needed to create a favorable attitude towards sustainable clothing and a stylish perception of sustainable clothes.

References

Abraham, C., Sheeran, P., Norman, P., Conner, M., de Vries, N., & Otten, W. (1999). When good intentions are not enough: modeling postdecisional cognitive correlates of condom use. Journal of Applied Social Psychology, 29(12), 2591–2612.

Achabou, M. A., & Dekhili, S. (2013). Luxury and sustainable development: is there a match? Journal of Business Research, 66(10), 1896–1903.

Ajzen, I. (1985). From intentions to actions: a theory of planned behavior. In: Kuhl, J., Beckmann, J. (Eds.), Springer Series in Social Psychology. Action Control: from Cognition to Behavior, first ed. Springer, 11–39.

Ajzen, I. (1988). Attitudes, Personality and Behavior. Open University Press. Ajzen, I., 1991. The theory of planned behavior. Organizational Behavior Human Decision Process, 50(2), 179–211.

Ajzen, I. (1996). The social psychology of decision making. In: Higgins, E.T., Kruglanski, A.W. (Eds.), Social Psychology: Handbook of Basic Principles. Guilford Press, 297–325.

Ajzen, I., & Fishbein, M. (1980). Understanding Attitudes and Predicting Social Behavior. Prentice-Hall.

Ali, A., Khan, A. A., Ahmed, I., & Shahzad, W. (2011). Determinants of Pakistani consumers' green purchase behavior: some insights from a developing country. International Journal of Business and Social Science, 2(3), 217–226.

Allwood, J. M., Laursen, S. E., Russell, S. N., Rodríguez, C. M., & De Bocken, N. M. P. (2008). An approach to scenario analysis of the sustainability of an industrial sector applied to clothing and textiles in the UK. Journal of Cleaner Production, 16(12), 1234–1246.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: a meta-analytic review. British Journal Social Psychology, 40(4), 471–499.

Armstrong, C. M., Niinimäki, K., Lang, C., & Kujala, S. (2016). A use-oriented clothing economy? Preliminary affirmation for sustainable clothing consumption alternatives. Sustainable Development, 24(1), 18–31.

Bagozzi, R. P. (1992). The self-regulation of attitudes, intentions, and behavior. Social Psychology Quarterly, 55(2), 178.

Beckmann, J., & Kuhl, J. (1984). Altering information to gain action control: functional aspects of human information processing in decision making. Journal of Research in Personality, 18(2), 224–237.

Bianchi, C., & Birtwistle, G. (2012). Consumer clothing disposal behaviour: a comparative study. International Journal of Consumer Studies, 36(3), 335–341.

Bird, B. (1988). Implementing entrepreneurial ideas: the case for intention. Academy Management Review, 13(3), 442–453.

Bowen, F., & Aragon-Correa, J. A. (2014). Greenwashing in corporate environmentalism research and practice. Organization & Environment, 27(2), 107–112.

Bray, J., Johns, N., & Kilburn, D. (2011). An exploratory study into the factors impeding ethical consumption. Journal of Business Ethics, 98(4), 597–608.

Chan, R. Y. K. (2001). Determinants of Chinese consumers' green purchase behavior. Psychology & Marketing, 18(4), 389–413.

Chen, Y. S., & Chang, C. H. (2013). Greenwash and green trust: the mediation effects of green consumer confusion and green perceived risk. Journal of Business Ethics, 114(3), 489–500.

Cheung, S. F., Chan, D. K. S., & Wong, Z. S. Y. (1999). Reexamining the theory of planned behavior in understanding wastepaper recycling. Environment and Behavior, 31(5), 587–612.

Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences. Lawrence Erlbaum Associates.

Connell, K. Y. H. (2010). Internal and external barriers to eco-conscious apparel acquisition. International Journal of Consumer Studies, 34(3), 279–286

Connolly, J., & Prothero, A. (2003). Sustainable consumption: consumption, consumers and the commodity discourse. Consumption, Markets and Culture, 6(4), 275–291.

Crosby, L. A., Gill, J. D., & Taylor, J. R. (1981). Consumer/voter behavior in the passage of the Michigan container law. Journal of Marketing, 45(2), 19–32.

Csikszentmihalyi, M. (2000). The costs and benefits of consuming. Journal of Consumer Research, 27(2), 267–272.

D'Souza, C., Taghian, M., Lamb, P., & Peretiatko, R. (2007). Green decisions: demographics and consumer understanding of environmental labels. International Journal of Consumer Studies, 31(4), 371–376.

Dagher, G. K., Itani, O. (2014). Factors influencing green purchasing behaviour: empirical evidence from the Lebanese consumers. Journal of Consumer Behavior, 13(3), 188–195.

Do Paço, A. M. F., & Reis, R. (2012). Factors affecting skepticism toward green advertising. Journal of Advertising, 41(4), 147–155.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New trends in measuring environmental attitudes: measuring endorsement of the new ecological paradigm: a revised NEP scale. Journal of Social Issues, 56(3), 425–442.

Echegaray, F., & Hansstein, F. V. (2017). Assessing the intention-behavior gap in electronic waste recycling: the case of Brazil. Journal of Cleaner Production, 142, 180–190.

Ellen, P. S. (1994). Do we know what we need to know? Objective and subjective knowledge effects on pro-ecological behaviors. Journal of Business Research, 30(1), 43–52.

Ellen, P. S., Eroglu, D., & Webb, D. (1997). Consumer Judgments in a Changing information Environment: How Consumers Respond to ‘‘green Marketing Claims” [Working Paper]. Georgia State University.

Fishbein, M., & Ajzen, I. (1975). Belief, Attitude, Intention, and Behavior: an Introduction to Theory and Research. Addison-Wesley.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

Fryxell, G. E., & Lo, C. W. (2003). The influence of environmental knowledge and values on managerial behaviours on behalf of the environment: an empirical examination of managers in China. Journal of Business Ethics, 46(1), 45–69.

George, J. F. (2004). The theory of planned behavior and Internet purchasing. Internet Research, 14(3), 198–212.

GFA, & BCG. (2017). Pulse of the fashion industry. Available at: https://globalfashionagenda.com/ wp-content/uploads/2017/05/Pulse-of-the-Fashion-Industry_2017.pdf.

Godin, G., & Kok, G. (1996). The theory of planned behavior: a review of its applications to health-related behaviors. American Journal of Health Promotion (AJHP), 11(2), 87–98.

Gollwitzer, P. M. (1990). Action phases and mind-sets. In: Higgins, E. T., Sorrentino, R. M. (Eds.), Handbook of Motivation and Cognition: Foundations of Social Behavior. Guilford, 53–92.

Gollwitzer, P. M. (1993). Goal achievement: the role of intentions. European Review of Social Psychology, 4(1), 141–185.

Goworek, H., Fisher, T., Cooper, T., Woodward, S., & Hiller, A. (2012). The sustainable clothing market: an evaluation of potential strategies for UK retailers. International Journal of Retail & Distribution Management, 40(12), 935–955.

Goworek, H., Oxborrow, L., Claxton, S., McLaren, A., Cooper, T., & Hill, H. (2018). Managing sustainability in the fashion business: challenges in product development for clothing longevity in the UK. Journal of Business Research, 117, 629–641.

Greenland, S. (2019). Valid P -values behave exactly as they should: some misleading criticisms of P -values and their resolution with S -values. The American Statistician, 73(1), 106–114.

Ha, H. Y., & Janda, S. (2012). Predicting consumer intentions to purchase energy-efficient products. Journal of Consumer Marketing, 29(7), 461–469.

Hair, Jr. J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). Sage Publications.

Hair, Jr. J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24.

Harris, F., Roby, H., & Dibb, S. (2016). Sustainable clothing: challenges, barriers and interventions for encouraging more sustainable consumer behaviour. International Journal of Consumer Studies, 40(3), 309–318.

Hartmann, P., & Apaolaza-Ibanez, V. (2012). Consumer attitude and purchase intention toward green energy brands: the roles of psychological benefits and environmental concern. Journal of Business Research, 65(9), 1254–1263.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

Hoch, S. J., & Deighton, J. (1989). Managing what consumers learn from experience. Journal of Marketing, 53(2), 1–20.

Hsu, C. L., Chang, C. Y., & Yansritakul, C. (2017). Exploring purchase intention of green skincare products using the theory of planned behavior: testing the moderating effects of country of origin and price sensitivity. Journal of Retailing and Consumer Services, 34, 145–152.

Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. Journal of Consumer Behavior, 6(2-3), 94–110.

Hustvedt, G., & Dickson, M. A. (2009). Consumer likelihood of purchasing organic cotton apparel. Journal of Fashion Marketing and Management: An International Journal, 13(1), 49–65.

Jacoby, J., Berning, C. K., & Dietvorst, T. F. (1977). What about disposition? Journal of Marketing, 41(2), 22–28.

Jaiswal, D., & Kant, R. (2018). Green purchasing behaviour: a conceptual framework and empirical investigation of Indian consumers. Journal of Retailing and Consumer Services, 41, 60–69.

Joergens, C. (2006). Ethical fashion: myth or future trend? Journal of Fashion Marketing and Management: An International Journal, 10(3), 360–371.

Kashima, Y., Gallois, C., & McCamish, M. (1993). The theory of reasoned action and cooperative behaviour: it takes two to use a condom. British Journal of Social Psychology, 32(3), 227–239.

Kautish, P., Paul, J., & Sharma, R. (2019). The moderating influence of environmental consciousness and recycling intentions on green purchase behavior. Journal of Cleaner Production, 228, 1425–1436.

Kautonen, T., van Gelderen, M., & Fink, M. (2015). Robustness of the theory of planned behavior in predicting entrepreneurial intentions and actions. Entrepreneurship Theory and Practice, 39(3), 655–674.

Kautonen, T., van Gelderen, M., & Tornikoski, E. T. (2013). Predicting entrepreneurial behaviour: a test of the theory of planned behaviour. Applied Economics, 45(6), 697–707.

Kendzierski, D. (1990). Decision making versus decision implementation: an action control approach to exercise adoption and Adherence1. Journal of Applied Social Psychology, 20(1), 27–45.

Kendzierski, D., & Whitaker, D. J. (1997). The role of self-schema in linking intentions with behavior. Personality and Social Psychology Bulletin, 23(2), 139–147.

Kim, H. Y., & Chung, J. E. (2011). Consumer purchase intention for organic personal care products. Journal of Consumer Marketing, 28(1), 40–47.

Kock, N. (2015). Common method bias in PLS-SEM: a full collinearity assessment approach. International Journal of e-Collaboration (ijec), 11(4), 1–10.

Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental Education Research, 8(3), 239–260.

Kumar, B., Manrai, A. K., & Manrai, L. A. (2017). Purchasing behaviour for environmentally sustainable products: a conceptual framework and empirical study. Journal of Retailing and Consumer Services, 34, 1–9.

Kwong, G. S., & Balaji, M. S. (2016). Linking green skepticism to green purchase behavior. Journal of Cleaner Production, 131(10), 629–638.

Laitala, K., & Boks, C. (2012). Sustainable clothing design: use matters. Journal of Design Research, 10(1-2), 121–239.

Lang, C., Armstrong, C. M., & Brannon, L. A. (2013). Drivers of clothing disposal in the US: an exploration of the role of personal attributes and behaviours in frequent disposal. International Journal of Consumer Studies, 37(6), 706–714.

LaPiere, R. (1934). Attitudes versus actions. Social Forces, 13, 230–237.

Lee, K. (2008). Opportunities for green marketing: young consumers. Marketing Intelligence Planning, 26(6), 573–586.

Lee, Y. K., Kim, S., Kim, M. S., & Choi, J. G. (2014). Antecedents and interrelationships of three types of pro-environmental behavior. Journal of Business Research, 67(10), 2097–2105.

Li, L. Y. (1997). Effect of collectivist orientation and ecological attitude on actual environmental commitment. Journal of International Consumer Marketing, 9(4), 31–53.

Liska, A. E. (1984). A critical examination of the causal structure of the fishbein/ajzen attitude-behavior model. Social Psychology Quarterly, 47(1), 61–74.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: a 35-year odyssey. American Psychologist, 57(9), 705–717.

Lundblad, L., & Davies, I. A. (2016). The values and motivations behind sustainable fashion consumption. Journal of Consumer Behavior, 15(2), 149–162.

Lyon, T. P., & Maxwell, J. W. (2011). Greenwash: corporate environmental disclosure under threat of audit. Journal of Economics and Management Strategy, 20(1), 3–41.

Lyon, T. P., & Montgomery, A. W. (2015). The means and end of greenwash. Organization & Environment 28(2), 223–249.

Maichum, K., Parichatnon, S., & Peng, K. C. (2016). Application of the extended theory of planned behavior model to investigate purchase intention of green products among Thai consumers. Sustainability, 8(10), 1–20.

Marquis, C., Toffel, M. W., & Zhou, Y. (2016). Scrutiny, norms, and selective disclosure: a global study of greenwashing. Organization Science, 27(2), 483–504

Milfont, T. L., & Duckitt, J. (2004). The structure of environmental attitudes: a first- and second-order confirmatory factor analysis. Journal of Environmental Psychology, 24(3), 289–303.

Mohr, L. A., Eroglu, D., & Ellen, P. S. (1998). The development and testing of a measure of skepticism toward environmental claims in marketers' communications. Journal of Consumer Affairs, 32(1), 30–55.

Morgan, L. R., & Birtwistle, G. (2009). An investigation of young fashion consumers' disposal habits. International Journal of Consumer Studies, 33(2), 190–198.

Mostafa, M. M. (2006). Antecedents of Egyptian consumers' green purchase intentions. Journal of International Consumer Marketing, 19(2), 97–126.

Mostafa, M. M. (2007). A hierarchical analysis of the green consciousness of the Egyptian consumer. Psychology & Marketing, 24(5), 445–473.

Newton, J. D., Tsarenko, Y., Ferraro, C., & Sands, S. (2015). Environmental concern and environmental purchase intentions: the mediating role of learning strategy. Journal of Business Research, 68(9), 1974–1981.

Niinimäki, K., & Hassi, L. (2011). Emerging design strategies in sustainable production and consumption of textiles and clothing. Journal of Cleaner Production, 19(16), 1876–1883.

Orbell, S., & Sheeran, P. (1998). 'inclined abstainers': a problem for predicting health related behaviour. British Journal of Social Psychology, 37(2), 151–165.

Park, C. W., Mothersbaugh, D. L., & Feick, L. (1994). Consumer knowledge assessment. Journal of Consumer Research, 21(1), 71–82.

Park, H. J., & Lin, L. M. (2018). Exploring attitude-behavior gap in sustainable consumption: comparison of recycled and upcycled fashion products. Journal of Business Research, 117, 623–628.

Paul, J., Modi, A., & Patel, J. (2016). Predicting green product consumption using theory of planned behavior and reasoned action Journal of Retailing and Consumer Services, 29, 123–134.

Pavlou, P. A., & Fygenson, M. (2006). Understanding and predicting electronic commerce adoption: an extension of the theory of planned behavior. MIS Quarterly, 30(1), 115.

Petty, R. E., Unnava, R. H., & Stratham, A. J. (1991). Theories of attitude change. In: Robertson, T.S., Kassarjian, H.H. (Eds.), Handbook of Consumer Behavior. Prentice-Hall, 241–280.

Pickett Baker, J., & Ozaki, R. (2008). Pro environmental products: marketing influence on consumer purchase decision. Journal of Consumer Marketing, 25(5), 281–293.

Pinto, D. C., Nique, W. M., Anana, E. D. S., & Herter, M. M. (2011). Green consumer values: how do personal values influence environmentally responsible water consumption? International Journal of Consumer Studies, 35(2), 122–131.

Prakash, G., & Pathak, P. (2017). Intention to buy eco-friendly packaged products among young consumers of India: a study on developing nation. Journal of Cleaner Production, 141, 385–393.

Rigdon, E. E. (2012). Rethinking partial least squares path modeling: in praise of simple methods. Long Range Planning, 45(5-6), 341–358.

Schlegelmilch, B. B., Bohlen, G. M., & Diamantopoulos, A. (1996). The link between green purchasing decisions and measures of environmental consciousness. European Journal of Marketing, 30(5), 35–55.

Schultz, P. W. (2000). New environmental theories: empathizing with nature: the effects of perspective taking on concern for environmental issues. Journal of Social Issues, 56(3), 391–406.

Seele, P., & Gatti, L. (2017). Greenwashing revisited: in search of a typology and accusation-based definition incorporating legitimacy strategies. Business Strategy and the Environment, 26(2), 239–252.

Shaw, D., Shiu, E., & Clarke, I. (2000). The contribution of ethical obligation and self -identity to the theory of planned behaviour: an exploration of ethical consumers. Journal of Marketing Management, 16(8), 879–894.

Sheeran, P. (2002). Intention-behavior relations: a conceptual and empirical review. European Review of Social Psychology, 12(1), 1–36.

Sheeran, P., & Abraham, C. (2003). Mediator of moderators: temporal stability of intention and the intention-behavior relation. Personality and Social Psychology Bulletin, 29(2), 205–215.

Sheeran, P., & Orbell, S. (1998). Do intentions predict condom use? Meta-analysis and examination of six moderator variables. British Journal of Social Psychology, 37(2), 231–250.

Sheeran, P., & Orbell, S. (1999). Augmenting the theory of planned behavior: roles for anticipated regret and descriptive norms. Journal of Applied Social Psychology, 29(10), 2107–2142.

Shirokova, G., Osiyevskyy, O., & Bogatyreva, K. (2016). Exploring the intentionebehavior link in student entrepreneurship: moderating effects of individual and environmental characteristics. European Management Journal, 34(4), 386–399.

Shmueli, G., Ray, S., Velasquez Estrada, J. M., & Chatla, S. B. (2016). The elephant in the room: predictive performance of PLS models. Journal of Business Research, 69(10), 4552–4564.

Siano, A., Vollero, A., Conte, F., & Amabile, S. (2017). More than words": expanding the taxonomy of greenwashing after the Volkswagen scandal. Journal of Business Research, 71, 27–37.

Sparks, P., & Shepherd, R. (1992). Self-Identity and the theory of planned behavior: assessing the role of identification with "green consumerism. Social Psychology Quarterly, 55(4), 388–399.

Statista. (2020). eCommerce - Worldwide. https://www.statista.com/outlook/243/ 100/ecommerce/worldwide.

Tan, C. S., Ooi, H. Y., & Goh, Y. N. (2017). A moral extension of the theory of planned behavior to predict consumers' purchase intention for energy-efficient household appliances in Malaysia. Energy Policy, 107, 459–471.

Taufique, K. M. R., & Vaithianathan, S. (2018). A fresh look at understanding Green consumer behavior among young urban Indian consumers through the lens of Theory of Planned Behavior. Journal of Cleaner Produciton, 183, 46–55.

Vermeir, I., & Verbeke, W. (2008). Sustainable food consumption among young adults in Belgium: theory of planned behaviour and the role of confidence and values. Ecological Economics, 64(3), 542–553.

Wang, P., Liu, Q., & Qi, Y. (2014). Factors influencing sustainable consumption behaviors: a survey of the rural residents in China. Journal of Cleaner Production, 63, 152–165.

Wang, Z., Guo, D., & Wang, X. (2016). Determinants of residents' e-waste recycling behaviour intentions: evidence from China. Journal of Cleaner Production, 137, 850–860.

Webb, T. L., & Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. Psychological Bulletin, 132(2), 249–268.

Wicker, A.W. (1969). Attitudes versus actions: the relationship of verbal and overt behavioral responses to attitude objects. Journal of Social Issues, 25(4), 41–78.

Yadav, R., & Pathak, G. S. (2016). Young consumers' intention towards buying green products in a developing nation: extending the theory of planned behavior. Journal of Cleaner Production, 135, 732–739.

Yadav, R., & Pathak, G. S. (2017). Determinants of consumers' green purchase behavior in a developing nation: applying and extending the theory of planned behavior. Ecological Economics, 134, 114–122.

Young, W., Hwang, K., McDonald, S., & Oates, C. J. (2009). Sustainable consumption: green consumer behaviour when purchasing products. Sustainable Development, 18(1), 20–31.

Zhang, L., Li, D., Cao, C., & Huang, S. (2018). The influence of greenwashing perception on green purchasing intentions: the mediating role of green word-of-mouth and moderating role of green concern. Journal of Cleaner Production, 187, 740–750.

Zhao, H. H., Gao, Q., Wu, Y. P., Wang, Y., & Zhu, X. D. (2014). What affects green consumer behavior in China? A case study from Qingdao. Journal of Cleaner Production, 63, 143–151.

Appendix

Table A.1: Covariance matrix.

	PAR1	PAR2	PAR3	ATT1	ATT2	ATT3	PER1	PER2	PER3	EC1	EC2	EC3	EC4	GC1	GC2	GC3	PEK1	PEK2	PEK3	PEK4	PB1	PB2	PB3	PB4	PI1	PI2	PI3	PI4	SN1	SN2	SN3
PAR1	1.218																														
PAR2	0.952	1.162																													
PAR3	0.880	1.000	1.156																												
ATT1	-0.381	-0.400	-0.417	0.734																											
ATT2	-0.263	-0.337	-0.347	0.401	1.299																										
ATT3	-0.382	-0.401	-0.431	0.511	0.579	0.973																									
PER1	0.189	0.136	0.110	-0.016	-0.061	0.033	0.937																								
PER2	0.324	0.294	0.292	-0.147	-0.138	-0.111	0.505	1.353																							
PER3	0.162	0.146	0.121	-0.015	-0.036	0.027	0.694	0.555	1.054																						
EC1	-0.126	-0.094	-0.124	0.242	0.201	0.254	0.023	-0.074	0.051	0.489																					
EC2	-0.145	-0.123	-0.134	0.245	0.245	0.286	0.024	-0.077	0.047	0.308	0.533																				
EC3	-0.184	-0.165	-0.177	0.278	0.276	0.327	-0.016	-0.063	0.045	0.302	0.336	0.761																			
EC4	-0.147	-0.120	-0.139	0.217	0.199	0.233	0.019	-0.044	0.066	0.290	0.290	0.323	0.525																		
GC1	-0.003	-0.019	-0.061	0.085	0.091	0.080	0.035	0.203	0.082	0.066	0.058	0.135	0.104	1.071																	
GC2	-0.057	-0.023	-0.070	0.092	0.134	0.096	0.005	0.129	0.069	0.085	0.078	0.150	0.112	0.807	1.096																
GC3	-0.017	-0.019	-0.057	0.069	0.182	0.065	-0.014	0.058	-0.001	0.020	0.032	0.083	0.063	0.638	0.749	1.056															
PEK1	-0.037	-0.052	-0.053	0.161	0.145	0.139	-0.008	-0.059	-0.005	0.039	0.121	0.073	0.066	0.015	0.034	-0.011	0.601														
PEK2	-0.093	-0.073	-0.079	0.155	0.146	0.160	-0.002	-0.051	0.020	0.093	0.134	0.109	0.105	0.027	0.054	0.027	0.275	0.420													
PEK3	-0.064	-0.052	-0.044	0.150	0.145	0.155	0.017	-0.080	-0.007	0.084	0.142	0.119	0.085	0.008	0.049	0.038	0.252	0.268	0.539												
PEK4	-0.084	-0.090	-0.089	0.172	0.152	0.136	0.020	-0.067	0.013	0.093	0.149	0.151	0.082	0.083	0.081	0.060	0.268	0.285	0.319	0.632											
PB1	-0.335	-0.380	-0.392	0.299	0.350	0.389	-0.118	-0.159	-0.118	0.109	0.145	0.199	0.104	0.054	0.044	0.062	0.172	0.127	0.110	0.164	1.012										
PB2	-0.263	-0.384	-0.413	0.370	0.336	0.435	-0.127	-0.180	-0.119	0.157	0.206	0.212	0.124	0.109	0.150	0.091	0.181	0.156	0.165	0.202	0.581	1.199									
PB3	-0.421	-0.449	-0.440	0.386	0.365	0.476	-0.114	-0.294	-0.142	0.203	0.220	0.277	0.167	0.044	0.073	0.060	0.161	0.137	0.138	0.153	0.643	0.692	1.137								
PB4	-0.373	-0.400	-0.442	0.413	0.480	0.520	-0.038	-0.142	0.006	0.173	0.229	0.332	0.148	0.104	0.089	0.085	0.180	0.155	0.169	0.234	0.715	0.702	0.707	1.190							
PI1	-0.411	-0.403	-0.442	0.426	0.477	0.545	-0.042	-0.107	-0.017	0.224	0.265	0.302	0.216	0.128	0.149	0.091	0.171	0.187	0.175	0.181	0.388	0.462	0.486	0.516	0.789						
PI2	-0.366	-0.375	-0.409	0.459	0.450	0.564	-0.032	-0.084	0.011	0.214	0.244	0.323	0.241	0.152	0.141	0.116	0.181	0.187	0.177	0.164	0.428	0.488	0.505	0.536	0.689	0.870					
PI3	-0.396	-0.424	-0.460	0.455	0.484	0.531	-0.022	-0.153	0.015	0.196	0.243	0.281	0.179	0.099	0.074	0.069	0.185	0.169	0.159	0.166	0.426	0.499	0.498	0.546	0.608	0.642	0.884				
PI4	-0.272	-0.287	-0.325	0.310	0.302	0.409	-0.066	-0.123	-0.015	0.196	0.196	0.245	0.185	0.075	0.129	0.062	0.088	0.100	0.122	0.120	0.222	0.347	0.355	0.339	0.427	0.442	0.420	0.649			
SN1	-0.043	-0.086	-0.080	0.181	0.251	0.193	0.007	-0.021	0.041	0.106	0.186	0.251	0.089	0.104	0.041	0.059	0.103	0.065	0.037	0.113	0.210	0.331	0.262	0.299	0.155	0.193	0.191	0.101	1.115		
SN2	-0.026	-0.027	-0.072	0.140	0.089	0.129	-0.074	-0.090	-0.026	0.121	0.173	0.235	0.097	0.103	0.113	0.029	0.103	0.086	0.059	0.143	0.186	0.295	0.201	0.255	0.124	0.131	0.113	0.124	0.713	1.304	
SN3	-0.038	-0.097	-0.113	0.195	0.169	0.223	0.001	-0.089	0.034	0.130	0.182	0.218	0.101	0.093	0.054	0.026	0.079	0.070	0.044	0.124	0.249	0.373	0.296	0.346	0.152	0.189	0.161	0.147	0.776	0.905	1.224

Note: ATT = attitude towards sustainable clothing, EC = environmental concern, GC = greenwashing concern, PAR = perceived aesthetic risk, PEK = perceived environmental knowledge, PER = perceived economic risk, PI = purchase intention for sustainable clothes, PB = purchase behavior, SN = subjective norm

Table A.2: Cross-loadings.

	PAR	ATT	PER	EC	GC	PEK	PB	PI	SN
PAR1	**0.898**	-0.401	0.246	-0.222	-0.026	-0.112	-0.357	-0.423	-0.035
PAR2	**0.956**	-0.447	0.217	-0.189	-0.021	-0.107	-0.422	-0.445	-0.072
PAR3	**0.940**	-0.472	0.201	-0.217	-0.064	-0.107	-0.442	-0.490	-0.087
ATT1	-0.462	**0.840**	-0.095	0.469	0.105	0.318	0.483	0.620	0.213
ATT2	-0.277	**0.737**	-0.087	0.330	0.125	0.221	0.379	0.485	0.164
ATT3	-0.407	**0.879**	-0.034	0.456	0.090	0.260	0.521	0.669	0.197
PER1	0.145	-0.011	**0.805**	0.023	0.012	0.011	-0.115	-0.053	-0.017
PER2	0.257	-0.141	**0.857**	-0.092	0.127	-0.094	-0.189	-0.128	-0.056
PER3	0.136	-0.006	**0.803**	0.083	0.058	0.011	-0.102	-0.002	0.022
EC1	-0.161	0.423	-0.018	**0.822**	0.094	0.194	0.261	0.382	0.176
EC2	-0.181	0.444	-0.020	**0.834**	0.086	0.321	0.309	0.418	0.258
EC3	-0.198	0.423	-0.026	**0.788**	0.157	0.221	0.332	0.425	0.279
EC4	-0.184	0.377	0.007	**0.798**	0.143	0.205	0.212	0.365	0.137
GC1	-0.029	0.102	0.130	0.140	**0.894**	0.053	0.084	0.142	0.100
GC2	-0.047	0.123	0.081	0.163	**0.930**	0.089	0.095	0.152	0.064
GC3	-0.031	0.114	0.023	0.075	**0.833**	0.048	0.081	0.106	0.040
PEK1	-0.061	0.241	-0.042	0.159	0.021	**0.751**	0.251	0.261	0.126
PEK2	-0.124	0.298	-0.030	0.280	0.063	**0.853**	0.249	0.321	0.115
PEK3	-0.071	0.256	-0.047	0.241	0.047	**0.799**	0.223	0.278	0.064
PEK4	-0.110	0.242	-0.027	0.245	0.104	**0.784**	0.272	0.256	0.163
PB1	-0.365	0.426	-0.152	0.225	0.056	0.240	**0.822**	0.470	0.225
PB2	-0.325	0.440	-0.152	0.262	0.118	0.278	**0.810**	0.528	0.319
PB3	-0.406	0.485	-0.210	0.332	0.060	0.234	**0.847**	0.557	0.251
PB4	-0.369	0.535	-0.074	0.328	0.092	0.284	**0.857**	0.573	0.290
PI1	-0.467	0.676	-0.081	0.463	0.153	0.346	0.588	**0.917**	0.171
PI2	-0.408	0.663	-0.052	0.445	0.160	0.328	0.591	**0.915**	0.195
PI3	-0.451	0.650	-0.082	0.391	0.094	0.309	0.590	**0.874**	0.177
PI4	-0.364	0.533	-0.109	0.416	0.123	0.229	0.443	**0.764**	0.159
SN1	-0.067	0.238	0.004	0.243	0.070	0.125	0.293	0.195	**0.876**
SN2	-0.037	0.136	-0.068	0.223	0.082	0.143	0.230	0.138	**0.846**
SN3	-0.076	0.225	-0.030	0.233	0.059	0.119	0.321	0.188	**0.909**

Note: Values corresponding to a construct's assigned indicators are highlighted in bold. ATT = attitude towards sustainable clothing, EC = environmental concern, GC = greenwashing concern, PAR = perceived aesthetic risk, PEK = perceived environmental knowledge, PER = perceived economic risk, PI = purchase intention for sustainable clothes, PB = purchase behavior, SN = subjective norm.

Table A.3: Fornell-Larcker evaluation.

	PAR	PER	ATT	EC	PEK	GC	PI	PB	SN
PAR	0.931								
PER	0.235	0.822							
ATT	-0.474	-0.085	0.821						
EC	-0.224	-0.019	0.516	0.811					
PEK	-0.116	-0.046	0.327	0.293	0.789				
GC	-0.041	0.093	0.127	0.148	0.073	0.887			
PI	-0.487	-0.091	0.728	0.492	0.352	0.153	0.870		
PB	-0.440	-0.176	0.567	0.347	0.311	0.098	0.640	0.834	
SN	-0.071	-0.031	0.235	0.266	0.145	0.079	0.202	0.326	0.877

Note: ATT = attitude towards sustainable clothing, EC = environmental concern, GC = greenwashing concern, PAR = perceived aesthetic risk, PEK = perceived environmental knowledge, PER = perceived economic risk, PI = purchase intention for sustainable clothes, PB = purchase behavior, SN = subjective norm.

Essay 8: Equifinal causes of sustainable clothing purchase behavior: an fsQCA analysis among Generation Y

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Abstract

Purchase intention of sustainable clothing is investigated using fuzzy-set qualitative comparative analysis to identify equifinal causal paths. A sample of 81 German students was drawn employing a two-stage cluster sampling approach. Environmental concerns appear to be a necessary condition for purchase intention. Segmentation according to gender revealed that for females, a pure focus on environmental concerns is sufficient for purchase intention, while the same configuration prevents this intention for males. Females emphasize price value considerations and do not wish for high visibility of their sustainable clothing, while males indicate the opposite. Further, a prestige-driven causal combination was found for the male segment, stressing social influence and visibility. The purchase intention of sustainable clothing yields interactions among causal conditions, corroborating the need for methodological diversity to gain a better understanding of the phenomenon.

Keywords sustainable clothing; purchase intention; fsQCA; environmental concern; causal combination

1 Introduction

Recent years have witnessed the phenomenal rise of sustainable products, with the textile industry constituting a significant market potential (Goworek et al., 2012). Companies are striving to address the consumer demand for sustainable products, rendering knowledge of the determinants of sustainable clothing consumption essential. Hence, research has sparked to gain an understanding of consumers' motives, demands, and apprehensions regarding sustainable clothing. This development contrasts profit maximization achieved by the satisfaction of a growing demand for consumption (Rausch and Kopplin, 2020), rendering it necessary to acquire insights into the matter to derive meaningful theoretical as well as practical implications. Although valuable contributions to the extant literature allow an understanding of consumer demands and behavior, the term sustainable clothing is not unequivocal: denominations such as green (D'Souza et al., 2007), organic (Hustvedt and Dickson, 2009), and eco-conscious (Hiller Connell, 2010) are frequently treated as synonyms (Rausch and Kopplin, 2020). The literature identifies the presence of pro-ecological activities across all phases of the product's lifespan as the fundamental quality of sustainable clothing (Bianchi and Birtwistle, 2012; Lundblad and Davies, 2016). Given the widely diverging interpretations of sustainable clothing in the existing literature, this paper relies on four facets which in their entirety broadly represent the consesus regarding the terminology in current research. Sustainable clothing thus incorporates fairness aspects such as social fairness and the fair and

ethical use of materials but also encompasses sustainable consumption and design and production techniques (Fletcher, 2013; Henninger et al., 2016; Khandual and Pradhan, 2019; Shen et al., 2013). Considering consumers' purchase intention, thus, sustainable clothing refers to the selection of garments consisting of ecologically favorable materials, such as recycled, upcycled, or biodegradable fiber used in a production process that yields fair working conditions (Allwood et al., 2008; Armstrong et al., 2016).

With the body of knowledge on this topic steadily growing, it appears fruitful to include a methodological diversity to gain detailed insights into the topic. The study at hand employs fuzzy-set qualitative analysis (fsQCA) to detect causal combinations of conditions that elicit a particular outcome – in this case, the purchase intention regarding sustainable clothing among consumers of Generation Y. In contrast to regression-based models, fsQCA can handle asymmetric effects (i.e., the presence of an outcome is not evoked by the reversed situation that leads to the absence of the outcome but yields a unique combination of conditions) and provides insights into causal interactions among conditions (Pappas and Woodside, 2021). The issue of multicollinearity impedes the examination of interrelated causal factors in regression-based models. The extant literature drawing on methods such as fuzzy-set qualitative comparative analysis (fsQCA) demonstrates that causal combinations are common in the real world, and the 'isolated' illumination of independent variables may produce a biased picture of the phenomenon (Bouncken et al., 2020b; Ho et al., 2016; Mikalef and Pateli, 2017; Pappas et al., 2016).

The study at hand seeks to explore the interrelation of the five conditions environmental concern, self-expressiveness, visibility, social influence, and price value considering their impact on young consumers' purchase intention of sustainable clothing. Earlier studies found a positive effect for environmental concern (Goh and Balaji, 2016; Park and Lin, 2018; Prakash and Pathak, 2017) and mixed results for the influence of self-expressiveness (Park and Lin, 2018; Yu and Lee, 2019) and social influence (Jung et al., 2020; Park and Lin, 2018). We contribute to the literature by identifying interrelations among these factors, seeking to advance our knowledge of their causal mechanisms in the context of sustainable clothing. To provide a realistic picture of the issue, we also include sustainable clothings' salience (i.e., visibility) and consumers' price considerations (i.e., price value) in our model.

It is important to stress that regression-based techniques are powerful and extraordinarily useful methods. We do not seek to criticize their usage; on the contrary – we suggest complementing their findings with techniques that draw on different assumptions to gain a more holistic understanding of the target phenomenon. Hence, the study aims to provide insights into consumers' motives to purchase sustainable clothing from a set-theoretic perspective while also providing multivariate findings for triangulation purposes. To do so, a nomological net is derived from the extant literature, and fsQCA is used for analysis. The paper is structured as follows: Section 2 provides an overview of the existing work on sustainable clothing, and hypotheses for the nomological net are derived. The research design is presented in

Section 3. The fourth section displays the results, followed by a discussion in Section 5. The paper closes with concluding remarks and an outlook on future research.

2 Theoretical background

2.1 Fuzzy-set qualitative comparative analysis

In recent years, fsQCA has experienced a surge of applications in empirical investigations (Bouncken et al., 2020a; Gligor and Bozkurt, 2020; Kraus et al., 2018; Oyemomi et al., 2016; Pappas et al., 2016). Its methodological balance between qualitative and quantitative, i.e., case-oriented and variable-oriented analyses, allows the detailed inspection of complex causal relationships (Pappas and Woodside, 2021). Complementing common techniques such as regression-based models, fsQCA is rooted in set theory and employs observations' membership degrees in sets as the level of analysis (Ragin, 2009). Memberships are described by scores that range between 0 (i.e., full non-membership in the set) and 1 (i.e., full membership). Hence, when preparing data for fsQCA, researchers need to specify the thresholds, so-called anchor points, that indicate full non-membership as well as full membership. A common way to achieve this calibration is the usage of Likert-type scales and the definition of scale points as anchors. For example, Ordanini et al. (2014) propose to employ the values of 2 and 6 as anchor points on a seven-point scale. This approach is backed by fsQCA advocates (Pappas et al., 2016; Pappas and Woodside, 2021). Other scholars use the endpoints, such as 1 and 7 on a seven-point Likert-type scale (Gligor and Bozkurt, 2020). The remaining anchor refers to the cross-over point of maximum ambiguity, i.e., a membership score of 0.50 in the set, which indicates neither membership nor non-membership (Pappas and Woodside, 2021; Ragin, 2009).

After calibration, each observed case yields membership scores in the conditions and the outcome. Based on fuzzy logic, these scores are used to identify set relations (Ragin, 2006). In general, a particular set may be either a subset or a superset of another, related set. The information about these relations allows the derivation of causal statements: cases that yield higher membership scores in the outcome than in the condition provide evidence for a sufficient condition, and observations exhibiting lower scores in the outcome than in the condition suggest a necessary condition (Dul, 2016a). Figure 1 displays the two cases. As can be seen, the bisecting line indicates the threshold when one membership score exceeds the other, i.e., when evidence for either a sufficient or a necessary condition has been detected.

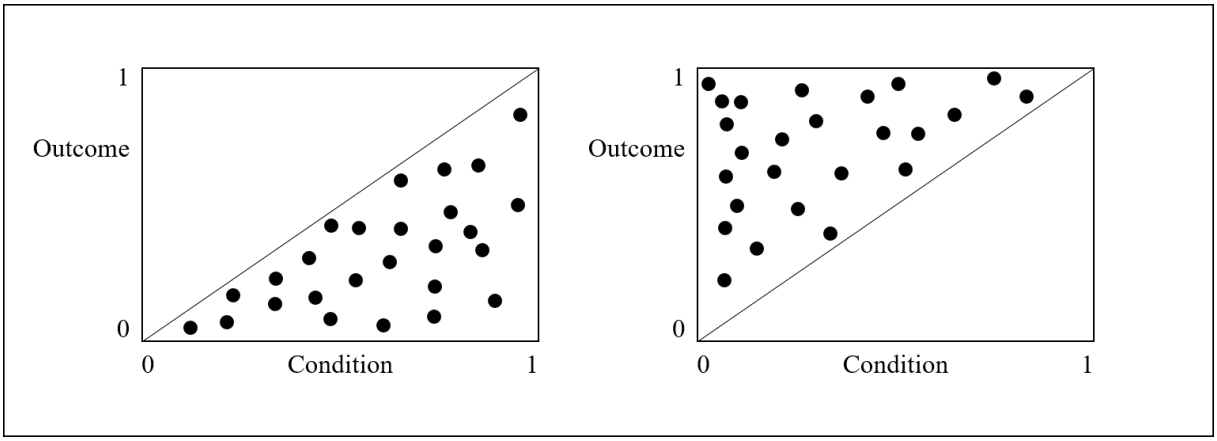


Figure 1: XY plots indicating a necessary (left) and a sufficient condition (right).

2.2 Purchase Intention

Consistent with the extant literature on sustainable clothing, the Theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) is used as a theoretical underpinning explaining the causal mechanisms of individual behavior. According to the TRA, an individual evaluates two sets of beliefs: behavioral and normative ones. These sets then form an attitude towards the behavior (influenced by behavioral beliefs) and a subjective norm (influenced by normative beliefs) (Fishbein and Ajzen, 1975; Madden et al., 1992). These perceptions of the behavior's outcome may be positive or negative and shape the intention to carry out the behavior. This behavioral intention, in turn, is viewed as an immediate antecedent of the actual behavior and, thus, as its best proxy. The TRA and its causal chain of attitude-intention-behavior are commonly used in research on sustainable products (Jung et al., 2020; Park and Lin, 2018; Rausch and Kopplin, 2020; Yadav and Pathak, 2016).

A central challenge within sustainability literature is the existence of an attitude-behavior gap, i.e., individuals that yield a favorable attitude towards sustainable products are frequently found not to translate this attitude into action (Park and Lin, 2018; Rausch and Kopplin, 2020). The study at hand seeks to employ an alternative approach compared to the extant literature to address this issue: (1) instead of calculating net effects, equifinal causal combinations are considered, (2) as opposed to the examination of regression weights (i.e., sufficiency in degree), combinations eliciting purchase intention in absolute terms are used (i.e., sufficiency in kind) . Equifinality describes the concept of multiple different causal combinations leading to the same outcome (Pappas and Woodside, 2021).

2.3 Environmental Concern

Environmental concern describes an individual's attachment to ecological issues and environmental protection (Park and Lin, 2018; Yadav and Pathak, 2016). It captures feelings of involvement and the affective assessment of ecological impacts (Dagher and Itani, 2014; Lee, 2008; Newton et al., 2015). Recent work found global awareness for environmental issues (Milfont and Schultz, 2016), encouraging

the assessment of the variable for the investigation of consumer behavior in global industries such as apparel. Environmental concern has frequently been utilized as a proxy for social responsibility (Van Liere and Dunlap, 1980) as it expresses the individual's sense of responsibility towards and enduring feelings about environmental problems (Chan, 2001; Weigel and Weigel, 1978; Maloney et al,. 1975). Mostly, environmental concern is thus referred to as a social-altruistic value orientation, but it can also arise out of self-interest (i.e., an egoistic value orientation) or out of biospheric values (Stern et al. 1993). A vast body of knowledge corroborates the existence of a positive influence on the purchase intention of sustainable products (Goh and Balaji, 2016; Hartmann and Apaolaza-Ibáñez, 2012; Park and Lin, 2018; Prakash and Pathak, 2017; Yadav and Pathak, 2016).

However, there is evidence that in some instances, environmental concern may not be carried over to ecologically favorable behavior (Newton et al., 2015; Tam and Chan, 2017). Particularly, while environmental concerns have been studied for several decades, consumption levels are ever increasing (Global Footprint Network, 2018). Research suggests that consumers are aware of this gap (Kennedy et al., 2009), motivating the need for further investigation. Thus, it appears relevant to examine its relationships with context-dependent factors that may influence the purchase intention and subsequent behavior of environmentally friendly products.

2.4 Self-expressiveness

Self-expressiveness captures an individual's perception that they may express their identity by purchasing and wearing sustainable clothing (Park and Lin, 2018). It is particularly important in the context of fashion and is also linked to a desire to express personal attitude and thereby gain the attention and validation of others (Auty and Elliott, 1998). Therefore, some motivation to wear sustainable textiles may be derived from the possibility to being perceived as an environmentally conscious person (Noppers et al., 2014).

Extant research in the field finds a significant positive impact on purchase intention regarding upcycled products but not for recycled ones (Park and Lin, 2018) and an insignificant relationship with individuals' attitudes towards upcycled goods (Yu and Lee, 2019). As attitude and intention are commonly conceptualized as constituting a cause-effect relation (e.g., in TRA, Ajzen and Fishbein, 1980), it is debatable whether the diverging results for attitudes and intentions are contradictory. However, one could argue that a purchase intention considers a particular product, while attitude may be vaguer, and this discrepancy may be the reason for the differing results. This argument is also consistent with the foundations underlying the TRA, where intentions are more concrete than attitudes and, thus, are employed to infer actual behavior (Ajzen and Fishbein, 1980).

2.5 Visibility

Visibility may be viewed as a complement to self-expressiveness, as it denotes an individual's perception of the purchased good being visible to others. Visibility has not been investigated in the context of

sustainable clothing yet; however, the study by Jung et al. (2020) displays a negative influence of conspicuous value, which may be regarded as a closely related notion. This conspicuous value refers to the acquisition of valued goods due to a wish to keep up with others that appear to achieve a higher status (Zheng et al., 2018). In their work, Jung et al. (2020) use a very prestige-oriented operationalization for this notion, which may elicit adverse reactions (e.g., 'I am envious of people who buy high-end brands', 'People can achieve recognition when they own high-end clothes and accessories'). We seek to include the notion as we deem prestige orientation an important motivator for young consumers. However, we adapted the visibility construct to achieve a more attenuated wording (e.g., 'Sustainable clothing is recognized by people who see me'). This measure does not include price considerations and, as such, is deemed more straightforward and unambiguous. In contrast, conspicuous value appears to capture feelings of envy and the perception of a strong causal chain between expensive goods and social recognition simultaneously.

For example, visibility's impact has been studied for the case of smartwatches, which may be regarded as a current topic similar to sustainable fashion in its degree of novelty, where it was found to yield a positive influence on the attitude towards using them and individuals' adoption intention (Chuah et al., 2016). It has been described as related to the concept of image, albeit it captures more subtle nuances by avoiding the explicit relationship with personal status (Chuah et al., 2016; Moore and Benbasat, 1991; Venkatesh and Bala, 2008). Thus, it may be considered an antecedent variable (Fisher and Price, 1992). As sustainability may be considered an emotional topic, we believe that visibility is more adequate and less intrusive.

2.6 Social Influence

Social influence, i.e., significant others' perceived expectations, is a major variable in sustainability research. It is closely related to the concept of subjective norms, which is a major part of TRA besides attitude (Ajzen and Fishbein, 1980; Madden et al., 1992), and has been proposed as a proxy for these (Venkatesh et al., 2003). Hence, incorporating the social environments' opinion on the matter is a basal factor in human decision-making. In the context of sustainability, this notion is deemed to become even more important, as ecologically harmful actions cause indirect damage to other individuals. Thus, the social environment may expect the avoidance of such behavior or emphasize ecologically friendly alternatives.

The extant literature on sustainable behavior reports a mixed impact of social influence on environmentally agreeable intentions and actions. For example, Park and Lin (2018) identify a positive effect on purchase intention for recycled products. Jung et al. (2020) report a positive influence of social norms among Chinese consumers affecting their intention to buy sustainable clothing. Similar results are provided by Yadav and Pathak (2016) and Saricam and Okur (2019) for the context of developing nations. These studies show that social influence plays a role in decision-making across different cultural settings, corroborating its universally applicable role ascribed in TRA. However, contradictory findings

show insignificant effects (Kumar et al., 2017; Lasuin and Ng, 2014; Rausch and Kopplin, 2020). Hence, it appears reasonable to include the concept to provide more insights into its role regarding purchase intention.

2.7 Price Value

The relation of cost (i.e., price) and benefit (i.e., value) is a major factor in consumer decision-making. Research on sustainable products revealed that price considerations might impede purchase behavior, as even consumers willing to buy sustainable goods hesitate to pay a higher price (Joergens, 2006). Several studies show that from a consumer perspective, prices for sustainable products cannot compete with those for conventional goods (Ali et al., 2011; Hustvedt and Dickson, 2009; Young et al., 2010). Subsequently, the existing literature reports a negative correlatio between price value and purchase intention in the context of recycled and upcycled fashion products as well as eco-fashion (Chan and Wong, 2012; Park and Lin, 2018). Nevertheless, there is also evidence that this economic risk may not play a significant role (Rausch and Kopplin, 2020).

Hence, this paper aims to extend existing findings by combining price value with other conditions to shed light on possible interactions. This way, potential causes underlying the inhibition of purchase intention by price value and – as it can be generally stated that a sound price-performance ratio is relevant to any rational decision-maker – combinations where price value unexpectedly seems to be insignificant may be identified.

3 Research Design

3.1 Nomological Net

In line with their respective usage in studies drawing on multivariate techniques, the five conditions are hypothesized to yield a positive impact on individuals' purchase intention in the sense that causal combinations are sufficient to evoke the presence of purchase intention. Further, particular interactions are expected. Due to their conceptualizations, it is assumed that visibility and social influence may interact, as the purchase of clothing with a signaling function may serve as a response to perceived social expectations. For cases with this configuration, it is further expected that price value considerations play only a minor role, as clothing that ensures high visibility is likely to exhibit a recognizable design or brand, which is often the case for expensive products. Hence, causal combinations including visibility and social influence are expected to exclude price value for a large proportion of cases. Further, the need for visible, socially desired clothing is assumed to correspond to self-expressiveness, as the individual seeks to comply with socially implied expectations (i.e., social influence) to reveal themselves as a part of the group.

Further, the altruistic nature of environmental concern may conflict with perceptions of visibility. For individuals solely focusing on a positive ecological impact, price value considerations may also be of

minor importance. Thus, it is expected that empirically relevant causal combinations including environmental concern and excluding price value will be identified. In these altruistically motivated cases, self-expressiveness may be an additional component to achieve a high degree of identification with the chosen product. Consequently, causal combinations incorporating environmental concerns and self-expressiveness are expected to be found. Table 1 summarizes the expected relations.

Table 1: Expected relations among conditions.

Note: ~ denotes a negated condition.

Condition	Expected interaction
EC	~VI; ~PV; SE
SE	VI; SI
VI	~EC; PV; SE
SI	SE; VI
PV	~EC; VI

3.2 Questionnaire Compilation and Sampling Strategy

The questionnaire was drafted using Qualtrics and disseminated via e-mail. For environmental concerns, the four items by Wei and Jung (2017) were adopted. The four items of self-expressiveness were derived from two studies to gain a more comprehensive understanding. Items SE1 and SE2 were drawn from Park and Lin (2018), who generalized them from research to examine self-expressiveness in the context of recycled and upcycled fashion products. SE3, as well as SE4, were adapted from Choo et al. (2012). These were also used by Yu and Lee (2019) in the context of upcycled products. Visibility was evaluated using the three items from Chuah et al. (2016), adjusted to sustainable clothing. The items for social influence were derived from the research of Venkatesh et al. (2012). Price value was evaluated using items from Sweeney and Soutar (2001), generalized according to the object of study. All variables were measured using a seven-point Likert-type scale. Variables and items are supplied in Appendix A.

German university students are targeted as the study's population. This decision was made because students belong to Generation Y, which is considered to have increased interest in the environment, but implements this interest insufficiently in practice (Hume, 2010). Additionally, Generation Y has tremendous purchasing power, accounting for 20.2 % of fast-moving consumer goods revenue in Germany (GfK, 2020), rendering them an important target group for retailers and consumer goods companies (Parment, 2013). A list containing all German universities and their faculties was compiled. A two-stage cluster sampling approach is employed, selecting a university in the first step and a faculty in the second step.

4 Results

4.1 Descriptive Statistics

Eighty-one questionnaires were collected over four weeks. About two-thirds (65.4 %) identified as female, and 34.6 % identified as male. In line with the sampling strategy, age ranged from 17 to 34 years,

with a mean of 23.54. A check for outliers was performed by drawing on boxplots; however, no extreme cases were identified, and all data points were retained. In total, the sample represented 39 German universities and 27 degree programs. A detailed description is supplied in Appendices B and C. The items' covariance matrix is provided in Appendix D.

Next, the data were assessed for speeders and straightliners. Speeders were defined as participants that took less than half of the median time to complete the survey. This threshold was undercut by two individuals that were classified as speeders and removed from the data set. Straightliners were examined by checking centrism and extremism, which did not reveal any issues. Consequently, 79 questionnaires qualified for analysis.

Two-thirds (64.6 %) responded they had already purchased sustainable clothing. Regarding the shopping location, the majority indicated a mix of online and brick-and-mortar stores (67.1 %), followed by stores (22.8 %) and online shopping (10.1 %). Shopping frequency ranged between monthly and every other month for most participants (29.1 % and 49.4 %, respectively). About 10 % each make purchases on a more (8.9 % shop several times a month, and 2.5 % do so weekly) and less frequent basis (5.1 % indicate once a year and 5.1 % even less). Considering the cost of these purchases, the majority ranges below 100 Euros per month: about half of the sample (48.1 %) spend less than 50 Euros, and a third (35.4 %) invest between 50 and 100 Euros. Less than one in ten (8.9 %) spends between 100 and 200 Euros, and 7.6 % invest more.

4.2 Measurement Evaluation

The data set is checked for common method bias by drawing on Harman's single-factor test (Podsakoff and Organ, 1986). The evaluation indicates that common method bias does not affect the study's analysis, as no major factor could be identified: the strongest factor explained 52.9 % of the variance and is accompanied by five more extracted factors. Measurement adequacy in terms of reliability and internal validity is assessed using Cronbach's Alpha, composite reliability, and the average variance extracted. These calculations are part of multivariate techniques' standard repertoire (Hair et al., 2019) and are adopted to ensure high data quality. Further, factor loadings are derived using exploratory factor analysis. All manifest variables' outer loadings are sufficiently high, ranging above 0.5 in absolute values and, for the most part, exceeding 0.7. In terms of loadings, recommendations from the literature on partial least squares structural equation modeling are adopted: items should, in general, meet a threshold of 0.7; however, items with lower loadings may be retained when the variable assessment is satisfactory (Hair et al., 2019). Hence, all items are kept for further analysis. An overview is provided in Appendix A. The heterotrait-monotrait ratio (HTMT) is used to evaluated discriminant validity (Henseler et al., 2015). Tables 2 and 3 display the results.

As can be seen, the HTMT is fairly high for PI/EC. In general, ratios should be lower than 0.85 for established models; however, a more relaxed threshold of 0.9 has been proposed (Henseler et al., 2015).

To gain further insights, a bootstrapping procedure with 10,000 draws was used to calculate 95 % confidence intervals, all of which excluded the null value of 1. Thus, discriminant validity could be established.

Table 2: Variable assessment.

Note: SD = standard deviation, CR = composite reliability, AVE = average variance extracted.

Variable	Items	Mean (SD)	Cronbach's Alpha	CR	AVE
Environmental concern	4	6.00 (0.81)	0.760	0.846	0.580
Self-expressiveness	4	4.08 (1.38)	0.850	0.901	0.701
Visibility	3	2.95 (1.42)	0.898	0.936	0.829
Social influence	3	3.46 (1.40)	0.889	0.931	0.818
Price value	4	3.98 (1.01)	0.792	0.863	0.616
Purchase intention	4	4.79 (1.27)	0.869	0.912	0.724

Table 3: Heterotrait-monotrait ratios.

Note: EC = environmental concern, PI = purchase intention, PV = price value, SE = self-expressiveness, SI = social influence, VI = visibility.

	EC	PI	PV	SE	SI	VI
EC						
PI	0.860					
PV	0.578	0.631				
SE	0.813	0.798	0.505			
SI	0.522	0.649	0.329	0.577		
VI	0.263	0.307	0.208	0.115	0.082	

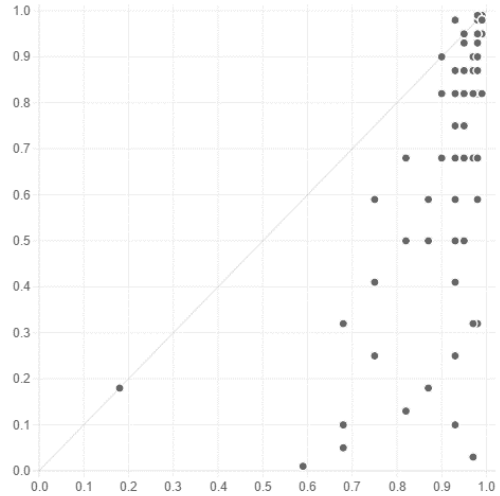
4.3 Fuzzy-set Qualitative Comparative Analysis

The software package fsQCA3.0 was used for analysis (Ragin and Davey, 2016). Before an fsQCA run can be performed, the data collected in the present study by means of seven-point Likert-type scales needs to be calibrated into fuzzy sets, i.e., their values may only range from 0 to 1 (Kraus et al., 2018; Ragin, 2009). Determining anchors for full set membership, full non-membership, and the cross-over point allows mapping the empirical data using a logistic function to convert them into fuzzy membership scores. Consistent with the extant literature, a theoretical a priori calibration is employed, defining the scale points 2 and 6 on the Likert-type scale as full non-membership (i.e., 2) and full membership (i.e., 6), respectively (Ordanini et al., 2014). This calibration draws on Likert-type scales' properties of symmetry and equidistance. The mid-point value of 4 serves as the cross-over point, showing the highest degree of ambiguity (Joshi et al., 2015). Since both 7 (i.e., 'strongly agree') and 6 (i.e., 'agree') express respondents' acceptance of the respective statement, and in principle, respondents have a tendency to avoid extreme values (Boari and Nai Ruscone, 2015), 6 as selected as the threshold for full membership. Consequently, the threshold of 2 was defined for non-membership.

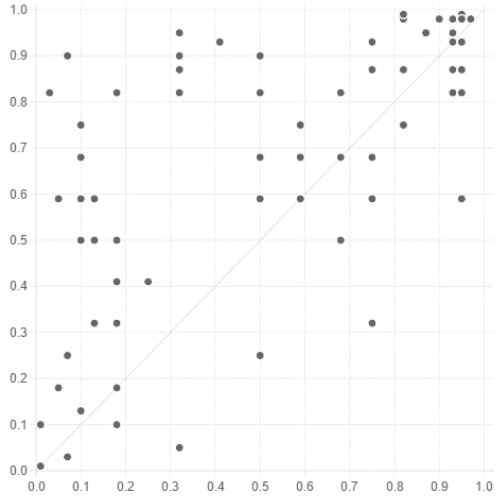
After the calibration, fsQCA-related analyses may be run. XY plots were generated to inspect the data qualitatively (Dul, 2016a; Woodside, 2016), denoting the membership scores in the condition on the

horizontal axis and the membership score in the outcome on the vertical axis. The observed cases' distribution allows insights into potential necessary or sufficient conditions: cases in the lower-right corner – i.e., observations with larger membership scores in the condition than in the outcome – provide evidence for a necessity of the condition (Dul, 2016a). The opposite pattern of cases being located in the upper-left corner – i.e., observations with larger membership scores in the outcome than in the condition – yields evidence for a sufficient condition (Ragin, 2009). Necessary conditions need to be present to allow the outcome to occur; however, their presence does not force the outcome, and it may be absent as well (Dul, 2016b). On the other hand, sufficient conditions elicit the outcome when they are present, but the outcome may also occur when the sufficient condition is absent. Figure 1 exhibits the XY plots for the five conditions, and Table 4 displays the configuration of both types of conditions.

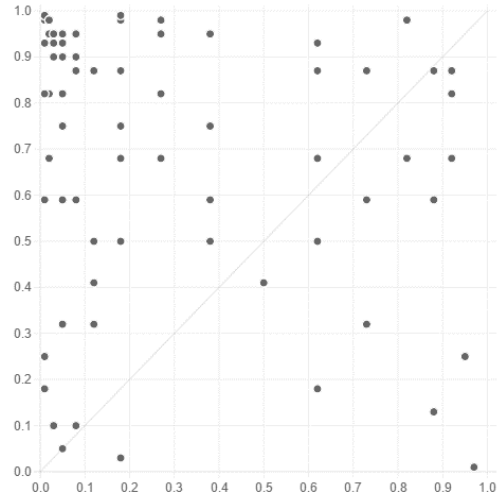
EC-PI



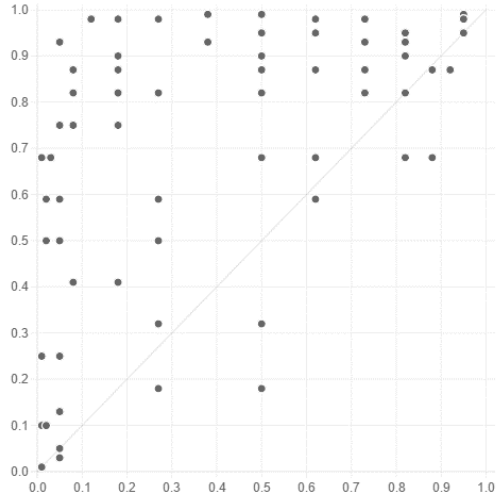
SE-PI



VI-PI



SI-PI



PV-PI

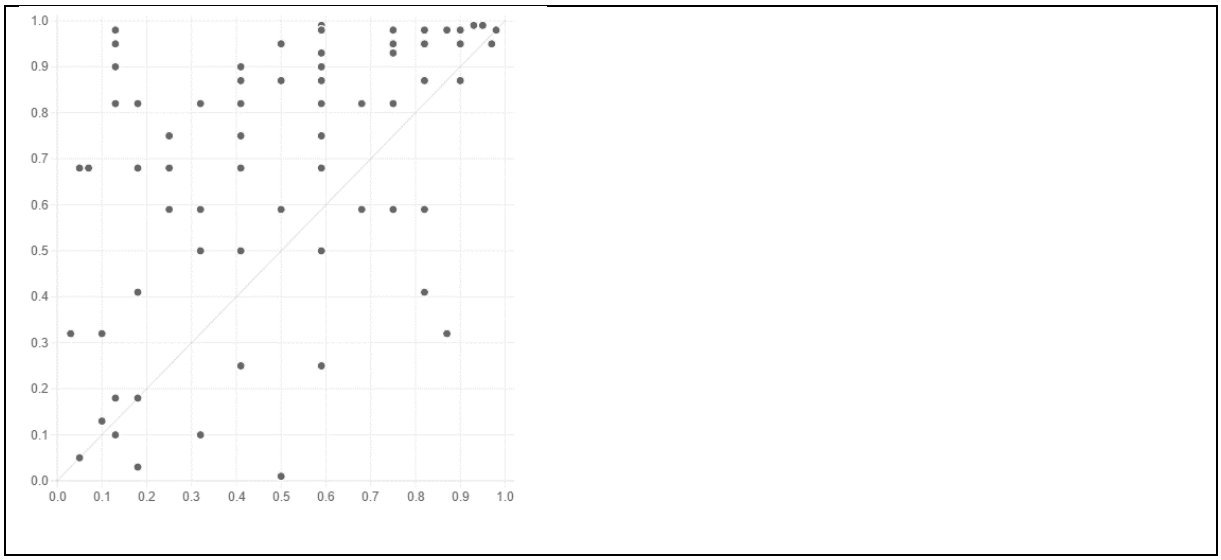


Figure 4: XY plots for the five conditions and PI as the outcome.

Note: EC = environmental concern, SE = self-expressiveness, VI = visibility, SI = social influence, PV = price value.

Table 4: Logic of necessary and sufficient conditions.

Condition		Outcome
Necessary condition	Present	Present or absent
	Absent	Absent
Sufficient condition	Present	Present
	Absent	Present or absent

The set-theoretic measures of consistency and coverage allow a quantitative assessment of necessary conditions and are analyzed in the first step (Ragin, 2006). For this evaluation, a threshold for the consistency value needs to be defined. A value of 1, i.e., all observations support the existence of a subset-relation, would characterize an absolute necessary condition. However, researchers commonly apply thresholds below a perfect consistency. In line with the extant literature, a threshold value of 0.9 is used (Dul, 2016a). Table 4 shows the results. Investigating PI, i.e., the presence of a purchase intention, EC meets the requirements for a necessary condition. In the case of ~PI, i.e., the absence of a purchase intention, the threshold is exceeded by EC, ~SE, and ~SI.

Hence, it can be derived that EC is a necessary condition for PI. The high coverage value of 0.755 further indicates the empirical relevance of this subset-relation. Regarding ~PI, EC also exceeds the threshold value; however, the low coverage of 0.314 suggests that this finding is not empirically striking. The same interpretation applies to ~SE and ~SI, both of which yield low coverage values. Thus, these conditions are not considered necessary. It is important to note that the analysis of necessary conditions is only a part of fsQCA and not its main focus, which comprises sufficient causal combinations. Consequently, the data set is not modified due to these findings (e.g., necessary conditions are sometimes removed before further analyses, as they must be present in any causal combination).

Table 5: Necessary condition assessment.

Note: ~ denotes the negation of a variable.

Condition	Outcome: PI		Outcome: ~PI	
	Consistency	Coverage	Consistency	Coverage
EC	0.999	0.755	0.936	0.314
~EC	0.092	0.765	0.263	0.990
SE	0.691	0.944	0.472	0.286
~SE	0.478	0.671	0.908	0.565
VI	0.326	0.792	0.533	0.574
~VI	0.825	0.799	0.807	0.347
SI	0.567	0.962	0.417	0.314
~SI	0.596	0.697	0.949	0.493
PV	0.653	0.923	0.612	0.383
~PV	0.563	0.766	0.877	0.529

To provide a better picture of necessity, fsQCA findings were amended with Necessary Condition Analysis (NCA) (Dul, 2016a). Similar to fsQCA, XY plots are used for evaluation. However, in contrast to the necessary condition assessment reported in Table 5, the borderline defining necessary conditions does not need to be the bisecting line. Instead, a ceiling line is drawn above the data. Depending on the technique the researcher employs, this calculation may involve step-wise or continuous functions. The study at hand used CR-FDH (ceiling regression – free disposal hull). This technique draws a continuous line above the plotted data while allowing a small fraction of observations, commonly 5 %, to exceed this regression line (Dul, 2016b). For each condition, a bootstrapping procedure with 10,000 draws was employed to derive a p-value. As Table 6 shows, four conditions (EC, SE, SI, and PV) exhibit characteristics of necessary conditions. However, for the most part, these constraints come into play for high values of PI only.

Table 6: Necessary condition analysis using NCA.

Note: Obs. above = observations above the ceiling line, i.e., the evidence against a necessary condition.

Condition	Ceiling zone	Obs. above	Accuracy	Effect size d	p-value
EC	8.498	3	0.962	0.354	< 0.001
SE	6.138	4	0.949	0.195	< 0.001
VI	< 0.001	0	1.000	< 0.001	1.000
SI	2.782	3	0.962	0.093	< 0.001
PV	3.107	4	0.949	0.109	0.010

A more detailed impression is gained by using the bottleneck technique, which displays the proportion of each condition that needs to be 'in place' to a particular proportion of the outcome to occur. In other words, the bottleneck technique allows a granular insight into the strength and nature of constraints that are imposed by the conditions. Table 7 presents the results. Strikingly, VI does not yield any restrictions, and no evidence is found to consider it a necessary condition. The other four conditions exhibit necessity qualities, albeit to a varying degree. EC imposes the strongest constraint: to allow medium values of PI

to occur (i.e., 50 % of its range), 32.2 % of the maximum range of EC needs to be achieved. These demands quickly rise, and fairly strong intentions demand high identification with EC.

The second substantial restriction is detected for SE; however, the demands are much lower: about half of its range is required to allow 90 % of the outcome, and two-thirds are necessary to achieve the full range of PI. Ultimately, SI and PV show similar patterns and impose moderate demands. Hence, in sum, the more detailed NCA results confirm fsQCA's finding of EC being a candidate for a necessary condition. EC exhibits a large effect regarding effect sizes, SE and PV yield medium effects, and SI's impact can be considered small to medium (Dul, 2016b). Still, all conditions are kept for the main fsQCA runs to gain insights into their interactions.

Table 7: Bottleneck technique.

Note: NN = not necessary.

Outcome	EC	SE	VI	SI	PV
0	NN	NN	NN	NN	NN
10	NN	NN	NN	NN	NN
20	NN	NN	NN	NN	NN
30	8.6	NN	NN	NN	NN
40	20.4	NN	NN	NN	NN
50	32.3	8.3	NN	NN	NN
60	44.2	20.3	NN	NN	7.3
70	56.1	32.4	NN	10.8	16.9
80	68.0	44.4	NN	23.2	26.6
90	79.8	56.5	NN	35.5	36.2
100	91.7	68.5	NN	47.9	45.9

In the second step, observed causal combinations (i.e., configurations) are examined. To do so, a truth table is compiled, including all possible 2k configurations (with k denoting the number of conditions; i.e., the study at hand yields 25 = 32 possible combinations), and an additional column indicating each configuration's frequency within the data set (Mendel and Korjani, 2012). All 'empty' configurations (i.e., combinations without observations) are removed. The literature further proposes defining a frequency threshold larger than 1 to remove noise (Krogslund et al., 2015). The study at hand follows the recommendations by Maggetti and Levi-Faur (2013) and applies a 5 % threshold considering the total sample size, eliminating configurations with a frequency lower than four. The truth table is minimized using the Quine-McCluskey algorithm to derive sufficient causal combinations (Ragin, 2009). Table 8 displays the results.

Table 8: Intermediate solutions from fsQCA analyses.

Note: Solutions were derived using a consistency threshold of 0.9 and a frequency threshold of 4. Black circles indicate the presence of a condition, white circles the absence. Empty cells indicate that a condition is not part of a causal combination. Numbers indicate the solution, letters denote the individual solution term.

	PI			~PI
	1a	1b	1c	2
EC	●	●	●	●
SE	●		●	⊗
VI	⊗	⊗	⊗	●
SI	⊗	⊗		⊗
PV		●	●	⊗
Consistency	0.966	0.936	0.994	0.853
Raw coverage	0.391	0.401	0.459	0.433
Unique coverage	0.077	0.087	0.145	0.433
Overall solution consistency	0.942			0.853
Overall solution coverage	0.622			0.433

Three terms explain the presence of the outcome (1a through 1c), and one term was derived for the absence of the outcome (2). Consistency measures are high and, thus, allow the interpretation of the findings. In general, the consistency should be higher than 0.8 (Cooper and Glaesser, 2016). The first striking result is that EC is part of all terms, i.e., it is also included in the solution explaining ~PI.

Term 1a indicates that a combination of EC and SE and a simultaneous absence of VI and SI is sufficient to elicit PI. Term 1c is similar, including the combined presence of EC and SE and the absence of VI. However, PV is part of the solution. The third term for PI is 1b, which comprises EC's and PV's combined presence and the absence of VI and SI. Thus, in total, EC and ~VI are critical components for PI. SE appears to play a role for some individuals, but not for all. The same result is found for PV. Considering the unique coverage, i.e., the proportion of the outcome set overlapped by the solution without interference, 1c is the dominant term. Examining ~PI, the presence of EC appears surprising. The explicit absence of PV, on the other hand, is intuitive. VI's role may be explained by comparing the solutions for PI and ~PI: its absence is part of most terms for PI; hence, from the participants' perspective, it is considered contrary to the intention to purchase sustainable clothing. Consequently, the inverse relation of VI being part of ~PI's solution is reasonable.

The identified solutions are challenged by varying the thresholds for consistency (between 0.75 and 0.9) and frequency (between one and 5 % of the sample size). This robustness check corroborated the validity of the solutions. Further, a triangulation using partial least squares structural equation modeling (PLS-SEM) was employed. The results are supplied in Appendix E and confirm the fsQCA's solutions.

4.4 Gender-specific Differences

The data set is split into male and female subsamples to assess potential differences in the solution terms. Insights suggesting systematic discrepancies between men and women regarding environmental issues have been reported in the literature for several decades, concluding that women care more about the biosphere, which correlates to differences in beliefs and values (see, e.g., Stern and Dietz, 1994). Hence, female respondents may be assumed to exhibit causal patterns that focus on EC, while in the case of men, more egoistic tendencies will be expected. Such a distinction of altruistic and egoistic aspects of EC have already been proposed and corroborated in the literature (see, e.g., Schultz, 2001). Table 9 provides the findings.

The results reveal that the solutions are very determined, i.e., there are almost no empty cells, but conditions need to be either present or absent. Starting with the terms for the female subsample, one causal combination is particularly striking: term 3b indicates that EC with a simultaneous absence of all other conditions is sufficient to evoke PI. This finding suggests the existence of an altruistic solution (which may correspond to an altruistic consumer segment) that emphasizes concerns for the environment and perceives additional influences, such as sustainable clothing's visibility or price value considerations, adversely. Taking solution term 6 into account, the same configuration is also found in the male subsample, albeit with the outcome of absence of purchase intention. It is further implied that for the female respondents the linkage of SE and PV and the simultaneous absence of visibility (3a) is of great importance for purchase intention since the absence of these two under the presence of VI leads to a contrary outcome (4). Comparatively, in the male subsample, the combination with other conditions seems to be decisive for the presence of purchase intention. EC together with the absence of PV is hereby combined either with the possibility to express oneself (5a) or with prestige aspects, implied by the presence of VI and SI (5b).

Table 9: Gender-specific results.

	PI		~PI
Female subsample	3a	3b	4
EC	●	●	●
SE	●	⊗	⊗
VI	⊗	⊗	●
SI		⊗	
PV	●	⊗	⊗
Consistency	0.994	0.901	0.824
Raw coverage	0.485	0.280	0.512
Unique coverage	0.305	0.101	0.512
Overall solution consistency	0.951		0.824
Overall solution coverage	0.586		0.512

	PI		~PI
Male subsample	5a	5b	6
EC	●	●	●
SE	●	⊗	⊗
VI	⊗	●	⊗
SI	⊗	●	⊗
PV	⊗	⊗	⊗
Consistency	0.912	0.936	0.872
Raw coverage	0.297	0.272	0.581
Unique coverage	0.177	0.153	0.590
Overall solution consistency	0.934		0.872
Overall solution coverage	0.450		0.581

4.5 Granular Insights

To gain an in-depth understanding of causal patterns, further segmentations were assessed. First, a grouping according to purchase channels (mixed-channel buyers, i.e., online and in-store, versus brick-and-mortar-only buyers) was conducted. Considering participants that indicated they only purchase sustainable clothing in brick-and-mortar stores (n = 18), fsQCA's necessity assessment reveals that EC may be considered a necessary condition (consistency = 0.996, coverage = 0.743). The solutions eliciting PI show a diverse picture: one causal path emphasizes SE combined with the absence of VI (7a), while another incorporates the absence of VI and the presence of PV (7b). In both cases, VI is explicitly required to be absent; however, the focus on SE suggests a more identity- and personality-related path, and term 7b appears to capture price-conscious buyers. The final term, 7c, stresses the presence of all conditions except for VI. However, it is important to note that the coverage measures for 7c indicate a lack of empirical relevance. Regarding the complementary analysis examining the absence of PI, only one solution was found: the absence of EC (8). While the term's consistency value is fairly high, its empirical relevance appears rather questionable (coverage = 0.276). Hence, it is deemed likely that other conditions play a role in eliciting ~PI.

For the mixed-channel buyers (n = 61), EC's potential necessity is detected as well (consistency = 0.999, coverage = 0.756). Sufficient solutions show two terms, one of which appears surprising. With consistency and coverage values of 0.830 and 0.952, they are considered valid and empirically relevant. While EC's and SE's combined presence allows straightforward interpretation as providing a good match to an environmentally-oriented consumer's self-image (9b), the sufficiency of VI being absent is puzzling (9a). This term implies that for a major fraction of mixed-channel buyers, the mere absence of VI elicits PI. The complementary analysis' findings, investigating the occurrence of ~PI, reveal two causal paths. Term 10a indicates that the simultaneous absence of all conditions except VI evokes ~PI,

suggesting that VI's influence is asymmetric in some cases. Its presence impedes PI (9a); however, it does not elicit ~PI. Term 10b, on the other hand, includes VI combined with the absence of SE, SI, and PV. Altogether, VI may be perceived rather heterogeneously among consumers. Table 10 presents the results for brick-and-mortar and mixed-channel buyers.

Table 10: Results for the brick-and-mortar and the online-and-mixed subgroups.

	PI			~PI
Brick-and-mortar subsample	7a	7b	7c	8
EC	●	●	●	⊗
SE	●		●	
VI	⊗	⊗		
SI			●	
PV		●	●	
Consistency	0.923	0.938	1	0.970
Raw coverage	0.580	0.537	0.291	0.276
Unique coverage	0.208	0.165	0.052	0.276
Overall solution consistency	0.912			0.970
Overall solution coverage	0.798			0.276
	PI		~PI	
Online-and-mixed subsample	9a	9b	10a	10b
EC		●	⊗	
SE		●	⊗	⊗
VI	⊗			●
SI			⊗	⊗
PV			⊗	⊗
Consistency	0.821	0.946	0.996	0.856
Raw coverage	0.823	0.727	0.259	0.496
Unique coverage	0.225	0.129	0.074	0.311
Overall solution consistency	0.830		0.871	
Overall solution coverage	0.952		0.570	

Similar results of necessity were found for the individuals that had purchased sustainable clothing before (n = 51): EC was the only condition to yield evidence for necessity, but this evidence was striking (consistency = 0.998, coverage = 0.835). Interestingly, the groups of participants with purchase experience and a preference for brick-and-mortar stores overlap only in part: 55.5 % of experienced buyers prefer traditional stores. Among online-only buyers, this proportion rises to 62.5 %. The highest fraction was identified for the mixed-channel buyers (online and in-store); 67.9 %. For the segment of experi-

enced individuals, strong solutions could be derived. The overall solution properties show a high consistency (0.903) and high empirical relevance (coverage = 0.957). The solution terms are exhibited in Table 10.

A surprising result was found for the segment of participants without previous experience in purchasing sustainable clothing: fsQCA's test for necessity revealed one condition, EC, to be necessary, with a perfect consistency score of 1.000 and a coverage of 0.587. In other words, for a large proportion of non-sustainable buyers, EC is a must-have antecedent for them to form a purchase intention for sustainable clothing. Table 11 shows the results.

Table 11: Previous-purchase and non-purchase subgroups.

	PI				~PI
Previous-purchase subsample	11a	11b	11c	11d	12
EC	●	●	●	●	
SE		●	●	⊗	⊗
VI	⊗				●
SI		●		⊗	⊗
PV			●	⊗	⊗
Consistency	0.902	0.999	0.989	0.928	0.858
Raw coverage	0.849	0.505	0.583	0.273	0.497
Unique coverage	0.217	0.032	0.017	0.003	0.497
Overall solution consistency	0.903				0.858
Overall solution coverage	0.957				0.497

	PI			~PI
Non-purchase subsample	13a	13b	13c	14
EC	●	●	●	
SE	●			⊗
VI		⊗	⊗	
SI		●		⊗
PV			●	⊗
Consistency	0.879	0.928	0.874	0.822
Raw coverage	0.542	0.365	0.510	0.766
Unique coverage	0.181	0.058	0.140	0.766
Overall solution consistency	0.840			0.822
Overall solution coverage	0.808			0.766

Besides, individuals spending a low budget on clothing (less than 50 Euros a month, n = 38) were analyzed and compared to participants with higher investments above 100 Euros (n = 13). Consistent with earlier findings, EC was identified as a necessary condition for both segments (consistency = 0.998, coverage = 0.755 and consistency = 0.999, coverage = 0.647, respectively). However, the differences in coverage show that EC's critical role is more empirically relevant for buyers spending less than 50 Euros a month. Findings are provided in Table 12.

Table 12: Low-budget and high-budget subgroups.

	PI			~PI
Low-budget subsample	15a	15b	15c	16
EC	●	●	●	⊗
SE	●			⊗
VI		⊗	⊗	⊗
SI		●		⊗
PV			●	⊗
Consistency	0.932	0.965	0.955	0.982
Raw coverage	0.769	0.422	0.560	0.243
Unique coverage	0.231	0.024	0.058	0.243
Overall solution consistency	0.912			0.982
Overall solution coverage	0.878			0.243

	PI				~PI
High-budget subsample	17a	17b	17c	17d	18
EC	●	●	●	●	
SE		●	●		⊗
VI	●				⊗
SI		●		●	⊗
PV			●	●	
Consistency	0.807	1.000	0.950	1.000	0.933
Raw coverage	0.515	0.441	0.582	0.425	0.694
Unique coverage	0.181	0.014	0.146	0.059	0.694
Overall solution consistency	0.875				0.933
Overall solution coverage	0.931				0.694

A final segmentation drawing on the participants' interest in fashion was conducted. For the fashion-interested group (n = 55), EC's values for the necessary condition assessment exhibit a consistency of 0.998 and a coverage of 0.785. The measures for the uninterested group (n = 24) are 1.000 and 0.677,

respectively, indicating that for a large proportion of this segment, EC is a necessary condition in absolute terms. The analysis run for ~PI shows a bulky solution, incorporating all five conditions' simultaneous absence and a very low empirical relevance (coverage = 0.270). Hence, this result is deemed unreasonable to be interpreted, and other variables that are not included in the study likely cause the absence of PI. Table 13 summarizes the results.

Table 13: Fashion-interested and uninterested subgroups.

	PI		~PI
Fashion-interested subsample	19a	19b	20
EC	●	●	
SE		●	⊗
VI	⊗		●
SI			⊗
PV			⊗
Consistency	0.877	0.963	0.829
Raw coverage	0.840	0.732	0.550
Unique coverage	0.213	0.105	0.550
Overall solution consistency	0.884		0.829
Overall solution coverage	0.945		0.550

	PI				~PI
Uninterested subsample	21a	21b	21c	21d	22
EC	●	●	●	●	⊗
SE	●		●	●	⊗
VI	⊗	⊗			⊗
SI			●		⊗
PV		●		●	⊗
Consistency	0.899	0.911	0.967	0.947	1.0000
Raw coverage	0.504	0.512	0.403	0.449	0.270
Unique coverage	0.069	0.167	0.054	0.076	0.270
Overall solution consistency	0.868				1.000
Overall solution coverage	0.829				0.270

5 Discussion and Contribution

5.1 Discussion of the Findings

An interesting result is the amount of evidence rendering EC a candidate for a necessary condition. Depending on the segmentation, close-to-perfect or even perfect consistency scores (in the case of individuals that are not interested in fashion) could be identified. A plausible explanation is the survey's

implementation as a self-administered questionnaire. The study's topic of sustainable clothing may draw more attention from environmentally concerned consumers than unconcerned individuals. Hence, the self-administration may have promoted the participation of green consumers. However, research focusing on age stratifications such as Generation Y, which includes our target population of university students, generally finds a propensity towards environmental issues among young people (Lu et al., 2013; Yadav and Pathak, 2016).

The solution terms derived from fsQCA show that PI can be explained fairly well in terms of consistency and coverage. Terms explaining its absence mostly fall behind in empirical relevance, albeit only slightly for most segmentations. However, this discrepancy may stem from the nomological net focusing conditions hypothesized to exert a positive influence. The extant literature on sustainability in general and sustainable clothing in particular, however, identified significant impacts of adverse concepts such as greenwashing concerns (Rausch and Kopplin, 2020; Torelli et al., 2020; Zhang et al., 2018) and aesthetic risk (Harris et al., 2016; Hiller Connell, 2010). Hence, ~PI's occurrence may be explained more holistically by adding conditions assumed to yield negative influences.

Regarding the analysis of gender-specific differences, interesting results were found. First, a term that might be denominated 'altruistic' was identified for the female segment, including environmental concerns and the absence of all other conditions. No similar combination was detected for the males. Second, a male-specific solution was identified that might be called 'prestige-driven', comprising environmental concerns, visibility, social influence, and the simultaneous absence of the other conditions. As environmental concern is present in all solutions, the idiosyncratic qualities stress visibility and social influence.

Another striking result is that the 'altruistic' term found in the female segment is the male group's solution eliciting the absence of purchase intention. Hence, there appears to be a significant gender difference regarding the importance of environmental concern on its own. This gap between men and women has been reported in several studies on sustainable clothing before (Baier et al., 2020; Paetz and Guhl, 2017). For male students, these concerns need to be complemented with additional perceptions to elicit a purchase intention: either it is combined with the presence of self-expressiveness, which may depict a high degree of congruence between an individual's self-image and the associations elicited by the sustainable product, or it is combined with visibility and social influence, which we termed the 'prestige-driven' solution. Examining the term including environmental concerns and self-expressiveness, the question arises of how this causal combination differs from the 'altruistic' term in the female segment. It appears reasonable to assume the major distinction in self-expressiveness: males seem to form a purchase intention when the product under consideration fits their identity, while females also yield an intention without this congruence. Consequently, it may be assumed that females are willing to act environmentally friendly for the sake of nature.

Considering configurations that impede the formation of a purchase intention in the female segment, high visibility and a simultaneous absence of self-expressiveness and price value were found, while social influence does not play a role. The adverse role of visibility indicates that female consumers do not want to be perceived as conspicuously purchasing sustainable clothing. The absence of price value is also part of a configuration eliciting an affirmative intention; however, in this combination, it is deemed to fit the interpretation of conspicuous consumption, as the simultaneous perception of high visibility and low price value draws a picture of a salient and costly product.

We also found many instances of price considerations being important for an individual's intention to purchase sustainable clothing (e.g., 1b, 1c, 3a, 7b, 7c). These findings, while being intuitive at first and consistent with evidence in the field (see, e.g., Leeuw et al., 2015), seem to contradict results from other studies in the same context that identify higher willingness to pay in the context of sustainable products (see, e.g., Brand and Rausch, 2020; Lu et al., 2013). However, this contradiction needs to be treated with care, as we identified terms not including PV or even its explicit absence (e.g., 1a, 3b, 5a, 5b). Further complicating the matter, many studies examining consumers' willingness to pay employ choice-based conjoint analysis, which is deemed to overestimate the actual price individuals would pay (Miller et al., 2011; Sichtmann et al., 2011). However, it is critical to note that the study at hand used the variable 'price value' to capture perceptions of costliness. This concept inheres a weighting of costs and benefits (Venkatesh et al., 2012); i.e., consumers may be willing to pay a high price for sustainable clothing if they gain an adequate value. Thus, the presence of PV in solution terms does not necessarily imply high price sensitivity per se but prevalent assessments of the cost-benefit balance. As conjoint studies present stimuli that contain several aspects of the target product, it appears reasonable to assume that the willingness to pay studies also measured some sort of cost-benefit balance.

Thus, we may conclude that consumers are aware of sustainable clothing costing more than conventional products; however, they are willing to pay the extra fee if the overall benefit is sufficiently high compared to the conventional alternative. In the case of individuals yielding serious environmental concerns, the utility derived from preventing ecological harm alone may be sufficient to justify the higher price. Brand and Rausch (2020) report significant differences in willingness to pay dependent on consumers' greenness, finding that green customers attach the least importance to price when making their purchase decision compared to less green individuals. Our data set yields high values regarding EC; hence, it appears reasonable to use the results by Brand and Rausch (2020) detected for the green segment as a benchmark. They further show that female customers exhibit higher surcharges than men. This result also helps explain the gender-specific term 3b revealed in the study at hand, displaying that a female subgroup emphasizing environmental aspects and neglecting pricing exists. However, as the gender-specific term 3a displays, this consumer type is only a subsegment of female costumers, and it should not be generalized that women pay more than men on the overall level. Thus, our findings add to their

insights, revealing that green consumers should be treated heterogeneously instead of viewing them as a uniform market segment.

Another interesting finding against the backdrop of their study is the difference regarding purchase channels. Our findings show that consumers preferring brick-and-mortar yield EC as a prominent part of their solution terms, while the opposite is the case for online- and mixed-channel buyers. Brand and Rausch (2020) report the contrary, showing that green consumers prefer online shopping, although with an additional fee for CO2 compensation. It may be this particular framing of compensation that explains the different results, as driving to a store to purchase a product would cause CO2 without any compensating mechanism and thus seem an unattractive option for green consumers. Compensation was not part of our study, however, and we did not include this boundary condition. Consequently, without an explicit framing of CO2 compensation, it appears reasonable to assume that environmentally concerned consumers would follow a 'shop local' paradigm to avoid ecological harm. If this explanation is correct, it will imply that what is considered 'correct' green behavior is highly dependent on the information provided in a particular context and, as such, rather volatile.

Contrasting consumers interested in fashion against those that are not, similarities in terms of EC being required and VI being considered undesirable or indifferent at best could be found. Besides, solution consistency and coverage are fairly high in both cases. However, the complexity widely differs: for the group of fashion-interested participants, two terms including EC and ~VI and EC and SE, respectively, yield a coverage value of 0.945; i.e., these rather simple and manageable causal combinations explain almost all of the cases. This simplicity could not be replicated for the uninterested group, leading to four terms and an accumulated coverage value of 0.829. Again, EC and SE play a critical role; and VI is either not incorporated or negated (i.e., ~VI). In sum, PV is an important component (which was not part of the fashion-interested group's solution), followed by SI. Hence, it appears that individuals that are not particularly interested in clothing need external stimuli to make a purchase. Although this is certainly not the case for each participant within the segment, the finding is deemed rather curious, as the fashion industry is considered a prototypical branch suffering from unsustainable practices (e.g., 'fast fashion'), and consumers with a high interest in fashion may be used to these procedures and view them as a matter of course.

However, our results indicate that this may not be the case. For example, individuals following fashion trends are likely to be exposed to environmental concerns regularly, as many large corporations include eco-friendly products in their portfolios and use ecological issues to boost their marketing campaigns. Thus, fashion-interested consumers may not be perceived as embracing fast fashion and harming practices, but rather as informed customers that know about the industry's issues, while uninterested individuals likely yield fewer insights into the matter. Still, it is important to keep in mind that our sample was drawn among university students, which may have led to an increased awareness compared to the

overall segment of fashion-interested consumers. In the EC literature, age has been proposed as denominating a relatively weak attachment to the "existing social order" (Fransson and Gärling, 1999), which may explain an openness towards developments that might change this order (see, e.g., Arcury and Christianson, 1990; van Liere and Dunlap, 1980). However, the empirical evidence must be considered mixed when it comes to translating concern into actual behavior (Gifford and Nilsson, 2014; Gray et al., 2019; Pinto et al., 2011).

Lastly, we want to discuss the role of VI. All terms seeking to explain PI – except for three (5b, 17c, and 17d) – negate the condition or do not incorporate it, corroborating extant research on conspicuous notions in the context of sustainable clothing (Jung et al., 2020). Even more, VI's presence is part of several segments' solution eliciting ~PI. Hence, consumers do not wish for their sustainable clothing to be easily recognizable or even eye-catching in general. However, three terms include the condition as a part of a causal combination evoking PI. These correspond to males (term 5c) and consumers with a high budget for fashion (terms 17c and 17d). Thus, we might conclude that individuals investing a fairly high amount of money also wish for this investment to become visible to others, and a proportion of men yields the same demand. For female customers, regardless of their fashion budget, VI appears to be an adverse property.

5.2 Theoretical Contribution and Practical Implications

Our findings make several contributions to the literature. Most salient, the evidence suggesting that EC may be a necessary condition for PI adds insights into the mixed results previously reported for EC: studies using regression-based models examine causal mechanisms from a sufficiency perspective, and conditions do not need to be both necessary and sufficient. Thus, it appears likely that the contradictory findings may at least partially be explained due to the analyses' focus on sufficiency: our results indicate that EC yields necessity properties, but in several market segments, its impact is not sufficient for the occurrence of PI as instead, causal combinations including other conditions are found.

Identifying causal combinations suggests that it is critical to consider sustainable clothing bundles of interrelated properties from a managerial point of view instead of collections of separate qualities. Hence, organizational decisions should focus on the simultaneous advancement of favorable properties as opposed to prioritizing a single, 'major' characteristic.

The gender-segmented solutions indicate the fruitfulness of employing different marketing strategies for men and women. Women appear to form a purchase intention to do good for the environment, while men only behave that way when an additional component is present. This may be either a high congruency with their identity, i.e., they view the product as an opportunity to express their personality, or high visibility in combination with social influence, which may be considered a prestige-seeking behavior. Hence, for female audiences, sustainable clothing's ecological impact should be emphasized, while for

male consumers, a strong and recognizable brand identity appears critical. A sole focus on environmental influences is likely to scare off male customers. Since environmental concern coupled with the absence of visibility, either in combination with self-expressiveness or with price value, led to an intention to buy among brick-and-mortar buyers, the focus that should be placed here is firstly on low-key branding in conjunction with good corporate messaging that buyers can identify with, and secondly on providing good value for money. As in many cases of this study, a positively perceived price-performance ratio is part of the configurations that lead to the intention to buy, this should also be accentuated from a marketing perspective. In this context, the value received should be highlighted in addition to price communication to establish a positive, justified relation in consumers' minds.

Besides, the extant literature reports a substantial amount of evidence that consumers are willing to pay an extra fee for sustainable clothing compared to their conventional counterparts. We provide clues that PV is a sufficient condition for PI and hence, individuals will consider the purchase of sustainable clothing when they perceive a fair balance of price and value. Although we did not ask for particular price points for segmentation purposes, it appears reasonable to conclude that vendors should seek to identify distinct market segments – as each of them might yield their unique price value pattern – to offer different sets of goods that provide this balance for different budgets and consumer demands.

Social influence appears to be particularly interesting from a practitioner's perspective. In most cases, it is either considered indifferently or even yields an adverse effect on consumers' intention to purchase. Women appear to regard social influence fairly neutral, while for the male segment, two distinct patterns were found: one subgroup emphasizes their wish to act in an ecologically friendly way, exhibiting reluctance concerning social influence, while the other group emphasizes visibility as well as social influence. The first customer type is likely driven by intrinsic motivation and rejects the idea of doing good for reasons of peer pressure. The second type, on the other hand, seeks to display their actions. From a vendor perspective, it is deemed difficult to serve both groups' needs simultaneously. Thus, it appears fruitful to define a strong organizational guideline regarding the targeted consumer segments to provide an unequivocal image.

Further, differences were found between individuals that have purchased sustainable clothing before and those that have not. The most relevant solution in terms of empirical evidence for the ones that have purchased before emphasizes the role of environmental concerns. These consumers highly detest the notion of their products' visibility, as this perception leads to the rejection of purchase intention. Prospective buyers that have yet to make their first purchase, on the other hand, lack purchase intention when social influence and price value are not present. Consequently, it seems that both groups are fairly distinct, and marketing efforts eliciting awareness and, as such, increasing the probability for social influence as well as the introduction of inexpensive assortments may help to get prospective buyers on board.

Moreover, implications further emerge when considering the sample split according to individuals who spend a low budget on clothing versus those who yield high investments. While for the former, the simultaneous presence of environmental concern and self-expressiveness is already sufficient for the development of a purchase intention, individuals who spend more than 100 Euros per month report the presence of one additional conditions, which may be either price value or social influence. This finding reveals that customers with a higher budget are more influenced by their social evironment and focus on the price-performance component in spite of their larger budget. Since sustainable textiles tend to be part of higher-priced segments and the potential economic loss associated with them is higher, ensuring a good and transparent price-performance ratio should be an important element of marketing activities.

5.3 Limitations and Future Research

The findings of the study at hand need to be interpreted against the backdrop of a scientific work's limitations. While fsQCA was developed to analyze small samples, one needs to be careful when generalizing our findings. First and foremost, we examined university students' perceptions, which may have different views and perceptions than other market segments. Second, our work was carried out in a small- to mid-size-N situation. That is, our analysis is located in between qualitative, in-depth work and quantitative research. Consequently, the results cannot be fully explained from an individual psychological perspective and should be treated with care when used as a general statement about university students' purchase intention regarding sustainable clothing. However, this perspective complements the large-N, multivariate studies that are prominent in the field. Future research, thus, may link quantitative, qualitative-quantitative (e.g., fsQCA), and qualitative work to create a holistic picture.

The sample was drawn in Germany, and German university students may differ from other student populations depending on factors such as culture. These differences may shape the perception of the price value variable, for example, as Germany is a rather wealthy country, and consumers may yield different opinions on whether a product is expensive or not. Hence, future research should seek to challenge our findings in other contexts. Our results also suggest gender-specific differences; hence, future studies might focus on shedding more light on this comparison.

Finally, our outcome measures an individual's purchase intention rather than actual purchase behavior. While, against the backdrop of our study seeking to illuminate causal combinations, we deem this a valid choice, the extant literature reveals that intention does not necessarily translate into action. Consequently, further research is needed that incorporates actual purchase behavior.

6 Conclusion

Purchase intention of sustainable clothing was investigated from the set-theoretic perspective of fuzzy-set qualitative comparative analysis. The findings reveal that causal combinations need to be considered when studying the phenomenon and critical gender-specific differences in causal mechanisms. While women are willing to purchase sustainable clothing on the basis of environmental concerns alone, men

either seek a way to express their identity or gain prestige through a visible product. In total, fsQCA results help to advance our understanding of the causal mechanisms underlying consumer intention formation regarding sustainable clothing.

Environmental concern was found to be a necessary condition for purchase intention and to interact with other conditions regarding sufficiency. Self-expressiveness commonly appears in conjunction with these concerns, suggesting that ecologically concerned individuals seek to manifest their willingness to contribute to the avoidance of environmental damage. Visibility plays the opposite role: for most consumers, it introduces an unfavorable flavor and evokes the absence of purchase intention. Price value considerations are important drivers for purchase intention except for customers that are highly interested in fashion. Ultimately, social influence plays a minor role for most consumers; however, the male segment appears to react negatively to this form of pressure, indicating a need for perceived autonomy and freedom of decision.

References

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behaviour. Englewood Cliffs NJ: Prentice Hall.

Ali, A., Khan, A. A., Ahmed, I., & Shahzad, W. (2011). Determinants of Pakistani consumers' green purchase behavior: Some insights from a developing country. International Journal of Business and Social Science, 2(3), 217–226.

Allwood, J.M., Laursen, S.E., Russell, S.N., Rodríguez, C.M. de, & Bocken, N.M.P. (2008). An approach to scenario analysis of the sustainability of an industrial sector applied to clothing and textiles in the UK. Journal of Cleaner Production, 16(12), 1234–1246.

Arcury, T. A., & Christianson, E. H. (1990). Environmental worldview in response to environmental problems: Kentucky 1984 and 1988 compared. Environment and Behavior, 22(3), 387–407.

Armstrong, C.M., Niinimäki, K., Lang, C., & Kujala, S. (2016). A Use-Oriented Clothing Economy? Preliminary Affirmation for Sustainable Clothing Consumption Alternatives. Sustainable Development, 24(1), 18–31.

Auty, S., & Elliott, R. (1998). Fashion involvement, self-monitoring and the meaning of brands. Journal of Product & Brand Management.

Baier, D., Rausch, T. M., & Wagner, T. F. (2020). The drivers of sustainable apparel and sportswear consumption: A segmented kano perspective. Sustainability, 12(7), 2788.

Bianchi, C., Birtwistle, G. (2012). Consumer clothing disposal behaviour: a comparative study. International Journal of Consumer Studies, 36(3), 335–341.

Boari, G., & Nai Ruscone, M. (2015). A procedure simulating Likert scale item responses. Electronic Journal of Applied Statistical Analysis, 8(3), 288–297.

Bouncken, R., Ratzmann, M., Barwinski, R., & Kraus, S. (2020a). Coworking spaces: Empowerment for entrepreneurship and innovation in the digital and sharing economy. Journal of Business Research, 114, 102–110.

Bouncken, R. B., Fredrich, V., & Kraus, S. (2020b). Configurations of firm-level value capture in coopetition. Long Range Planning, 53(1), 101869.

Brand, B. M., & Rausch, T. M. (2020). Examining sustainability surcharges for outdoor apparel using Adaptive Choice-Based Conjoint analysis. Journal of Cleaner Production, 125654.

Chan, T.-Y., Wong, C.W.Y. (2012). The consumption side of sustainable fashion supply chain: Understanding fashion consumer eco-fashion consumption decision. Journal of Fashion Marketing and Management: An International Journal, 16(2), 193–215.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. Modern Methods for Business Research, 295(2), 295–336.

Choo, H.J., Moon, H., Kim, H., & Yoon, N. (2012). Luxury customer value. Journal of Fashion Marketing and Management: An International Journal, 16(1), 81–101.

Chuah, S. H.-W., Rauschnabel, P. A., Krey, N., Nguyen, B., Ramayah, T., & Lade, S. (2016). Wearable technologies: The role of usefulness and visibility in smartwatch adoption. Computers in Human Behavior, 65, 276–284.

Connell, K. Y. H. (2010). Internal and external barriers to eco-conscious apparel acquisition. International Journal of Consumer Studies, 34(3), 279–286.

Cooper, B., & Glaesser, J. (2016). Exploring the robustness of set theoretic findings from a large n fsQCA: an illustration from the sociology of education. International Journal of Social Research Methodology, 19(4), 445–459.

Dagher, G.K., Itani, O. (2014). Factors influencing green purchasing behaviour: Empirical evidence from the Lebanese consumers. Journal of Consumer Behavior, 13(3), 188–195.

D'Souza, C., Taghian, M., Lamb, P., & Peretiatko, R. (2007). Green decisions: demographics and consumer understanding of environmental labels. International Journal of Consumer Studies, 31(4), 371–376.

Dul, J. (2016a). Identifying single necessary conditions with NCA and fsQCA. Journal of Business Research, 69(4), 1516–1523.

Dul, J. (2016b). Necessary condition analysis (NCA) logic and methodology of "necessary but not sufficient" causality. Organizational Research Methods, 19(1), 10–52.

Fishbein, M., & Ajzen, I. (1975). Belief. Attitude, Intention and Behavior: An Introduction to Theory and Research, 578.

Fisher, R. J., & Price, L. L. (1992). An investigation into the social context of early adoption behavior. Journal of Consumer Research, 19(3), 477–486.

Fletcher, K. (2013) Sustainable Fashion and Textiles: Design Journeys. Taylor & Francis.

Fransson, N., & Gärling, T. (1999). Environmental concern: Conceptual definitions, measurement methods, and research findings. Journal of Environmental Psychology, 19(4), 369–382.

GfK (2020). Consumer Index. Total Grocery 10|2020. Available at: https://www.gfk.com/hubfs/NCE_DE_202007_CI_10_2020.pdf.

Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. International Journal of Psychology, 49(3), 141–157.

Gligor, D., Bozkurt, S. (2020). FsQCA versus regression: The context of customer engagement. Journal of Retailing and Consumer Services, 52, 101929.

Living Planet Report (2018). Available at: https://www.footprintnetwork.org/content/uploads/2018/10/LPR-2018-full-report.pdf.

Goh, S. K., & Balaji, M. S. (2016). Linking green skepticism to green purchase behavior. Journal of Cleaner Production, 131, 629–638.

Goworek, H., Fisher, T., Cooper, T., Woodward, S., Hiller, A., Wigley, S.M., & Sinha, P. (2012). The sustainable clothing market: an evaluation of potential strategies for UK retailers. International Journal of Retail & Distribution Management, 40(12), 935–955.

Gray, S. G., Raimi, K. T., Wilson, R., & Árvai, J. (2019). Will Millennials save the world? The effect of age and generational differences on environmental concern. Journal of Environmental Management, 242, 394–402.

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). A primer on partial least squares structural equation modeling (PLS-SEM). Sage Publications.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review.

Harris, F., Roby, H., & Dibb, S. (2016). Sustainable clothing: challenges, barriers and interventions for encouraging more sustainable consumer behaviour. International Journal of Consumer Studies, 40(3), 309–318.

Hartmann, P., Apaolaza-Ibáñez, V. (2012). Consumer attitude and purchase intention toward green energy brands: The roles of psychological benefits and environmental concern. Journal of Business Research, 65(9), 1254–1263.

Henninger, C.E., Alevizou, P.J., & Oates, C.J. (2016). What is sustainable fashion? Journal of Fashion Marketing and Management: An International Journal, 20(4), 400–416.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

Hiller Connell, K.Y. (2010). Internal and external barriers to eco-conscious apparel acquisition. International Journal of Consumer Studies, 34(3), 279–286.

Ho, J., Plewa, C., & Lu, V. N. (2016). Examining strategic orientation complementarity using multiple regression analysis and fuzzy set QCA. Journal of Business Research, 69(6), 2199–2205.

Hume, M. (2010). Compassion without action: Examining the young consumers consumption and attitude to sustainable consumption. Journal of World Business, 45(4), 385–394.

Hustvedt, G., & Dickson, M. A. (2009). Consumer likelihood of purchasing organic cotton apparel: Influence of attitudes and self-identity. Journal of Fashion Marketing and Management: An International Journal.

Joergens, C. (2006). Ethical fashion: myth or future trend? Journal of Fashion Marketing and Management: An International Journal, 10(3), 360–371.

Jung, H. J., Choi, Y. J., & Oh, K. W. (2020). Influencing factors of Chinese consumers' purchase intention to sustainable apparel products: Exploring consumer "attitude–behavioral intention" gap. Sustainability, 12(5), 1770–1783.

Kennedy, E.H., Beckley, T.M., McFarlane, B.L., & Nadeau, S. (2009). Why we don't "walk the talk": Understanding the environmental values/behaviour gap in Canada. Human Ecology Review, 16(2), 151–160.

Khandual, A., Pradhan, S. (2019). Fashion brands and consumers approach towards sustainable fashion, in: Fast fashion, fashion brands and sustainable consumption. Springer, pp. 37–54.

Kraus, S., Ribeiro-Soriano, D., & Schüssler, M. (2018). Fuzzy-set qualitative comparative analysis (fsQCA) in entrepreneurship and innovation research–the rise of a method. International Entrepreneurship and Management Journal, 14(1), 15–33.

Krogslund, C., Choi, D. D., & Poertner, M. (2015). Fuzzy sets on shaky ground: Parameter sensitivity and confirmation bias in fsQCA. Political Analysis, 21–41.

Kumar, B., Manrai, A. K., & Manrai, L. A. (2017). Purchasing behaviour for environmentally sustainable products: A conceptual framework and empirical study. Journal of Retailing and Consumer Services, 34, 1–9.

Lasuin, C. A., & Ng, Y. C. (2014). Factors influencing green purchase intention among university students. Malaysian Journal of Business and Economics (MJBE).

Lee, K. (2008). Opportunities for green marketing: young consumers. Marketing Intelligence & Planning, 26(6), 573–586.

Leeuw, A. de, Valois, P., Ajzen, I., & Schmidt, P. (2015). Using the theory of planned behavior to identify key beliefs underlying pro-environmental behavior in high-school students: Implications for educational interventions. Journal of Environmental Psychology, 42, 128–138.

Lu, L., Bock, D., & Joseph, M. (2013). Green marketing: what the Millennials buy. Journal of Business Strategy, 34(6), 3-10.

Lundblad, L., Davies, I.A. (2016). The values and motivations behind sustainable fashion consumption. Journal of Consumer Behavior, 15(2), 149–162.

Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. Personality and Social Psychology Bulletin, 18(1), 3–9.

Maggetti, M., & Levi-Faur, D. (2013). Dealing with errors in QCA. Political Research Quarterly, 198–204.

Mendel, J. M., & Korjani, M. M. (2012). Charles Ragin's fuzzy set qualitative comparative analysis (fsQCA) used for linguistic summarizations. Information Sciences, 202, 1–23.

Mikalef, P., & Pateli, A. (2017). Information technology-enabled dynamic capabilities and their indirect effect on competitive performance: Findings from PLS-SEM and fsQCA. Journal of Business Research, 70, 1–16.

Milfont, T.L., Schultz, P.W. (2016). Culture and the natural environment. Current Opinion in Psychology, 8, 194–199.

Miller, K. M., Hofstetter, R., Krohmer, H., & Zhang, Z. J. (2011). How should consumers' willingness to pay be measured? An empirical comparison of state-of-the-art approaches. Journal of Marketing Research, 48(1), 172–184.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. Information Systems Research, 2(3), 192–222.

Newton, J.D., Tsarenko, Y., Ferraro, C., & Sands, S. (2015). Environmental concern and environmental purchase intentions: The mediating role of learning strategy. Journal of Business Research, 68(9), 1974–1981.

Noppers, E.H., Keizer, K., Bolderdijk, J.W., & Steg, L. (2014). The adoption of sustainable innovations: driven by symbolic and environmental motives. Global Environmental Change, 25, 52–62.

Ordanini, A., Parasuraman, A., & Rubera, G. (2014). When the recipe is more important than the ingredients: A qualitative comparative analysis (QCA) of service innovation configurations. Journal of Service Research, 17(2), 134–149.

Oyemomi, O., Liu, S., Neaga, I., & Alkhuraiji, A. (2016). How knowledge sharing and business process contribute to organizational performance: Using the fsQCA approach. Journal of Business Research, 69(11), 5222–5227.

Paetz, F., & Guhl, D. (2017). Understanding differences in segment-specific willingness-to-pay for the fair trade label. Marketing: ZFP–Journal of Research and Management, 39(4), 37–46.

Pappas, I. O., Kourouthanassis, P. E., Giannakos, M. N., & Chrissikopoulos, V. (2016). Explaining online shopping behavior with fsQCA: The role of cognitive and affective perceptions. Journal of Business Research, 69(2), 794–803.

Pappas, I.O., Woodside, A.G. (2021). Fuzzy-set Qualitative Comparative Analysis (fsQCA): Guidelines for research practice in Information Systems and marketing. International Journal of Information Management, 58, 102310.

Park, H. J., & Lin, L. M. (2018). Exploring attitude–behavior gap in sustainable consumption: Comparison of recycled and upcycled fashion products. Journal of Business Research, 117, 623–628.

Parment, A. (2013). Generation Y vs. Baby Boomers: Shopping behavior, buyer involvement and implications for retailing. Journal of Retailing and Consumer Services, 20(2), 189–199.

Pinto, D. C., Nique, W. M., Añaña, E. d. S., & Herter, M. M. (2011). Green consumer values: how do personal values influence environmentally responsible water consumption? International Journal of Consumer Studies, 35(2), 122–131.

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. Journal of Management, 12(4), 531–544.

Prakash, G., & Pathak, P. (2017). Intention to buy eco-friendly packaged products among young consumers of India: A study on developing nation. Journal of Cleaner Production, 141, 385–393.

Ragin, C. C. (2006). Set relations in social research: Evaluating their consistency and coverage. Political Analysis, 291–310.

Ragin, C. C. (2009). Qualitative comparative analysis using fuzzy sets (fsQCA). Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques, 51, 87–121.

Rausch, T. M., & Kopplin, C. S. (2021). Bridge the gap: Consumers' purchase intention and behavior regarding sustainable clothing. Journal of Cleaner Production, 278, 123882–123894.

Saricam, C., & Okur, N. (2019). Analysing the Consumer Behavior Regarding Sustainable Fashion Using Theory of Planned Behavior. In Consumer Behaviour and Sustainable Fashion Consumption (pp. 1–37). Springer.

Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. Journal of Environmental Psychology, 21(4), 327–339.

Shen, D., Richards, J., Liu, F. (2013). Consumers' awareness of sustainable fashion. Marketing Management Journal, 23(2), 134–147.

Sichtmann, C., Wilken, R., & Diamantopoulos, A. (2011). Estimating Willingness-to-pay with Choice-based Conjoint Analysis–Can Consumer Characteristics Explain Variations in Accuracy? British Journal of Management, 22(4), 628–645.

Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. Journal of Social Issues, 50(3), 65–84.

Sweeney, J.C., Soutar, G.N. (2001). Consumer perceived value: The development of a multiple item scale. Journal of Retailing, 77(2), 203–220.

Tam, K.-P., Chan, H.-W. (2017). Environmental concern has a weaker association with pro-environmental behavior in some societies than others: A cross-cultural psychology perspective. Journal of Environmental Psychology, 53, 213–223.

Torelli, R., Balluchi, F., & Lazzini, A. (2020). Greenwashing and environmental communication: Effects on stakeholders' perceptions. Business Strategy and the Environment, 29(2), 407–421.

Van Liere, K. D., & Dunlap, R. E. (1980). The social bases of environmental concern: A review of hypotheses, explanations and empirical evidence. Public Opinion Quarterly, 44(2), 181–197.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. Decision Sciences, 39(2), 273–315.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 425–478.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Quarterly, 157–178.

Wei, X., Jung, S. (2017). Understanding Chinese consumers' intention to purchase sustainable fashion products: The moderating role of face-saving orientation. Sustainability, 9 (9), 1570.

Wong, K. K.-K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. Marketing Bulletin, 24(1), 1–32.

Woodside, A. G. (2016). The good practices manifesto: Overcoming bad practices pervasive in current research in business. Journal of Business Research, 69(2), 365–381.

Yadav, R., & Pathak, G. S. (2016). Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behavior. Journal of Cleaner Production, 135, 732–739.

Young, W., Hwang, K., McDonald, S., & Oates, C. J. (2010). Sustainable consumption: green consumer behaviour when purchasing products. Sustainable Development, 18(1), 20–31.

Yu, S., & Lee, J. (2019). The effects of consumers' perceived values on intention to purchase upcycled products. Sustainability, 11(4), 1034.

Zhang, L., Li, D., Cao, C., & Huang, S. (2018). The influence of greenwashing perception on green purchasing intentions: The mediating role of green word-of-mouth and moderating role of green concern. Journal of Cleaner Production, 187, 740–750.

Zheng, X., Baskin, E., Peng, S. (2018). Feeling inferior, showing off: The effect of nonmaterial social comparisons on conspicuous consumption. Journal of Business Research, 90, 196–205.

Appendix

Appendix A: Variables and items

Variable	Item		Factor loading
Environmental concern	EC1.	I am concerned about the environment.	0.806
	EC2.	The condition of the environment affects the quality of my life.	0.658
	EC3.	I am willing to make sacrifices to protect the environment.	0.536
	EC4.	My actions impact the environment.	0.667
Self-expressiveness	SE1.	The product can represent me.	0.903
	SE2.	This product completely reflects who I am.	0.873
	SE3.	The products of this brand help me to express myself.	0.834
	SE4.	A main benefit of the products of this brand is the ability for customers to express their own beliefs, values, or personalities.	
Visibility	VI1.	Generally speaking, other people would notice if I wear sustainable clothing.	0.844
	VI2.	Sustainable clothing is very visible to other people.	0.887
	VI3.	Sustainable clothing is recognized by people who see me.	0.866
Social influence	SI1.	People who influence my behavior think that I should seek out sustainable clothing.	0.788
	SI2.	People who are important to me think that I should wear sustainable clothing.	0.905
	SI3.	People whose opinions I value prefer that I seek out sustainable clothing.	0.839
Price value	PV1.	Sustainable clothing is reasonably priced.	0.607
	PV2.	Sustainable clothing offers value for money.	0.893
	PV3.	Sustainable clothing is a good product for the price.	0.832
	PV4.	Sustainable clothing would be economical.	0.519
Purchase intention	PI1.	I would like to purchase environmentally sustainable clothing.	0.907
	PI2.	I will buy environmentally sustainable clothing if I happen to see it in a store.	0.577
	PI3.	I would actively seek out environmentally sustainable clothing in a store in order to purchase it.	0.747
	PI4.	I would patronize and recommend the purchase of environmentally sustainable clothing.	0.913

Appendix B: Sample structure regarding universities

University	Frequency	University	Frequency
Hochschule Aalen	2	Universität Leipzig	2
Hochschule für angewandte Wissenschaften Ansbach	1	Technische Hochschule Lübeck	1
Fachhochschule Polizei Sachsen-Anhalt (Aschersleben)	1	Otto-von-Guericke-Universität Magdeburg	3
Universität Bayreuth	8	Hochschule der Wirtschaft für Management Mannheim	1
Beuth Hochschule für Technik Berlin	6	Philipps-Universität Marburg	1
Dekra Hochschule für Medien	1	Technische Universität München	2
Hochschule für Wirtschaft und Recht Berlin	1	Universität Passau	1
Ruhr-Universität Bochum	1	Universität Potsdam	2
Technische Universität Braunschweig	1	Pädagogische Hochschule Schwäbisch Gmünd	6
Hochschule für Technik und Wirtschaft Dresden	2	Universität Siegen	1
Universität Duisburg-Essen	3	Universität Stuttgart	1
Hochschule Düsseldorf	1	Bergische Universität Wuppertal	1
IUBH Internationale Hochschule (Erfurt)	1	Julius-Maximilians-Universität Würzburg	1
Friedrich-Alexander-Universität Erlangen-Nürnberg	1		
Frankfurt School of Finance & Management	1		
Universität Greifswald	5		
NBS Hamburg	1		
Universität Hamburg	1		
Gottfried-Wilhelm-Leibniz-Universität Hannover	3		
Hochschule Heilbronn	1		
Hochschule für Angewandte Wissenschaften Hof	2		
Ernst-Abbe-Hochschule Jena	7		
Universität Kassel	2		
Christian-Albrechts-Universität zu Kiel	1		
Universität zu Köln	3		

Appendix C: Sample structure regarding degree programs

Degree program	Frequency
Anglistics	1
Architecture	1
Business administration	7
Biology	10
Medical engineering	1
Biotechnology	2
Chemistry	2
Pedagogy	3
Health management	2
Human biology	2
Computer science	1
International management	2
Journalism	1
Communication science	1
Educational science	9
Marketing and media management	1
Mechanical engineering	1
Mathematics	3
Media sciences	4
Medical science	3
Optometry	7
Philosophy	3
Political science	1
Law	1
Social sciences	1
Industrial engineering and management	9
Economics	2

Appendix D: Indicator covariance matrix

	EC_1	EC_2	EC_3	EC_4	PI_1	PI_2	PI_3	PI_4	PV_1	PV_2	PV_3	PV_4	SE_1	SE_2	SE_3	SE_4	SI_1	SI_2	SI_3	VI_1	VI_2
EC_1	1.025	0.596	0.570	0.490	0.861	0.259	0.871	0.952	0.223	0.122	0.464	0.198	1.109	0.925	0.793	0.496	0.375	0.642	0.723	0.088	0.130
EC_2	0.596	1.456	0.389	0.601	0.802	0.282	0.692	0.827	0.600	0.357	0.503	0.345	1.188	0.829	0.699	0.379	0.256	0.513	0.651	0.183	0.047
EC_3	0.570	0.389	1.205	0.318	0.982	0.681	0.920	0.941	0.587	0.222	0.468	0.197	1.126	0.979	0.716	0.554	0.640	0.622	0.688	-0.600	-0.536
EC_4	0.490	0.601	0.318	0.879	0.684	0.370	0.584	0.796	0.408	0.444	0.523	0.254	0.696	0.497	0.519	0.226	0.064	0.334	0.362	-0.269	-0.222
PI_1	0.861	0.802	0.982	0.684	2.225	1.024	1.757	1.901	0.629	0.586	0.968	0.181	1.728	1.445	1.421	0.903	0.966	1.039	1.293	-0.661	-0.540
PI_2	0.259	0.282	0.681	0.370	1.024	1.771	1.028	1.010	0.804	0.655	0.904	0.326	0.846	0.793	0.820	0.428	0.971	0.636	0.724	-0.603	-0.519
PI_3	0.871	0.692	0.920	0.584	1.757	1.028	2.738	1.616	1.071	0.799	1.170	0.318	1.662	1.549	1.533	0.897	1.090	0.976	1.424	-0.422	-0.187
PI_4	0.952	0.827	0.941	0.796	1.901	1.010	1.616	2.156	0.549	0.568	0.994	0.315	1.680	1.261	1.340	0.875	0.784	0.961	1.221	-0.540	-0.332
PV_1	0.223	0.600	0.587	0.408	0.629	0.804	1.071	0.549	1.863	0.965	0.847	0.408	0.792	0.844	0.724	0.515	0.344	0.433	0.519	-0.528	-0.552
PV_2	0.122	0.357	0.222	0.444	0.586	0.655	0.799	0.568	0.965	1.384	1.171	0.524	0.482	0.723	0.714	0.198	0.435	0.292	0.487	-0.267	-0.261
PV_3	0.464	0.503	0.468	0.523	0.968	0.904	1.170	0.994	0.847	1.171	2.080	0.854	0.836	0.872	0.981	0.305	0.614	0.561	0.737	-0.302	-0.281
PV_4	0.198	0.345	0.197	0.254	0.181	0.326	0.318	0.315	0.408	0.524	0.854	1.232	0.330	0.267	0.397	0.261	0.030	0.165	0.158	0.024	-0.033
SE_1	1.109	1.188	1.126	0.696	1.728	0.846	1.662	1.680	0.792	0.482	0.836	0.330	3.071	2.252	2.102	1.117	0.988	1.152	1.473	-0.303	-0.265
SE_2	0.925	0.829	0.979	0.497	1.445	0.793	1.549	1.261	0.844	0.723	0.872	0.267	2.252	2.668	1.888	1.031	0.900	0.826	1.136	-0.174	-0.084
SE_3	0.793	0.699	0.716	0.519	1.421	0.820	1.533	1.340	0.724	0.714	0.981	0.397	2.102	1.888	2.473	1.198	0.954	1.000	1.424	-0.077	-0.071
SE_4	0.496	0.379	0.554	0.226	0.903	0.428	0.897	0.875	0.515	0.198	0.305	0.261	1.117	1.031	1.198	2.706	0.388	0.681	0.599	0.121	0.423
SI_1	0.375	0.256	0.640	0.064	0.966	0.971	1.090	0.784	0.344	0.435	0.614	0.030	0.988	0.900	0.954	0.388	2.372	1.747	1.589	-0.039	-0.311
SI_2	0.642	0.513	0.622	0.334	1.039	0.636	0.976	0.961	0.433	0.292	0.561	0.165	1.152	0.826	1.000	0.681	1.747	2.296	1.843	0.275	-0.058
SI_3	0.723	0.651	0.688	0.362	1.293	0.724	1.424	1.221	0.519	0.487	0.737	0.158	1.473	1.136	1.424	0.599	1.589	1.843	2.451	0.080	-0.037
VI_1	0.088	0.183	-0.600	-0.269	-0.661	-0.603	-0.422	-0.540	-0.528	-0.267	-0.302	0.024	-0.303	-0.174	-0.077	0.121	-0.039	0.275	0.080	2.592	1.818
VI_2	0.130	0.047	-0.536	-0.222	-0.540	-0.519	-0.187	-0.332	-0.552	-0.261	-0.281	-0.033	-0.265	-0.084	-0.071	0.423	-0.311	-0.058	-0.037	1.818	2.289

Appendix E: Triangulation using PLS-SEM

Partial least squares structural equation modeling (PLS-SEM) was used as a standard multivariate technique to provide additional insights into the data (Chin, 1998; Wong, 2013). According to the widely applied rule of ten (Hair et al., 2016), the final data set containing 79 observations is adequate for analysis, as the model includes six variables (five conditions and one outcome, i.e., five independent variables and one dependent variable). The algorithm was set to a path weighting scheme and 300 iterations at maximum. It converged after seven iterations. Indicators were weighted using Mode A. The measurement model in terms of indicator relevance (loadings), reliability, internal consistency, and discriminant validity has been established throughout the fsQCA analysis (Section 4.2). Hypotheses testing was carried out using a bootstrapping procedure with 10,000 draws (Hair et al., 2019), employing a standard significance level of 0.05. Figure A displays the results, indicating that all independent variables (i.e., fsQCA's conditions) are relevant and significantly linked to purchase intention. EC yields the most substantial impact, and VI is the only variable that influences PI negatively.

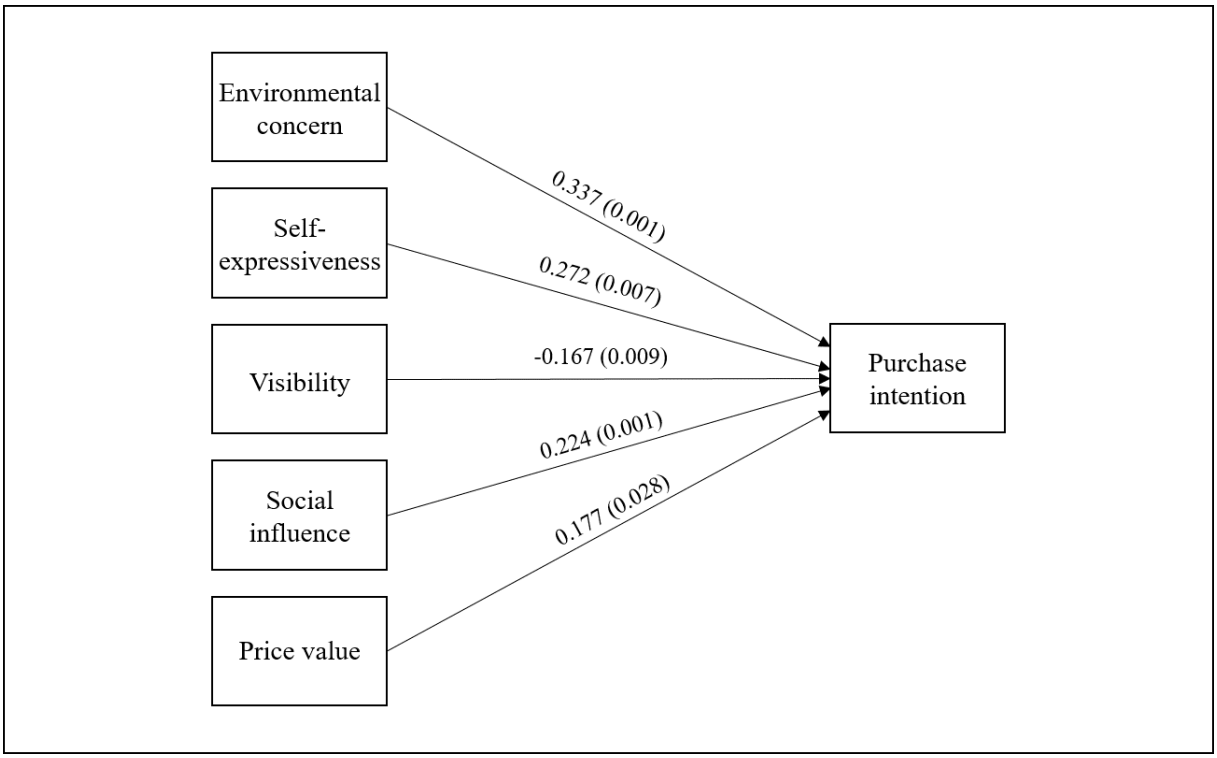


Figure A: Results from triangulation using PLS-SEM.

Note: Values on the edges indicate path coefficients. P-values are provided in parentheses.

Essay 9: Consumer acceptance of shared e-scooters for urban and short-distance mobility

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Abstract

E-scooters have conquered urban areas as a means for individual mobility and compete with other modes of transportation. While some studies endorse e-scooters as eco-friendly solution for crowded cities, others report contradictory findings and highlight safety issues. To reveal factors affecting e-scooter usage from a consumer's perspective, a study using an adapted Unified Theory of Acceptance and Use of Technology (UTAUT2) is conducted. Based on random sampling among German public transportation services, 749 responses were collected and analyzed. E-scooters are studied in the context of mobility alternatives, revealing that they are mostly viewed as fun objects, and perceived safety indeed impedes their usage. Additionally, environmental concerns and individual convenience (i.e., performance expectancy) evince to represent the main drivers for using e-scooter. Besides, differences in the motivation for (potential) usage were found between owners and non-owners. Regarding the ecological assessment of e-scooters, they may, in fact, substitute walking over short distances.

1 Introduction

Transportation in urban environments is experiencing changes "in favor of eco-friendly, compact, and light vehicles" (Zagorskas and Burinskien'e, 2020, p. 273). E-scooters (electricity-fueled scooters) have conquered cities around the world, promising a solution to the last-mile problem since their introduction in 2017 (Gössling, 2020; McKenzie, 2020; Nisson et al., 2020; Yang et al., 2020). They are discussed as alternatives to automobiles, potentially reducing traffic congestion, noise, and pollution (Che et al., 2020; Degele et al., 2018; Gössling, 2020), thereby helping to fight climate change. Early findings suggest that e-scooters are mainly used for distances between 1 and 6 km; however, one-third of trips is even longer, which, to some extent, challenges the last-mile notion (Degele et al., 2018). Empirical evidence indicates that for these short distances, e-scooters may replace walking rather than driving (James et al., 2019; Portland Bureau of Transportation, 2018).

Apart from e-scooters' impact on the transportation system, they have also raised discussions about safety concerns and injury risks (Badeau et al., 2019; Beck et al., 2019; Kobayashi et al., 2019; Yang et al., 2020). Previous work reports that most e-scooter users having an accident were riding without wearing a helmet (Liew et al., 2020), and providers often promote e-scooters omitting protective gear (Allem and Majmundar, 2019). Safety issues do not only concern riders themselves but have been found to affect other traffic participants, particularly pedestrians (Sikka et al., 2019). The technology has even been criticized as following the notion of "sell first, safety later" (Choron and Sakran, 2019, p. 555).

Hence, it is important to include safety concerns in the examination of technology acceptance of e-scooters.

Furthermore, e-scooters are marketed as green solutions for urban traffic, even though empirical evidence supporting that claim is still scarce (Moreau et al., 2020), and results about electric vehicles illustrate a mixed picture. While recent investigations conclude that e-scooters cause slightly more CO_2 emissions per kilometer compared to other modes of transportation (mainly due to their short lifespan, Hollingsworth et al., 2019; Moreau et al., 2020), others report that e-scooter usage could reduce emissions and congestion caused by automobiles (Allem and Majmundar, 2019).

To unfold their potential to reduce environmental stress, it is crucial to understand why consumers use e-scooters and how different impact factors are linked to behavioral patterns. The study at hand employs an original research model based on UTAUT2 (Venkatesh et al., 2012) to shed light on the components shaping consumers' intention to use e-scooters. In an automotive-dominated traffic setting, acceptance of novel modes is not trivial, as any alternative challenges power structures established by the dominant system (Gössling and Cohen, 2014). Previous research focused on barriers such as charging infrastructure and safety (Hardt and Bogenberger, 2019). However, demands concerning public opinion are only found in practice and lack scientific investigations (Gössling, 2020). Moreover, recent literature focused on examining electric vehicles in general or on more widespread alternatives such as e-bikes, and thereby leaving drivers and barriers for using e-scooters unanswered (Moreau et al., 2020). The study at hand seeks to address these research gaps by answering the following research question:

RQ1. What are the main drivers for consumers to use e-scooters?

Additionally, we aim to provide more granular insights on e-scooter usage, which is why the second research question is two-fold and deals with a descriptive assessment:

RQ2.1. Are e-scooters regarded as an alternative to conventional means of transportation?

RQ2.2. Is there a meaningful consumer segmentation considering utilitarian, hedonic, and sustainability-driven needs?

To shed light on these topics, a quantitative study on technology acceptance is conducted among public transit users. Insights from the Theory of Reasoned Action (TRA, Ajzen and Fishbein, 1980; Fishbein and Ajzen, 1975) are used to link users' intention to perform a particular behavior and their actual behavior. The TRA has been used successfully in established models such as the Technology Acceptance Model (TAM, Davis, 1989) and the Unified Theory of Acceptance and Use of Technology (UTAUT, Venkatesh et al., 2003; UTAUT2, Venkatesh et al., 2012). Accordingly, we develop a model to explain consumers' e-scooter acceptance based on UTAUT2 constructs augmented with context-specific drivers for using electric vehicles. The results are then further explored using segmentation based on construct values.

The remainder of the paper is structured as follows: Section 2 provides the theoretical background, shedding light on e-scooters' role in traffic and the importance of studying technology acceptance. Section 3 describes the research design, deriving the research model and discussing the sampling strategy. Results are presented in Section 4, followed by a discussion in Section 5. The final section provides concluding remarks, addresses limitations, and highlights paths for future research.

2 Theoretical background

2.1 Technology acceptance

Technology acceptance is a mature field that has been a vivid research topic for several decades (Benbasat and Barki, 2007; Venkatesh et al., 2007), gaining rapid growth with the advent of the TAM (Davis, 1989). Originally developed to study the organizational context, it was integrated with other models to form the UTAUT (Venkatesh et al., 2003), which was later adapted for consumer settings in the form of UTAUT2 (Venkatesh et al., 2012). On a conceptual level, factors explaining technology acceptance have advanced from considering only utilitarian constructs such as perceived usefulness and perceived ease of use to include hedonic variables, which are essential for the consumer context (Nysveen, 2005; van der Heijden, 2004; Venkatesh et al., 2012). All of these models have in common that they seek to explain individuals' behavior through the formation of behavioral intentions, which in turn are influenced by a set of factors. This mechanism stems from the TRA (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980), stating that an individual's behavioral intentions are the most immediate antecedent to actual behavior, and as such are good predictors for it. These intentions are shaped by behavioral and normative beliefs, which refer to the constructs attitude and subjective norm (Ajzen and Fishbein, 1980). As TRA was developed for settings characterized by volitional control, i.e., an individual may carry out a particular behavior if she or he likes to do so (Fishbein and Ajzen, 1975), it is suited to explain causal relations in the consumer context of the study at hand. These constructs themselves may be influenced by a variety of factors (Fishbein and Ajzen, 1975), e.g., in TAM, perceived usefulness and perceived ease of use are postulated as factors affecting attitude (Davis, 1989). Hence, we complemented established constructs from TRA-based research with drivers and barriers identified in the context of green vehicles.

2.2 Drivers for and ecological assessment of electric vehicles

Motivations for using electric vehicles, such as e-scooters, are multifarious (Cordera et al., 2019; Degele et al., 2018; Haustein and Jensen, 2018; Morton et al., 2017), vary between owner and non-owner (James et al., 2019; Jenn et al., 2018; Kroesen, 2017), and differ contingent on contextual factors (Rezvani et al., 2015; Sang and Bekhet, 2015). Especially consumers with increased environmental concerns (Guerra, 2019; Kim et al., 2017; Sang and Bekhet, 2015; She et al., 2017), and those living in rural areas (Sun et al., 2020) are more likely to choose the electric vehicles. Furthermore, various socio-demo-

graphic factors affect the preference for and usage of electric vehicles in general and e-scooters in particular. For instance, Degele et al. (2018) found that consumers' gender and age affect e-scooter usage. Additionally, education, economic (Haustein and Jensen, 2018; Morton et al., 2017), consumers' innovativeness (Seebauer, 2015), social and cultural background, and prior experiences influence the preference for buying electric vehicles (Cordera et al., 2019). Dependent on the contextual framework, convenience could represent an essential motivation for using electric vehicles, e.g., when traveling in foreign cities (Fang et al., 2015; McKenzie, 2019). Apart from that, the number of charging stations and potential range to be driven with electric vehicles constitute driving forces for or against using electric vehicles (Cordera et al., 2019; Fang et al., 2015; Haustein and Jensen, 2018; Liu and Lin, 2017; She et al., 2017). As a result, this problem has meanwhile propelled research developing optimization models revealing where to find the nearest e-scooter to consumers (Masoud et al., 2019) or how many recharge stations are needed based on charging time (Wang, 2007). Other performance indicators affecting the decision for or against electric vehicles represent their safety, reliability, and ease of operation (Sovacool et al., 2019). Moreover, the decision for or against buying electric vehicles seems primarily driven by fuel-saving, followed by reductions in CO_2 emissions and pollution (Jenn et al., 2018). Furthermore, symbolic attitudes related to conventional cars could represent a primary barrier to using electric vehicles (Haustein and Jensen, 2018). Besides, a certain degree of technology affinity facilitates using electric vehicles (Martínez-Díaz et al., 2018), as it is commonly necessary to assess map tools in the form of mobile applications for localizing and renting an available vehicle, which is then unlocked by means such as scanning QR codes (McKenzie, 2020). Additionally, other consumers' social influence and financial benefits can contribute to the acceptance of electric vehicles (Sang and Bekhet, 2015). While some studies incorporate findings related to electric vehicles in general due to the scarcity of literature on e-scooters, it still needs to be examined to what extent these insights hold for the new context: e-scooter usage evinces to be different even from its counterpart of e-bikes (McKenzie, 2019). Table 1 provides an overview of the motives for the introduction of e-scooters in urban areas. It becomes apparent that the consumer perspective lacks information.

Table 1: Motives for e-scooter introduction. Based on Gössling (2020).

City perspective	Consumer perspective
• Reduce congestion • Reduce air pollution • Promote electric vehicles • Provide energy- and space-efficient means of transportation • Support commuters on their way from or to transit stations	• Fast and convenient transportation • Reduce CO_2 emissions

Similar to findings from the e-bike sector (Kroesen, 2017; Sun et al., 2020), politicians promote the advantages of using vehicles with lower emission rates per kilometer for gaining approval rates among more sustainable-oriented citizens. Besides, findings about electric vehicles provide a dialectical picture concerning their actual benefits for the environment. While some authors find e-scooters to induce more

CO_2 emissions compared to previous alternatives due to their short lifespan (Hollingsworth et al., 2019; Moreau et al., 2020), others highlight less pollution of electric two-wheelers compared to cars and motorcycles (Cherry et al., 2009; Weiss et al., 2015) or positive net effects for the environment by e-bike usage (Kroesen, 2017; Sun et al., 2020) and electric vehicles in general (Zagorskas and Burinskien˙ e, 2020). Although research draws mixed findings about e-scooters ecological assessment, politicians still subsidize e-scooter purchases and try to replace fossil oil-driven vehicles (Pham et al., 2019).

In contrast to these driving forces of e-scooter adoption, multiple studies reveal a heightened amount of traffic crashes caused by e-scooters (Choron and Sakran, 2019; Kobayashi et al., 2019; Nisson et al., 2020). These accidents do concern both pedestrians (Sikka et al., 2019) as well as e-scooter riders themselves (Nisson et al., 2020), resulting in increased irritation of pedestrians facing the risk of e-scooters on footpaths (Che et al., 2020; James et al., 2019). As a result, literature started to analyze types of crashes caused by e-scooters based on demographics (Liew et al., 2020; Yang et al., 2020), speed and angle of e-scooters within crashes (Xu et al., 2016), type of injury (Badeau et al., 2019; Beck et al., 2019; Puzio et al., 2020) and manufacturers' emphasis on wearing protective gear (Allem and Majmundar, 2019). In line with these findings, research revealed safety to represent one of the major barriers preventing consumers from buying electric vehicles (She et al., 2017). Issues that occurred rather unexpected are those of vandalism, short e-scooter lifetime, and recycling and disposal (Gössling, 2020). Besides, the literature reveals the opportunistic driving behavior of e-scooter users that are not shirking back from violating traffic rules (Tuncer et al., 2020).

3 Research design

Perceptions of responsibility for preserving the environment and avoiding ecological damage are integrated into the model via the environmental concerns construct. As e-scooters are marketed as an eco-friendly mode of transportation, a positive influence on intention to use is expected. Concerning behavioral beliefs, performance expectancy is employed to capture utility, i.e., extrinsic motivation, and hedonic motivation complements the model through integration of intrinsic motivation (van der Heijden, 2004; Venkatesh et al., 2012), and are expected to increase consumers' intention to use e-scooters. Effort expectancy refers to "the degree of ease associated with consumers' use of technology" (Venkatesh et al., 2012, p. 159) and is postulated to have a positive effect on intention to use. Facilitating conditions, acting as a proxy for behavioral control in UTAUT and UTAUT2 and as such corresponding to TRA's successor, the Theory of Planned Behavior (Ajzen, 1991; Venkatesh et al., 2012), is dropped from the framework, as our model relying on TRA assumes that consumers have complete control of their decision to use e-scooters. Hence, our model implicitly adopts the view that individuals' behavior of using (or not using, respectively) e-scooters in traffic is volitional. Normative influences as postulated in TRA are captured by the social influence construct, replacing/advancing subjective norms from the TRA model, which are presumed to yield a positive impact on intention to use (Venkatesh et al., 2003). In the context of e-scooters, risks of accident and injury have been a significant topic of study (Badeau et al.,

2019; Beck et al., 2019; Kobayashi et al., 2019; Yang et al., 2020). Consequently, consumers' perception of being at risk while using an e-scooter is included as a moderator variable and hypothesized to decrease intrinsic motivation. Summarizing the assumptions derived by literature, Figure 1 depicts the resulting research model. We therefore hypothesize:

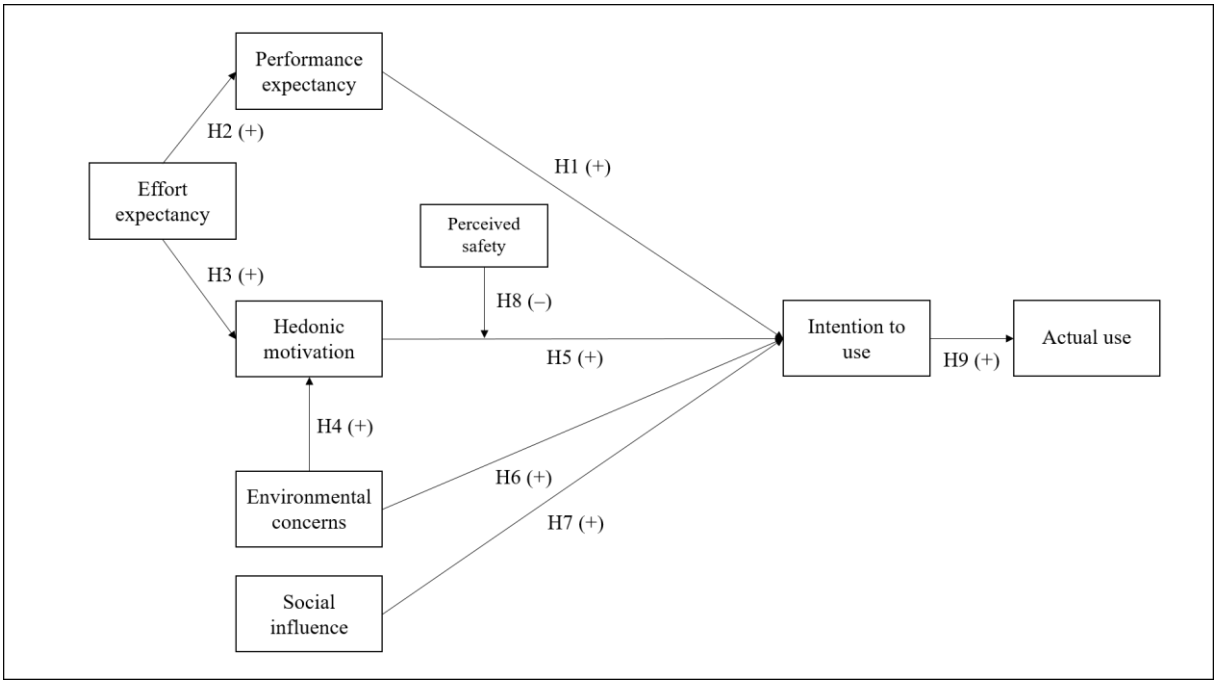

Figure 1: Research model and hypothesis.

All items were measured on a seven-point Likert-type scale ranging from 'I completely disagree' (i.e., 1) to 'I completely agree' (i.e., 7). Construct scales were adapted from extant literature to ensure validity (see Appendix A). Items for performance expectancy, effort expectancy, hedonic motivation, social influence, intention to use, and actual use are adapted from UTAUT2 (Venkatesh et al., 2012). Environmental concerns are adapted from Dunlap et al. (2000) and Lee (2008), and perceived safety is based on Osswald et al. (2012). Following demands regarding the measurement of actual use in previous research (Burton-Jones and Straub, 2006; see, e.g., Benbasat and Barki, 2007; Sun, 2012), in addition to the frequency of use, which was also measured on a seven-point scale ranging from 'never' to 'several times a day', different aspects such as travel distance, the substitution of other transportation modes, and destination were included in the survey.

Following sampling strategies proposed by the extant literature (Permut et al., 1976; Singh and Matsuo, 2004), we focused on public transportation services in Germany derived from topic-related standard references, such as members of the the Association of German Transport Companies (VDV), to forward our survey and reach out to individual consumers. These members were contacted and asked to spread the questionnaire through their Facebook social media channel. This approach reduces the need for comprehensive sample specifications (Permut et al., 1976). As e-scooters are purposed to close the last mile gap, VDV members focused on railway transportation (n = 158) and merely providing infrastruc-

ture (n = 16) were excluded. Individuals only focusing on railway-related information are deemed different compared to consumers interested in local traffic: a mere focus on railway is assumed to belong to individuals that are reliant on this alternative, e.g., because they need to commute over far distances frequently, and thus, are less committed to local traffic than road users particularly following this type of content. Those who engage in content on railway and other transportation modes – and, consequently, also received information from other VDV members – may be reached via our sample strategy. Out of 608 organizations, 450 remained as potential contacts. After removing duplicates corresponding to different federal states, 431 organizations were identified for contacting (VDV, 2020). We then detached those not possessing a Facebook page and having their page set up at the moment (n = 323).

Consequently, 92 VDV members were selected, of which 57 cooperated and disseminated the survey (see Appendix B). Control variables in the survey were used to trace how a respondent entered the survey (i.e., through which channel) to remove duplicates if necessary and get an impression of the questionnaire's dissemination. As the study at hand is the first to address consumer acceptance of e-scooters using a quantitative approach, there is no empirical data to base sample size estimation. Hence, the rule of thumb following the inverse square root method proposed by Kock and Hadaya (2018) for PLS models is used to determine the minimum sample size, suggesting at least 160 observations.

4 Results

4.1 Descriptive statistics

Data collection took place over five weeks in November and December 2019. Among the non-cooperative organizations, no specific pattern regarding geographical location and city size could be found. In total, 1,185 participants initiated the survey. After removing incompletes (n = 414) and checking for speeders and straightliners (n = 22), 749 questionnaires were retained for analysis. All respondents accessed the survey via Facebook as intended, and no duplicates needed to be removed. Non-response bias was addressed by comparing the first respondents to the last ones, assuming that late respondents act similar to non-respondents (Armstrong and Overton, 1977; Ferber, 1948). Respondents from the first quartile were compared to participants from the last quartile using a series of t-tests, revealing no significant results. These findings were further corroborated by calculating a multi-group analysis (MGA) to compare the PLS model of the first quartile to the model of the last quartile. Again, no differences were found. Hence, it is assumed that non-response bias does not play a critical role in our study. Regarding the distribution of the survey, 562 respondents entered the survey through a public transportation services' social media channel, 26 came from social media accounts dealing with transportation in general, and 22 accounts dedicated to e-scooters. Five participants were recruited from e-scooter providers' social media accounts. Additional 134 respondents did not indicate how they entered the survey. Age ranged from 18 to 73 years, with an average of 34.35 (median = 32) and a standard deviation of 11.49 years (lower quartile = 25, upper quartile = 41). More than one-third of the participants were female (31.8%). Almost half of the respondents have experience in using an e-scooter (46.6%), most of them

being practiced users with a usage pattern exceeding ten rides (15.1%), others having tested a vehicle for once (10.0%), or used it two to three times (9.1%). 9.7% remarked they possess an e-scooter. A correlation analysis was performed to examine the relationship between a participant's residence (ranging from rural to major city above a population of 100,000) and his or her intention to use e-scooters, finding a weak negative link (Kendall $\tau = -0.116$, $p < 0.001$). No correlation between intention to use and age could be found ($r = 0.100$, $p = 0.779$).

At the end of the survey, participants were asked whether they had additional remarks. In general, participants seem to be well-informed about the topic, and e-mobility and environmental aspects on an overall level. Annotations targeted safety conflicts between e-scooter riders and other road users (n = 36), the negative environmental impact of e-scooter production and usage (n = 28) stating that over their lifespan, they rather cause harm than benefits, and the social aspect of so-called 'juicers' that collect and charge e-scooters (n = 4).

In addition, participants using e-scooters reported on their last e-scooter ride and were asked to indicate which alternative mode of transportation was superseded. The most substantial decrease was found for walking (mentioned by 31.4%, one-sample t-test: $T = -19.524$, $p < 0.001$), followed by bus (14.4%, $T = -8.160$, $p < 0.001$), streetcar or metro (14.4%, $T = -5.422$, $p < 0.001$; however, note that not all German cities offer these alternatives), and car (8.1%, $T = -11.449$, $p < 0.001$)[1].

Lastly, e-scooters' potential to replace car trips was investigated. Participants were given examples of different travel distances, ranging from short trips under 2 km and mid-range trips (2 to 5 km) to long-range distances (more than 5 km). Respondents were asked to indicate their willingness to use an e-scooter for the respective travel distance on a seven-point Likert-type scale (1 = 'I completely disagree', 7 = 'I completely agree').

Table 2: Challenges addressed by e-scooters. Values in percent. o. = owners, n.-o. = non-owners.

Challenges	Tendency	Total	E-scooter owners (n = 73)	Non-owners (n = 676)	Mann-Whitney-*U*-test t-value (p-value)
Air pollution	Agree	18.7	43.8	15.9	7.660 (< 0.001)
	Rather agree	26.7	31.5	26.2	
	Rather disagree	23.9	12.3	25.1	
Median o. = 2	Disagree	22.4	4.1	24.4	
Median n.-o. = 3	Not sure	8.3	8.2	8.3	
Congestion	Agree	15.2	43.8	12.1	9.190 (< 0.001)
	Rather agree	27.1	35.6	26.2	
	Rather disagree	24.6	12.3	25.9	
Median o. = 2	Disagree	22.3	2.7	24.4	
Median n.-o. = 4	Not sure	10.8	5.5	11.4	
Lack of space for parking	Agree	21.2	54.8	17.6	13.648 (< 0.001)
	Rather agree	29.5	38.3	28.5	

[1] One-sample t-tests were used to assess our empirical distribution's deviation from indifference, which assumes a mean value of 3 on a five-point Likert-type scale.

Challenges	Tendency	Total	E-scooter owners (n = 73)	Non-owners (n = 676)	Mann-Whitney-*U*-test t-value (p-value)
	Rather disagree	20.3	2.7	22.2	
Median o. = 1	Disagree	21.9	1.4	24.1	
Median n.-o. = 3	Not sure	7.1	2.7	7.5	
Accidents	Agree	5.5	8.2	5.2	7.358 (< 0.001)
	Rather agree	4.4	13.7	3.4	
	Rather disagree	26.2	35.6	25.1	
Median o. = 3	Disagree	51.8	9.6	56.4	
Median n.-o. = 5	Not sure	12.1	32.9	9.9	
Traffic volume	Agree	8.3	17.8	7.2	6.956 (< 0.001)
	Rather agree	18.4	43.8	15.7	
	Rather disagree	27.4	17.8	28.4	
Median o. = 2	Disagree	28.6	6.8	30.9	
Median n.-o. = 4	Not sure	17.4	13.7	17.7	
Noise pollution	Agree	22.6	56.2	18.9	7.655 (< 0.001)
	Rather agree	31.2	28.8	31.5	
	Rather disagree	17.5	4.1	18.9	
Median o. = 1	Disagree	18.4	6.8	19.7	
Median n.-o. = 2	Not sure	10.3	4.1	10.9	
Public transport shortcomings	Agree	15.5	39.7	12.9	6.683 (< 0.001)
	Rather agree	29.4	35.6	28.7	
	Rather disagree	18.6	6.8	19.8	
Median o. = 2	Disagree	24.3	9.6	25.9	
Median n.-o. = 3	Not sure	12.3	8.2	12.7	

Short distances were evaluated rather favorably (mean = 4.24, SD = 2.18), followed by mid-range (mean = 3.65, SD = 2.07), and long-range distances (mean = 2.61, SD = 1.77). A one-sample t-test revealed that all three assessments were significantly different from indifference on a 0.05 (short distance) and 0.01 level (mid-range and long-range); albeit, they point in opposite directions. While short distances were evaluated as rather attractive for e-scooter usage, mid- and long-range distances were rated unattractive. However, standard deviations indicate that participants were rather discordant.

4.2 Outer model evaluation

For estimating the main model, a structural equation modeling using partial least squares (PLS-SEM) was employed. The algorithm was set to path weighting, a maximum of 300 iterations, and a stop criterion of 10^{-7}, and converged after five iterations. Following the established two-step approach, the outer model and measurement model, respectively, are assessed. Outer loadings are evaluated using a threshold of 0.708 (Hair et al., 2019), revealing that three indicators fall short of this value: EE3 (0.689), EE4 (0.621), and SI4 (0.627; see Appendix A). In order to decide whether to keep these in the model, internal consistency measures are consulted. Composite reliability (Jöreskog, 1971) and average variance extracted (AVE) are used as a reference; however, Cronbach's α is also provided due to the measure's high profile. Table 3 displays the results, showing satisfactory values. Hence, to ensure theoretical rigor, the indicator triad below the outer loadings threshold are retained.

Table 3: Construct assessment.

Latent variable	Indicators	Mean (SD)	Cronbach's α	CR	AVE
Performance expectancy	4	3.65 (1.81)	0.909	0.936	0.785
Effort expectancy	4	5.67 (0.98)	0.753	0.845	0.582
Hedonic motivation	3	4.51 (1.60)	0.911	0.944	0.848
Environmental concerns	3	2.71 (1.55)	0.888	0.931	0.818
Social influence	4	2.71 (1.29)	0.822	0.883	0.659
Perceived safety	4	4.13 (0.91)	0.875	0.913	0.725
Intention to use	4	3.09 (1.97)	0.942	0.959	0.854
Actual use	1	5.52 (1.86)	Single-indicator construct		

For evaluation of discriminant validity, the Fornell-Larcker criterion (Fornell and Larcker, 1981), an assessment of cross-loadings, and evaluation of the heterotrait-monotrait ratio (HTMT, Henseler et al., 2015) is employed. Table 4 summarizes HTMT examination; Fornell-Larcker is provided in Appendix C. Examination of cross-loadings confirms that all indicators load highest on the latent variable they are assigned to.

Table 4: HTMT ratios.

	PE	EE	HM	EC	SI	PS	ITU	AU
PE								
EE	0.547							
HM	0.744	0.520						
EC	0.825	0.396	0.657					
SI	0.797	0.476	0.651	0.887				
PS	0.580	0.570	0.478	0.518	0.498			
ITU	0.895	0.551	0.736	0.845	0.824	0.612		
AU	0.717	0.437	0.536	0.677	0.672	0.516	0.848	

Two dyads exceed the conservative threshold of 0.85, but still meet the upper limit of 0.90 (Henseler et al., 2015): PE and ITU, and SI and EC. $HTMT_{inference}$ is calculated for amendment using bootstrapping with 10,000 subsamples, revealing that the null value of 1 is excluded from 95% confidence intervals, and hence overall, discriminant validity is verified.

4.3 Inner model evaluation

To check the model for collinearity issues and common method bias, variance inflation factors (VIFs) are employed, using a threshold of 3.3 (Kock, 2015; Hair et al., 2019). All VIFs meet this criterion; hence an absence of both collinearity problems and common method bias can be assumed. The inner model is examined drawing on determination coefficients, cross-validated redundancy, and bootstrapping to investigate the path coefficients' statistical significance (Hair et al., 2011). For moderator analysis of perceived safety, an orthogonalization approach was used (Henseler and Chin, 2010). Findings are summarized in Figure 2, and an assessment of explanatory and predictive power is provided in Table 5.

Table 5: Inner model assessment. Evaluation based on Hair et al. (2019).

Construct	R^2 value	Adjusted R^2 value	Evaluation	Q^2 value	Evaluation

PE	0.205	0.204	Weak	0.158	Small relevance
HM	0.420	0.418	Weak to moderate	0.350	Medium relevance
ITU	0.789	0.787	Substantial	0.666	Large relevance
AU	0.680	0.680	Moderate	0.675	Large relevance

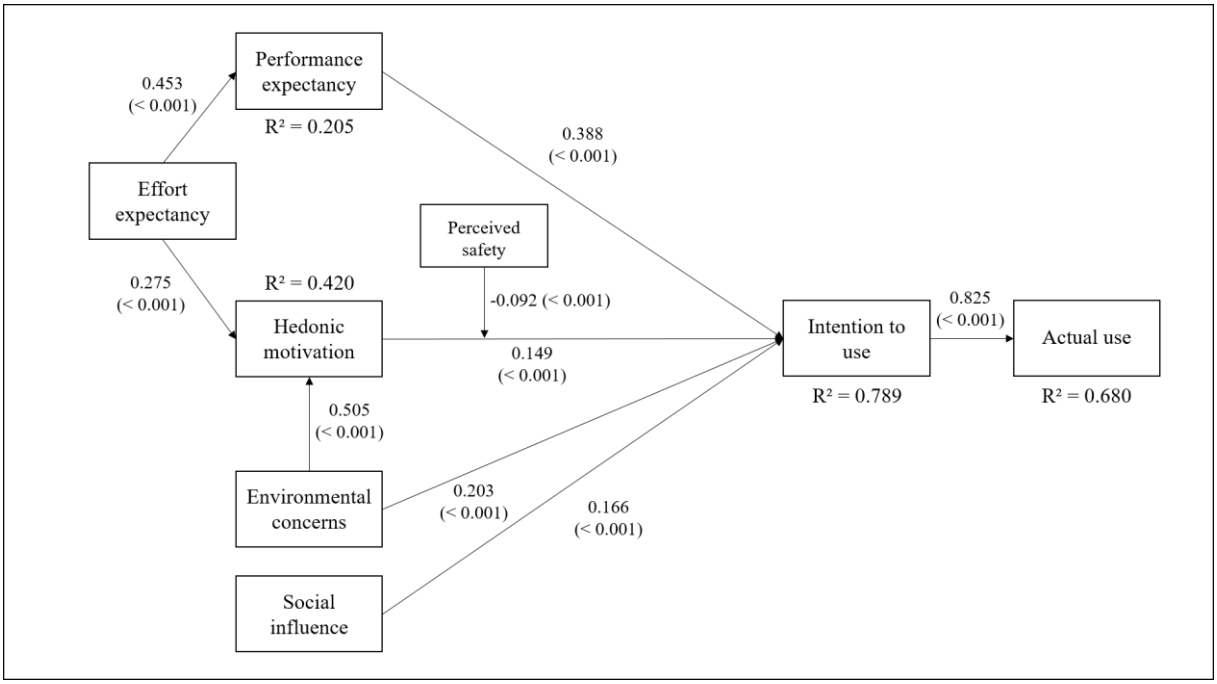

Figure 2: Inner model results.

All proposed hypotheses could be corroborated. EE, as an antecedent of PE and HM, has a more substantial positive impact on PE than on HM. Its variance explanation for PE is slightly below the 'weak' threshold of 0.25 (Hair et al., 2019), indicating that EE does not suffice to explain consumers' PE. This result is consistent with our theoretical derivation of the model postulating that PE is an important and self-contained factor. PE indeed exhibits the most substantial link to ITU in the model. Hedonic motivation yields an R^2 value of 0.420, which approaches the 'moderate' benchmark of 0.50 (Hair et al., 2019). While it is influenced by EE, indicating that ease of use increases enjoyment, a much stronger impact was found for EC (path coefficient = 0.505). Participants' ecological reflections appear to be positively linked to the joy derived from e-scooter usage. SI as a depiction of subjective norm (Fishbein and Ajzen, 1975), i.e., the perception of being under pressure due to social standards, has a reasonably weak positive impact on ITU. Additionally, PS was confirmed to serve as a moderator of the effect of HM on ITU, although its impact is rather weak. Interestingly, a direct effect of PS on ITU was detected, which is stronger than the moderating effect (path coefficient = -0.125, $p < 0.001$). Regarding ITU's variance explanation, the proposed set of factors provided substantial explanatory power ($R^2 = 0.789$). For the relation of ITU and AU, a tight positive link was found (path coefficient = 0.825), which is an interesting finding in the context of sustainability, as in many cases, the gap between ITU and AU is a major challenge (Hughner et al., 2007; Kollmuss and Agyeman, 2002; Pickett-Baker and Ozaki, 2008). Our result indicates that the causal relation is symmetric in the context of e-scooters, i.e., high values of ITU elicit AU, and low values of ITU lead to the absence of use behavior (Woodside, 2013).

In order to provide deeper insights, we also collected participants' motives for using an e-scooter. Here, we asked respondents why they trialed e-scooters previously. Out of the 749 respondents, 349 had used an e-scooter before. 39 (11.7%) indicated they wanted to save money by avoiding bus and train tickets, 349 (100%) answered using an e-scooter seemed enjoyable, and 58 (16.6%) mentioned they deemed e-scooters to be eco-friendly. Further, 81 (23.2%) indicated a social aspect and used an e-scooter to ride with their friends, while 64 (18.3%) sought to avoid looking for a parking lot, and 85 (24.3%) responded they had no car. Another 75 participants (21.5%) mentioned the lack of a bus or train station at their destination, and 259 (74.2%) emphasized the utility of moving fast and effortless.

4.4 Multi-group analyses

For further insights, several segments are defined and used for MGA (Henseler, 2012; Sarstedt et al., 2011). Multiple authors find that the acceptance and usage of electric vehicles depend on consumers' attitudes towards the environment (Guerra, 2019; Kim et al., 2017; Rezvani et al., 2015; Sang and Bekhet, 2015). Therefore, the data set is split by participants' environmental concerns in the first step. The construct was assessed employing a seven-point Likert-type scale, which is used for segmentation. The group of 'environmentally concerned users' consists of cases with ratings above 4 (n = 426), and the group of 'environmentally unworried users' comprises cases with ratings below 4 (n = 281). Cases yielding the neutral value of 4 were excluded due to indecisiveness (n = 42). Results mirror findings from the total sample. A difference was detected for the relation of EE and PE, which is moderate and positive for both segments, but significantly higher for the environmentally concerned group (path coefficients 0.492 versus 0.255, difference 0.238, $p < 0.001$). An alternative calibration omitting observations yielding values of 3, 4, and 5 was considered; however, the segment size for environmentally concerned users turned out to be too small for calculation (n = 28). On the other hand, an overwhelming majority was assigned to the unworried segment (n = 439).

Drawing on findings from Table 2, e-scooter owners and non-owners were employed for a second segmentation, as literature highlighted differences among these groups (James et al., 2019). Several insights may be obtained from MGA (Table 6). Observing models for owners and non-owners separately, all hypotheses are corroborated for the non-owner segment. PE has the strongest positive impact on ITU (path coefficient = 0.393), followed by EC (path coefficient = 0.212). EC further impact HM to a remarkable extent (path coefficient = 0.480) and PS yields a negative moderating effect on the relation between HM and ITU. In the case of owners, several hypotheses are rejected. PE does not appear to be a driver of ITU, and EE could not be found to influence HM. Strikingly, findings suggest that for owners, EC do not play a role for ITU at all (path coefficient = -0.016, $p = 0.921$), and no convincing evidence for a moderating effect of PS was found (path coefficient = -0.136, $p = 0.467$). Moreover, compared to non-owners, the link between ITU and AU is much weaker (path coefficients: 0.324 versus 0.763). This result indicates that for owners, additional factors not included in the model may have an important impact. Differences between the models show a convergence of PLS-MGA and parametric test results.

Significant discrepancies were identified for the EC-HM relation and the link between ITU and AU. Hence, owners and non-owners indeed differ regarding the impact of EC on HM, which is negligible for owners, and the strength of the ITU-AU path.

Table 6: Multi-group analysis for owners and non-owners. *Moderating effect.

Hypotheses				Path coefficients (p-value)		Difference
				Owners (n = 73)	Non-Owners (n = 676)	(p-value PLS-MGA, p-value parametric test)
H1	PE	→	ITU	0.197 (0.102)	0.393 (< 0.001)	0.207 (0.072, 0.082)
H2	EE	→	PE	0.345 (0.014)	0.415 (< 0.001)	0.116 (0.307, 0.259)
H3	EE	→	HM	0.109 (0.484)	0.282 (< 0.001)	0.188 (0.144, 0.086)
H4	EC	→	HM	0.264 (0.034)	0.480 (< 0.001)	0.230 (0.036, 0.010)
H5	HM	→	ITU	0.262 (0.047)	0.152 (< 0.001)	-0.107 (0.405, 0.236)
H6	EC	→	ITU	-0.016 (0.921)	0.212 (< 0.001)	0.200 (0.101, 0.096)
H7	SI	→	ITU	0.313 (< 0.001)	0.169 (< 0.001)	-0.161 (0.108, 0.122)
H8	PS*	→	HM → ITU	-0.136 (0.467)	-0.081 (< 0.001)	0.097 (0.492, 0.314)
H9	ITU	→	AU	0.324 (0.014)	0.763 (< 0.001)	0.444 (< 0.001, < 0.001)

5 Discussion

Data analysis revealed that about half of the sample had used an e-scooter before. Descriptive statistics show that, unsurprisingly, e-scooter owners and non-owners differ in their perception of benefits. More than half of e-scooter owners view the vehicles as remedies for lack of parking space and noise pollution, followed by about 40% who see positive effects for air pollution, congestion, and shortcomings of public transportation. Non-owners are rather undetermined; however, they agree on positive impacts on noise pollution, but at the same time, they expect a high accident hazard. An important question is raised by Gössling (2020), asking whether trips using e-scooters replace trips otherwise using motorized vehicles or cycling and walking. The answer to this question appears to be critical on the future success of e-scooters, regarding high expectations concerning their positive influence on traffic, and climate in general. As a multiplicity of providers competes in the market, employing large amounts of venture capital to thrive for growth (Gössling, 2020), misjudgment of consumer perception poses the threat of high financial losses. This beauty spot on e-scooters' proclaimed sustainability image is further corroborated by the advent of tenuous jobs such as collecting and charging vehicles, commonly using workers' private accommodation. While approaches supporting these jobs in locating e-scooters exist (see, e.g., Masoud et al., 2019), the actual issue is how these concepts promoting the gig economy fit the notion of a triple bottom line of sustainability with social aspects as one of the key elements (Elkington, 1998). Our findings add to these concerns.

Respondents indicated that their last trips replaced walking rather than motorized transportation, and when asked about future rides, this pattern was repeated. This result of e-scooters being used for comfort

rather than for environmental reasons is consistent with the public opinion in Germany: one of the major concerns regarding traffic is gridlocks due to constantly increasing traffic volume (GfK, 2019), and e-scooters provide an individual solution that is independent of regular roadways. Further, consumers viewing e-scooters as effective means for environmental production comprise merely 20% of road users (YouGov, 2019). Our results show that e-scooters may replace walking rather than other means of transportation; however, they have a slight impact on bus, car, and streetcar/metro usage as well.

Particularly investigating e-scooters' potential to supersede cars across various distances, participants exhibited a slight tendency to swap cars for e-scooters over short distances (< 2 km); however, for longer trips, the opposite was mentioned. Hence altogether, only weak evidence for e-scooters' potential to replace motorized vehicles in the urban area was found, and consumers may rather abandon walking instead of other modes of transportation. While e-scooters are generally perceived as an eco-friendly transportation solution, the modes of transportation superseded indicate a negative environmental net effect. Hence, politicians should be aware of the aggregated harmful effects of e-scooters on the environment and, therefore, rethink their policy of incentivizing e-scooters. Besides, these findings emphasize convenience as a crucial driver for using e-scooters (Fang et al., 2015). Moreover, we contribute to electric transportation research by validating prior findings derived from electric vehicles (Sovacool et al., 2019) for e-scooters. Accordingly, ease of operation, reliability, and environmental concerns represent important drivers not only for electric vehicle adoption, but also for e-scooters. As the adoption of electronic vehicles can vary contingent on cultural background (Cordera et al., 2019), we further extend current literature by verifying occurring effects found in China (Sovacool et al., 2019) among German consumers.

Regarding results from PLS-SEM, performance expectancy was found to be the strongest predictor for intention to use, followed by environmental concerns. Social influence and hedonic motivation yield relatively weak, but significant, positive impacts. Intention to use was found to be a good predictor for actual use (path coefficient = 0.825), which indicates that there are little to no barriers that may hamper translating intentions into actions, and which confirms our research model's implicit assumption of volitional behavior. This is rather remarkable, as many studies in the context of sustainability suffer from the attitude/behavior or intention/behavior gap, respectively. For e-scooters, this challenge does not seem to apply, confirming that the research model is sufficiently powerful to explain both consumers' intention to use e-scooters and their actual use behavior. In part, this result may stem from the sampling approach, which captured fairly informed road users. These individuals might yield higher awareness of transportation alternatives than the general public and, as such, may be assumed to possess a firmer opinion on their benefits and detriments. Hence, the strong positive correlation between intention and actual behavior may be, at least partially, a result of this informed opinion and its implementation. For consumers less involved in modes of transportation, this correlation is assumed to diminish. Moreover, as the participants constitute of Facebook users, they could be considered as rather young consumers

and thus, yield higher environmental concerns compared to older ones (Tait et al., 2020; Yadav and Pathak, 2016). Consequently, environmental concerns' positive influence on HM and ITU may potentially be overestimated.

From a TRA point of view, findings show that relevant factors for behavioral and normative beliefs have been identified. Cross-validation added several interesting insights. First and foremost, while PLS-SEM revealed hedonic motivation to play a relatively small role in forming the intention to use, participants stated that e-scooters have a strong appeal of entertainment and that this appeal is an important motivation to undertake an e-scooter trip. The reason why HM serves as a more important driver for ITU among owners compared to non-owners (Table 6) might be due to the 'greener' perception of using e-scooter from the owners' perspective (Table 2). This effect (i.e., consuming green products resulting in enhanced enjoyment experience using it) has recently been described as 'green consumption effect' (Tezer and Bodur, 2019).

The role of environmental concerns exhibited surprising results: segmentation of e-scooter owners and non-owners displayed that while for non-owners, environmental concerns have a positive influence on intention to use, this effect was absent for owners. For them, hedonic motivation had a more substantial impact on intention to use than for non-owners. The influence of normative beliefs, i.e., social influence, did not differ depending on the degree of participants' environmental concerns; however, a difference was found between owners (higher impact, path coefficient = 0.313) and non-owners (lower impact, path coefficient = 0.169). Regarding perceived safety risk, owners and non-owners exhibited differences in the way that owners evaluate risk lower (owners: mean = 3.98, SD = 0.85, non-owners: mean = 4.22, SD = 0.90, t-test: $p < 0.001$). However, it is important to note that we do not have information about the causal direction, i.e., it is not clear whether e-scooter ownership and, as such, familiarity with the vehicle elicit perceptions of lower risk, or consumers yielding low-risk perception are more willing to buy an e-scooter and become part of the owner segment. Considering the absolute magnitude, perceived risk was assessed rather neutral. This is an important finding, as the objective risks have been vividly discussed in the literature, and injuries are a serious threat, made especially clear by the expression "sell first, safety later" (Choron and Sakran, 2019, p. 555). Particularly against the backdrop of many e-scooter providers' marketing regularly showing riders without protective gear, it becomes clear that the necessity of protection needs to be pointed out both by e-scooter providers and by policymakers. The two principal options to do so are fining riders participating in traffic without adequate protective equipment, and interdicting advertisements that show situations conflictive with real-world traffic requirements.

Besides findings from our research model, we additionally asked about motives for trying e-scooters in the past. Here, participants indicated that riding an e-scooter seemed enjoyable (both when riding alone and with friends) and providing utilitarian benefits in terms of not having to search for a parking lot, saving money for bus and metro tickets, and offering mobility when lacking access to a vehicle. While in general, these findings confirm the results from our PLS model, the importance of hedonic motivation

appeared to be the primary reason for trying out an e-scooter but does not play a major role in the perception of using e-scooters. A straightforward explanation for that finding would be that participants did not enjoy their ride as expected, and as such, evaluate entertainment low, or simply were curious about trying out an e-scooter.

Concerning the structural model, high (but acceptable) HTMT ratios for PE and ITU, and SI and EC, respectively, were identified. From a discriminant perspective, this opens the possibility of discussing EC as being perceived as similar to SI by consumers, e.g., in terms of feeling pressured by peers or gaining the impression that EC are socially desirable and externally imposed. Hence, the acceptance of e-scooters by peers can serve as a light catalyst for other consumers. In contrast to research exploring the acceptance of electric vehicles in general (such as Jenn et al., 2018), literature needs to be extended by hedonic motivation when examining e-scooter motives. Additionally, the previous finding derived from e-bike usage on a tendency to favor electric transport solutions when living in rural areas (Sun et al., 2020) could not be confirmed for e-scooters. Besides, we contribute to current literature dealing with e-scooter related accidents by empirically analyzing the effect of perceived safety and how it decreases intention to use. An important practical implication in order to decrease the number of e-scooter related accidents lies in the promotion of protective gear. While non-owners seem to be aware of the potential health risks related to driving e-scooters, owners express lower perceived safety concerns associated with driving e-scooters.

6 Conclusion

The study at hand is the first to examine consumers' perception of e-scooters in a quantitative setting. Factors influencing participants' intention to use e-scooters were investigated. Findings suggest that e-scooters are primarily viewed as entertainment rather than a significant mode of transportation. Evidence for e-scooters' potential to replace ecologically harmful vehicles such as cars is rather weak, and could only be found for short-distance trips (< 2 km). The primary alternative respondents intend to replace is walking. Hence in total, environmentally damaging transportation modes such as driving may be maintained, and the eco-friendly alternative of walking is superseded. Widespread e-scooter usage thus might add to the overall ecological damage as opposed to offering a remedy.

Further, perceptions of risk were evaluated rather low, indicating that providers and policymakers need to elucidate e-scooter riding's hazards, and may enforce wearing protective gear while riding. We also found evidence that important aspects within e-scooters' economic network, some of which may undermine their sustainability claims – namely safety concerns, environmental pollution caused by damaged and dumped vehicles, and the precarious work contracts of 'juicers' – are only mentioned by very few respondents. Hence, the majority of participants are likely unaware of e-scooters' potential adverse impacts. Consequently, increasing experience and coverage of e-scooters may influence the vehicles' image among road users and shift their perceptions towards a more critical perspective. However, it needs to be noticed that these statements were provided voluntarily in a free-format question, and participants

may have opted not to make use of this response opportunity even when knowing about the issues. Still, the very small number of answers makes one wonder whether e-scooters' challenges may be assumed to be prominent among many road users.

As for all scientific studies, a number of limitations need to be addressed. First, all measures were based on self-reports, which may lead to social desirability biases regarding behavior in traffic and environmental concerns in the way that respondents may have scored higher than what would be the reality. Second, sampling was carried out by acquiring public transportation services as project partners and asking them to spread the questionnaire on their social media accounts. Consequently, consumers that are particularly interested in transportation topics and, as such, regularly read and follow these services' social media content may be overrepresented. Third, sampling was conducted in Germany, and findings may not be directly applicable to settings with significantly different transport infrastructure. However, results of consumers favoring e-scooters for their entertainment potential and relief from walking match extant research from other regional and cultural contexts, and may be generalized to other settings.

Our study provides several opportunities for future research. The model's explanatory power may be tested in other regional and cultural contexts to gain insights into commonalities and distinctions regarding the choice of transportation mode, and drivers of intention to use e-scooters. Additional variables may be added to provide more context-sensitivity, i.e., both factors and moderators. Shortcomings of self-report measurement may be addressed via observational methods. Our research revealed significant differences in the perception of e-scooters between owners and non-owners (see Table 2), stressing the need to analyze consumers based on ownership (James et al., 2019) for deriving distinct implications. Differences between those two groups appeared to be smaller within our model, which might be caused by the rather small number of owners and the in contrast larger, potentially more heterogeneous non-owner group (see Table 6). Future research may conduct a dedicated examination of this segmentation and seek to draw a more balanced sample.

References

Ajzen, H., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs NJ: Prentice Hall.

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211.

Allem, J. P., & Majmundar, A. (2019). Are electric scooters promoted on social media with safety in mind? A case study on Bird's Instagram. Preventive Medicine Reports, 13, 62–63.

Armstrong, J. S., & Overton, T. S. (1977). Estimating Nonresponse Bias in Mail Surveys. Journal of Marketing Research, 14(3), 396–402.

Badeau, A., Carman, C., Newman, M., Steenblik, J., Carlson, M., & Madsen, T. (2019). Emergency department visits for electric scooter-related injuries after introduction of an urban rental program. The American Journal of Emergency Medicine, 37(8), 1531–1533.

Beck, S., Barker, L., Chan, A., & Stanbridge, S. (2019). Emergency department impact following the introduction of an electric scooter sharing service. Emergency Medicine Australasia, 32(3), 409–415.

Benbasat, I., & Barki, H. (2007). Quo vadis TAM?. Journal of the Association for Information Systems, 8(4), 211–218.

Burton-Jones, A., & Straub, D. W. (2006). Reconceptualizing System Usage: An Approach and Empirical Test. Information Systems Research, 17(3), 228–246.

Che, M., Lum, K. M., & Wong, Y. D. (2020). Users' attitudes on electric scooter riding speed on shared footpath: A virtual reality study. International Journal of Sustainable Transportation, 1(2), 1–10.

Cherry, C. R., Weinert, J. X., & Xinmiao, Y. (2009). Comparative environmental impacts of electric bikes in China. Transportation Research Part D: Transport and Environment, 14(5), 281–290.

Choron, R. L., & Sakran, J. V. (2019). The Integration of Electric Scooters: Useful Technology or Public Health Problem? American Journal of Public Health, 109(4), 555–556.

Cordera, R., Dell'Olio, L., Ibeas, A., & Ortúzar, J. D. D. (2019). Demand for environmentally friendly vehicles: A review and new evidence. International Journal of Sustainable Transportation, 13(3), 210–223.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340.

Degele, J., Gorr, A., Haas, K., Kormann, D., Krauss, S., Lipinski, P., Tenbih, M., Koppenhoefer, C., Fauser, J., & Hertweck, D. (2018). Identifying E-Scooter Sharing Customer Segments Using Clustering, in: Conference proceedings, ICE/IEEE ITMC 2018. 2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC): Stuttgart 17.06.-20.06.18. 2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC), Stuttgart. 6/17/2018 - 6/20/2018. IEEE, Piscataway, NJ, 1–8.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. Journal of Social Issues, 56(3), 425–442.

Elkington, J., 1998. Partnerships from cannibals with forks: The triple bottom line of 21st-century business. Environmental Quality Management, 8(1), 37–51.

Fang, S. C., Chang, I. C., & Yu, T. Y. (2015). Assessment of the behavior and characteristics of electric scooter use on islands. Journal of Cleaner Production, 108, 1193–1202.

Ferber, R. (1948). The Problem of Bias in Mail Returns: A Solution. Public Opinion Quarterly, 12(4), 669–676.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Addison-Wesley, Reading, Massachusetts.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

GfK. (2019). Was sind Ihrer Meinung nach die größten Herausforderungen in Hinblick auf die Mobilität der Zukunft? [What are the biggest challenges for mobility?]. Available at: https://de.statista.com/statistik/daten/studie/1069304/umfrage/umfrage-zu-den-herausforderungen-der-mobilitaet-der-zukunft/.

Gössling, S. (2020). Integrating e-scooters in urban transportation: Problems, policies, and the prospect of system change. Transportation Research Part D: Transport and Environment, 79, 102230–102242.

Gössling, S., & Cohen, S. (2014). Why sustainable transport policies will fail: EU climate policy in the light of transport taboos. Journal of Transport Geography, 39, 197–207.

Guerra, E. (2019). Electric vehicles, air pollution, and the motorcycle city: A stated preference survey of consumers' willingness to adopt electric motorcycles in Solo, Indonesia. Transportation Research Part D: Transport and Environment, 68, 52–64.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. Journal of Marketing Theory and Practice, 19(2), 139–152.

Hair, J. F., Risher, J. J., Sarstedt, M., Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24.

Hardt, C., & Bogenberger, K. (2019). Usage of e-Scooters in Urban Environments. Transportation Research Procedia, 37, 155–162.

Haustein, S., & Jensen, A. F. (2018). Factors of electric vehicle adoption: A comparison of conventional and electric car users based on an extended theory of planned behavior. International Journal of Sustainable Transportation, 12(7), 484–496.

Henseler, J. (2012). PLS-MGA: A non-parametric approach to partial least squares-based multi-group analysis. In: Challenges at the interface of data analysis, computer science, and optimization. Springer, 495–501.

Henseler, J., & Chin, W. W. (2010). A Comparison of Approaches for the Analysis of Interaction Effects Between Latent Variables Using Partial Least Squares Path Modeling. Structural Equation Modeling: A Multidisciplinary Journal, 17(1), 82–109.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

Hollingsworth, J., Copeland, B., & Johnson, J. X. (2019). Are e-scooters polluters? The environmental impacts of shared dockless electric scooters. Environmental Research Letters 14(8), 084031.

Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. Journal of Consumer Behaviour: An International Research Review, 6(2-3), 94–110.

James, O., Swiderski, J., Hicks, J., Teoman, D., & Buehler, R. (2019). Pedestrians and E-Scooters: An Initial Look at E-Scooter Parking and Perceptions by Riders and Non-Riders. Sustainability, 11(20), 5591.

Jenn, A., Laberteaux, K., & Clewlow, R. (2018). New mobility service users' perceptions on electric vehicle adoption. International Journal of Sustainable Transportation, 12(7), 526–540.

Jöreskog, K. G., (1971). Simultaneous factor analysis in several populations. Psychometrika, 36(4), 409–426.

Kim, J., Choi, K., Kim, S., & Fujii, S. (2017). How to promote sustainable public bike system from a psychological perspective? International Journal of Sustainable Transportation, 11(4), 272–281.

Kobayashi, L. M., Williams, E., Brown, C. V., Emigh, B. J., Bansal, V., Badiee, J., Checchi, K. D., Castillo, E. M., & Doucet, J. (2019). The e-merging e-pidemic of e-scooters. Trauma Surgery & Acute Care Open 4(1), e000337.

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of e-Collaboration (ijec), 11(4), 1–10.

Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. Information Systems Journal, 28(1), 227–261.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental Education Research, 8(3), 239–260.

Kroesen, M. (2017). To what extent do e-bikes substitute travel by other modes? Evidence from the Netherlands. Transportation Research Part D: Transport and Environment, 53, 377–387.

Lee, K. (2008). Opportunities for green marketing: young consumers. Marketing Intelligence & Plan 26(6), 573–586.

Liew, Y. K., Wee, C. P. J., & Pek, J. H. (2020). New peril on our roads: a retrospective study of electric scooter-related injuries. Singapore Medical Journal, 61(2), 92–95.

Liu, C., & Lin, Z. (2017). How uncertain is the future of electric vehicle market: Results from Monte Carlo simulations using a nested logit model. International Journal of Sustainable Transportation, 11(4), 237–247.

Martínez-Díaz, M., Soriguera, F., & Pérez, I. (2018). Technology: A Necessary but Not Sufficient Condition for Future Personal Mobility. Sustainability, 10(11), 4141.

Masoud, M., Elhenawy, M., Almannaa, M. H., Liu, S. Q., Glaser, S., & Rakotonirainy, A. (2019). Heuristic Approaches to Solve E-Scooter Assignment Problem. IEEE Access, 7, 175093–175105.

McKenzie, G. (2019). Spatiotemporal comparative analysis of scooter-share and bike-share usage patterns in Washington, D.C. Journal of Transport Geography, 78, 19–28.

McKenzie, G. (2020). Urban mobility in the sharing economy: A spatiotemporal comparison of shared mobility services. Computers, Environment and Urban Systems, 79, 101418.

Moreau, H., Jamblinne Meux, L. de, Zeller, V., D'Ans, P., Ruwet, C., & Achten, W. M. J. (2020). Dockless E-Scooter: A Green Solution for Mobility? Comparative Case Study between Dockless E-Scooters, Displaced Transport, and Personal E-Scooters. Sustainability, 12(5), 1803.

Morton, C., Anable, J., & Nelson, J. D. (2017). Consumer structure in the emerging market for electric vehicles: Identifying market segments using cluster analysis. International Journal of Sustainable Transportation, 11(6), 443–459.

Nisson, P. L., Ley, E., & Chu, R. (2020). Electric Scooters: Case Reports Indicate a Growing Public Health Concern. American Journal of Public Health, 110(2), 177–179.

Nysveen, H. (2005). Intentions to Use Mobile Services: Antecedents and Cross-Service Comparisons. Journal of the Academy of Marketing Science, 33(3), 330–346.

Osswald, S., Wurhofer, D., Trösterer, S., Beck, E., & Tscheligi, M. (2012). Predicting information technology usage in the car: towards a car technology acceptance model. Proceedings of the 4th International Conference on Automotive User Interfaces and Interactive Vehicular Applications, 51–58.

Permut, S. E., Michel, A. J., Joseph, M. (1976). The researcher's sample: A review of the choice of respondents in marketing research. Journal of Marketing Research, 13(3), 278-283.

Pham, T. T., Kuo, T. C., Tseng, M. L., Tan, R. R., Tan, K., Ika, D. S., & Lin, C. J. (2019). Industry 4.0 to Accelerate the Circular Economy: A Case Study of Electric Scooter Sharing. Sustainability, 11(23), 6661.

Pickett-Baker, J., & Ozaki, R. (2008). Pro-environmental products: marketing influence on consumer purchase decision. Journal of Consumer Marketing, 25(5), 281–293.

Portland Bureau of Transportation. (2018). E-Scooter Findings Report. Available at: https://www.portlandoregon.gov/transportation/article/709719.

Puzio, T. J., Murphy, P. B., Gazzetta, J., Dineen, H. A., Savage, S. A., Streib, E. W., & Zarzaur, B. L. (2020). The electric scooter: A surging new mode of transportation that comes with risk to riders. Traffic Injury Prevention, 21(2), 175–178.

Rezvani, Z., Jansson, J., & Bodin, J. (2015). Advances in consumer electric vehicle adoption research: A review and research agenda. Transportation Research Part D: Transport and Environment, 34, 122–136.

Sang, Y. N., & Bekhet, H. A. (2015). Modelling electric vehicle usage intentions: an empirical study in Malaysia. Journal of Cleaner Production, 92, 75–83.

Sarstedt, M., Henseler, J., & Ringle, C. M. (2011). Multi-Group Analysis in Partial Least Squares (PLS) Path Modeling: Alternative Methods and Empirical Results. Advances in International Marketing, 22, 195–218.

Seebauer, S. (2015). Why early adopters engage in interpersonal diffusion of technological innovations: An empirical study on electric bicycles and electric scooters. Transportation Research Part A: Policy and Practice, 78, 146–160.

She, Z. Y., Sun, Q., Ma, J. J., & Xie, B. C. (2017). What are the barriers to widespread adoption of battery electric vehicles? A survey of public perception in Tianjin, China. Transport Policy, 56, 29–40.

Sikka, N., Vila, C., Stratton, M., Ghassemi, M., & Pourmand, A. (2019). Sharing the sidewalk: A case of E-scooter related pedestrian injury. The American Journal of Emergency Medicine, 37(9), 1807.e5–1807.e7.

Singh, N., & Matsuo, H. (2004). Measuring cultural adaptation on the web: a content analytic study of US and Japanese web sites. Journal of Business Research, 57(8), 864-872.

Sovacool, B. K., Abrahamse, W., Zhang, L., & Ren, J. (2019). Pleasure or profit? Surveying the purchasing intentions of potential electric vehicle adopters in China. Transportation Research Part A: Policy and Practice, 124, 69–81.

Sun, H. (2012). Understanding user revisions when using information system features: Adaptive system use and triggers. MIS Quarterly, 36(2), 453–478.

Sun, Q., Feng, T., Kemperman, A., & Spahn, A. (2020). Modal shift implications of e-bike use in the Netherlands: Moving towards sustainability? Transportation Research Part D: Transport and Environment, 78, 102202.

Tait, P., Saunders, C., Dalziel, P., Rutherford, P., Driver, T., & Guenther, M. (2020). Comparing generational preferences for individual components of sustainability schemes in the Californian wine market. Applied Economics Letters, 27(13), 1091–1095.

Tezer, A., & Bodur, H. O. (2019). The Greenconsumption Effect: How Using Green Products Improves Consumption Experience. Journal of Consumer Research, 47(1), 25–39.

Tuncer, S., Laurier, E., Brown, B., & Licoppe, C. (2020). Notes on the practices and appearances of e-scooter users in public space. Journal of Transport Geography, 85, 102702.

Van der Heijden, H. (2004). User acceptance of hedonic information systems. MIS Quarterly, 28(4), 695–704.

VDV (Association of German Transport Companies). Available at: https://www.vdv.de/english_2.aspx.

Venkatesh, V., Davis, F. D., & Morris, M. G. (2007). Dead Or Alive? The Development, Trajectory And Future Of Technology Adoption Research. Journal of the Association for Information Systems, 8(4), 267–286.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425–478.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157–178.

Wang, Y. W. (2007). An optimal location choice model for recreation-oriented scooter recharge stations. Transportation Research Part D: Transport and Environment, 12(3), 231–237.

Weiss, M., Dekker, P., Moro, A., Scholz, H., & Patel, M. K. (2015). On the electrification of road transportation – A review of the environmental, economic, and social performance of electric two-wheelers. Transportation Research Part D: Transport and Environment, 41, 348–366.

Woodside, A. G. (2013). Moving beyond multiple regression analysis to algorithms: Calling for adoption of a paradigm shift from symmetric to asymmetric thinking in data analysis and crafting theory. Journal of Business Research, 66(4), 463–472.

Xu, J., Shang, S., Yu, G., Qi, H., Wang, Y., & Xu, S. (2016). Are electric self-balancing scooters safe in vehicle crash accidents? Accident Analysis and Prevention, 87, 102–116.

Yadav, R., & Pathak, G. S. (2016). Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behavior. Journal of Cleaner Production, 135, 732–739.

Yang, H., Ma, Q., Wang, Z., Cai, Q., Xie, K., & Di Yang. (2020). Safety of micro-mobility: Analysis of E-Scooter crashes by mining news reports. Accident Analysis & Prevention, 143, 105608.

YouGov, 2019. Sehen Sie E-Scooter für sich persönlich eher als Möglichkeit, sich umweltfreundlich fortzubewegen oder ist der E-Scooter für Sie ein Fortbewegungsmittel zum Vergnügen? [Do you perceive e-scooters as an environmentally friendly mode of transportation or rather a vehicle for entertainment purposes?]. Available at: https://yougov.de/opi/surveys/results/#/survey/8a752e0f-a158-11e9-8fc2-83a62feecb3c/question/f3181755-a162-11e9-bd83-c1c26ae0f2f3/gender.

Zagorskas, J., & Burinskienė, M. (2020). Challenges Caused by Increased Use of E-Powered Personal Mobility Vehicles in European Cities. Sustainability, 12(1), 273.

Essay 10: Above and beyond meat: the role of consumers' dietary behavior for the purchase of plant-based food substitutes

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Abstract

Shrinking meat intake levels and simultaneously increasing consumption of plant-based products among consumers suggest that consumers' dietary behavior implies the purchase of plant-based food substitutes. We contribute to the literature by investigating the most important determinants of consumers' dietary behavior and attitude towards plant-based food substitutes and whether consumers' dietary behavior is of relevance for the attitude towards plant-based food substitutes. Data of 1,363 consumers was used for structural equation modeling as well as necessary condition analysis. Consumers' dietary behavior is found to play only a minor role in attitude formation towards plant-based food substitutes. Dietary behavior is primarily influenced by animal welfare concerns. We did not find environmental concerns, consumers' perceived effectiveness, and health consciousness to influence dietary behavior. However, as consumers associate a high standard of animal welfare with healthiness and food safety, following a plant-based diet due to animal welfare concerns might be an altruistic pretext for health consciousness as an egoistic motive.

Keywords dietary behavior; structural equation modeling; necessary condition analysis; plant-based food substitutes; health; environmental concerns; animal welfare

1 Introduction

Throughout past years, consumers' dietary behavior is shifting in terms of a steadily decreasing meat intake and increasing consumption of plant-based products: meat consumption continues to sink in large European countries like Germany, France, and Italy (Agriculture and Agri-Food Canada 2017). Simultaneously, the plant-based food market increased by 29 % from 3.9 billion US dollars to 5.0 billion US dollars from 2017 to 2019 in the US alone (PBFA and GFI 2020), and meat substitute sales are expected to continue to grow in Germany with a value of 255.6 million US dollars in 2020 (Agriculture and Agri-Food Canada 2017). This increase in plant-based food substitute market value and the simultaneous decline in meat intake suggests that the concept of consumers' dietary behavior is closely related to the purchase of plant-based food substitutes. As omnivores frequently associate a plant-based diet with negative attributes (e.g., negative stereotypes or nutritional deficiencies) (Lea and Worsley 2001; Pohjolainen et al. 2015), it appears likely that only vegetarians and vegans are interested in purchasing plant-based food substitutes. However, research found consumers with a high nutritional knowledge to exhibit a negative attitude towards meat (Shepherd and Towler 2007) and hence, health-conscious individuals with a lower meat intake level may also be targeted by plant-based substitutes.

Further, to gather a better understanding of the impact of consumers' dietary behavior on plant-based food substitutes, the primary motives for a consumer's dietary behavior need to be investigated. Exploratory research found health-related (Dyett et al. 2013; Janssen et al. 2016; Lea et al. 2006b), environmental-related (Janssen et al. 2016; Mullee et al. 2017), and animal welfare-related aspects (Mullee et al. 2017) to be the main benefits associated with a plant-based diet. However, contrary findings were gathered among omnivores, linking a plant-based diet with nutrient deficiencies (Corrin and Papadopoulos 2017; Lea et al. 2006a; Lea and Worsley 2001; Pohjolainen et al. 2015) and refusing to reduce meat consumption due to health reasons (Boer et al. 2017). Similarly, environmental impact only played a negligible role for dietary behavior in some studies (Fox and Ward 2008; Povey et al. 2001). Apparently, determinants of consumers' dietary behavior and plant-based food substitute purchase behavior are still not fully understood.

We thus contribute to the literature by investigating whether consumers' dietary behavior is determined by different altruistic or egoistic motives or perceived consumers' effectiveness, and whether consumers' dietary behavior is of relevance for the attitude towards plant-based food substitutes. We compile and test a model based on the Theory of Reasoned Action (TRA) (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975), and employ structural equation modeling using partial least squares (PLS-SEM). As a result, we expect to identify factors that are sufficient to shift consumers' diet towards being plant-based and examine the linkage between dietary behavior and attitude towards plant-based food substitutes. PLS-SEM is complemented with a necessary condition analysis (NCA) (Dul 2016a) to gain further insights into the potential necessity of factors. To combine both approaches, we draw on the procedure recently suggested in the PLS literature and use latent variable scores as input for NCA (Richter et al. 2020).

The remainder of this study is structured as follows: We first outline the relevant theoretical background, then describe our methodology, and report our results. Section 5 first merges and discusses the findings of both PLS-SEM as well as NCA and then depicts our theoretical contribution and practical implications. Section 6 draws concluding remarks and outlines limitations as well as directions for future research.

2 Related work and hypotheses

2.1 Theory Of Reasoned Action

For decades, researchers draw on the TRA (Ajzen and Fishbein 1980; Fishbein and Ajzen 1975) to explain an individual's behavior. At its core, the TRA assumes behavior to be determined by an individual's behavioral intention to exhibit the respective behavior. Behavioral intention, in turn, is influenced by both an intrinsic (i.e., attitudinal) as well as an extrinsic (i.e., social) component. The former aspect, an individual's attitude towards a behavior, is assumed to be a function of the individual's be-

havioral beliefs about the likelihood of the behavior's consequences and the evaluation of these consequences. The latter aspect, subjective norm, is a function of normative beliefs regarding what the individual's relevant others think about the behavior and the individual's motivation to comply with this evaluation. However, the influence of attitude and subjective norm on intention is not always equal: Depending on the specific behavior, the situation, and individual differences of the actor, the strength of the impact of the attitudinal and normative component on behavioral intention varies (Ajzen and Fishbein 1980).

The TRA predicts primarily volitional behavior, i.e., behavior over which the individual completely has control, or behavior which does not require skills, opportunities, or cooperation of others (Ajzen 1988; Fishbein and Ajzen 1975; Webb and Sheeran 2006). However, behavior is often assumed to be neither entirely volitional nor entirely involitional but ranges in between (Liska 1984). Thus, the Theory of Planned Behavior (TPB) added the concept of perceived behavioral control and incorporated factors internal (e.g., skills or abilities) and external (e.g., time or opportunity) to the person (Ajzen 1985, 1988). It captures the individual's beliefs about how easy or difficult the behavior's performance is assumed to be (Ajzen and Madden 1986). Therefore, it is frequently compared to the notion of self-efficacy (Ajzen 1991; Ajzen and Madden 1986; Bandura 1982).

Both the TRA and the TPB (or extracts) were used to elucidate the purchase behavior of green products in general (Chan 2001; Jaiswal and Kant 2018; Kautish et al. 2019; Yadav and Pathak 2016, 2017) as well as of organic food (Michaelidou and Hassan 2008; Singh and Verma 2017; Smith and Paladino 2010; Vermeir and Verbeke 2006, 2008). We thus draw on the TRA to elucidate the purchase intention of plant-based substitutes:

H_1: Attitude towards plant-based food substitutes has a positive impact on purchase intention for plant-based food substitutes.

H_2: Subjective norm has a positive impact on purchase intention for plant-based food substitutes.

2.2 Consumers' dietary behavior

The intrinsic component of purchase intention, i.e., attitude, towards specific food products (such as plant-based food substitutes) may strongly depend on the consumer's diet. Research found the main barriers towards a plant-based diet among omnivores to be health concerns about vegetarianism, such as nutrient deficiencies (Corrin and Papadopoulos 2017; Lea et al. 2006a; Lea and Worsley 2001; Pohjolainen et al. 2015), convenience and habit in terms of food neophobia (Corrin and Papadopoulos 2017; Lea et al. 2006a; Lea and Worsley 2001; Pohjolainen et al. 2015), social concerns such as negative stereotypes (Lea and Worsley 2001), and hedonic barriers such as meat enjoyment (Corrin and Papadopoulos 2017; Lea et al. 2006a; Lea and Worsley 2001; Pohjolainen et al. 2015). Consequently, such consumers may consider plant-based food substitutes unnecessary and exhibit a rather negative attitude towards such products.

Thus, it appears likely that plant-based food substitutes may be particularly of interest for vegan and vegetarian consumers or individuals with specific allergies. However, extant research found health-conscious individuals with a high nutritional knowledge to have a negative attitude towards meat products (Shepherd and Towler 2007) and, thus, even non-vegetarian but health-conscious consumers with lower meat intake levels may have a positive attitude towards such plant-based products. Nevertheless, paradoxically, low meat-eating consumers were found to be unwilling to give up meat consumption entirely due to health reasons (Boer et al. 2017). We thus hypothesize:

H3: A consumer's dietary behavior (in terms of a plant-based diet) has a positive impact on attitude towards plant-based food substitutes.

2.3 Altruistic motives: environmental concerns and animal welfare concerns

Within the literature, an individual's degree of emotional attachment to environmental problems and its enduring beliefs and feelings about the environment are referred to as the individual's ecological affect or environmental concerns (Chan 2001; Maloney et al. 1975; Weigel and Weigel 1978). An overview of studies employing environmental concerns suggests that attitude as well as green behavior can be predicted using this variable (Kautish and Sharma 2019; Sharma and Joshi 2017). Sophisticated approaches provide a granular depiction of the concept, and assume environmental concerns to reflect three facets: Mostly, consumers' environmental concerns are referred to as a social-altruistic value orientation and imply that "an individual would bear personal costs to safeguard the environment only when doing so would protect other human beings" (Stern et al. 1993). However, if environmental concerns were based on self-interest and egoistic value orientation, an individual would only feel responsible for protecting the environment if the expected benefit for the individual itself outweighed the expected costs (Stern et al. 1993). The third dimension of environmental concerns comprises an individual's biospheric values: the individual would express concerns regarding other species and their habitat but would be unconcerned when environmental issues only affect other humans (Stern et al. 1993). Notwithstanding the construct's different conceptualizations, environmental concerns were frequently found to determine an individual's attitude towards green products (Chan 2001; Goh and Balaji 2016; Mostafa 2007; Prakash and Pathak 2017; Yadav and Pathak 2016) and organic food (Smith and Paladino 2010; Thogersen 2009), assuming that attitude comprises both cognitive as well as affective components (Ajzen 2001; Ajzen and Driver 1991; Petty et al. 1991).

Environmental concerns were found to be among the major motives to follow a vegan or vegetarian diet (Janssen et al. 2016). Even omnivores stated the environmental impact to be the main reason to eat a vegetarian diet (Mullee et al. 2017). However, other studies found environmentalism to play a minor role with respect to dietary behavior (Fox and Ward 2008; Povey et al. 2001) and further indicated a lack of awareness regarding the environmental impact of meat consumption (Macdiarmid et al. 2016).

We thus hypothesize:

H4A: Environmental concerns have a positive impact on attitude towards plant-based food substitutes.

H4B: Environmental concerns have a positive impact on consumer's dietary behavior (in terms of a plant-based diet).

Aside from environmental concerns, animal welfare concerns are a crucial altruistic facet to potentially influence both diet as well as attitude towards plant-based food substitutes. Animal welfare concerns cover both social and nutritional aspects (Hughner et al. 2007), as consumers draw on the standard of animal welfare as an indicator of food safety and healthiness (Harper and Makatouni 2002). Consumers associate, e.g., organic food with the humane treatment of animals (Harper and Makatouni 2002), and thus, a high standard of animal well-being is a motive for buying organic food (Hill and Lynchehaun 2002). Moreover, Jabs et al. (1998) described ethical vegetarians as a group of consumers being motivated to follow a vegetarian diet to align their diet with their beliefs and values about animal welfare. Even omnivores named animal welfare to be a major motive to follow a vegetarian diet (Mullee et al. 2017). We, therefore, derive the following hypotheses:

H5A: Animal welfare concerns have a positive impact on attitude towards plant-based food substitutes.

H5B: Animal welfare concerns have a positive impact on consumer's dietary behavior (in terms of a plant-based diet).

2.4 Egoistic motive: health consciousness

Health-conscious consumers are highly involved in healthy behavior and disease prevention, as they are concerned about their well-being and, thus, tend to have high nutritional knowledge (Gould 1988; Kraft and Goodell 1993; Newsom et al. 2005). Health consciousness was found to be the key motive to purchase organic food (Davies et al. 1995; Magnusson et al. 2001; Squires et al. 2001; Tregear et al. 1994) and further, the most im-portant reason among omnivores to change consumption habits in terms of eating less meat (Latvala et al. 2012) as well as to eat an entirely vegetarian diet (Mullee et al. 2017). Health and disease prevention were found to be the main benefit associated with a plant-based diet (Lea et al. 2006b). Jabs et al. (1998) classified health vegetarians as driven by an enduring perceived threat of disease and potential health benefits associated with a plant-based diet.

Health consciousness can thus not only be assumed to be one of the primary determinants of an individual's diet (Dyett et al. 2013) but further to be a cognitive component of an indi-vidual's attitude towards plant-based food substitutes: as a plant-based diet is associated with healthiness and disease prevention (Lea et al. 2006b), health-conscious consumers are expected to exhibit a positive attitude towards plant-based substitutes. We, therefore, derive the following hypotheses:

H6A: Health consciousness has a positive impact on attitude towards plant-based food substitutes.

H6B: Health consciousness has a positive impact on consumers' dietary behavior (in terms of a plant-based diet).

2.5 Perceived consumer effectiveness

Perceived consumer effectiveness comprises an individual's beliefs about whether his or her actions affect the environment and whether he or she can do anything to decrease his or her impact (Kinnear et al. 1974; Roberts 1996; Webster 1975). The concept is closely related to the concept of socially conscious (or responsible) consumers (Anderson and Cunningham 1972; Antil 1984) and self-efficacy (Bandura 1982; Vermeir and Verbeke 2008). Initially, perceived consumer effectiveness was treated equivalent to attitude (Antil 1984; Kinnear et al. 1974; Webster 1975), but further studies modeled attitude and perceived consumer effectiveness as two distinct constructs (Ellen et al. 1991): while attitude is considered an evaluation of an individual's beliefs and feelings about an object, perceived consumer effectiveness is the evaluation of the individual's self in the respective context (Berger and Corbin 1992). Drawing on this conceptualization with perceived consumer effectiveness as a stand-alone construct, it was frequently considered one of the central antecedents of an individual's attitude in green and organic food literature (Jaiswal and Kant 2018; Vermeir and Verbeke 2006), and has been verified as a determinant for pro-environmental behavior (Kautish and Sharma 2020; Park and Lin 2018; Taufique and Vaithianathan 2018). Further, the individual's belief about whether his or her actions and consumption behavior enhance environmental protection may influence his or her dietary behavior. We hence hypothesize:

H7A: Perceived consumer effectiveness has a positive impact on attitude towards plant-based food substitutes.

H7B: Perceived consumer effectiveness positively impacts consumers' dietary behavior (in terms of a plant-based diet).

Figure 1 depicts the final research model.

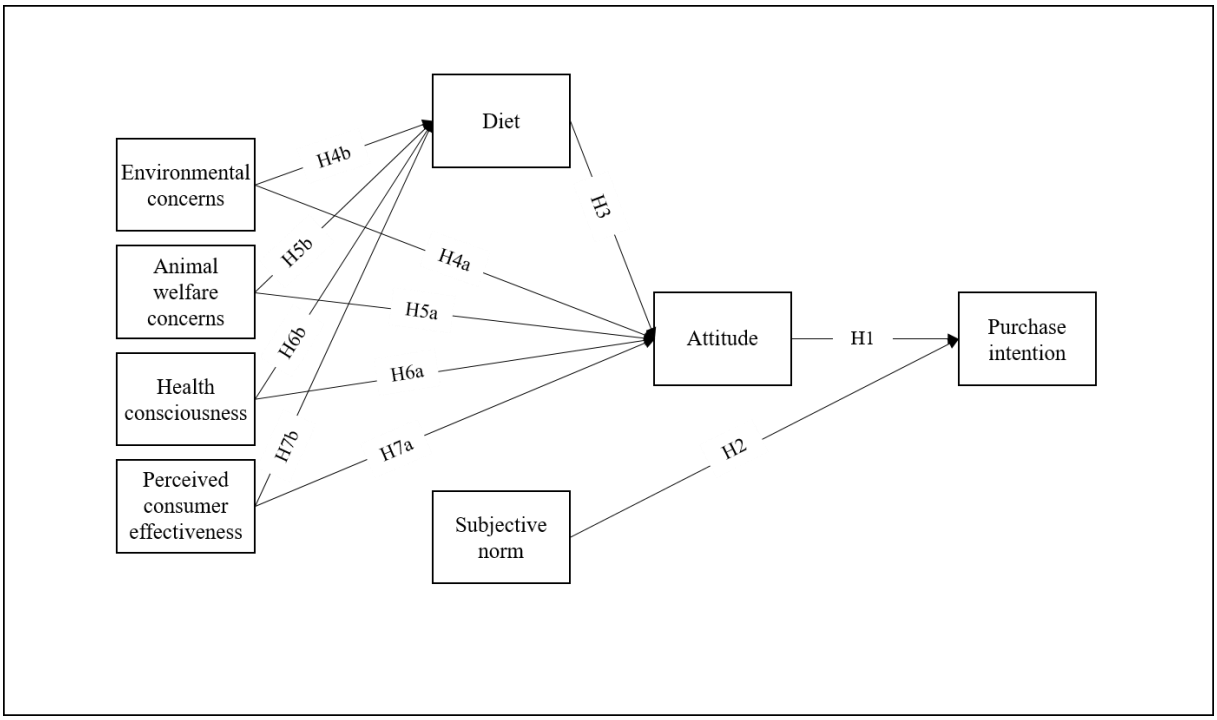

Figure 1: Research model and hypotheses.

3 Methodology

3.1 Conceptualization

We designed an online questionnaire comprising three major sections: The first part inquired respondents' dietary behavior (i.e., omnivore, flexitarian, pescetarian, vegetarian, mostly vegan, vegan), allergies, and meat consumption frequency (ranging from 'never' to 'daily' on a five-point scale). In the main part, respondents assessed the construct's items. All items were measured on a five-point Likert-type scale from 'Strongly disagree' = 1 to 'Strongly agree' = 5. The altruistic motives, animal welfare concerns, and environmental concerns were measured with scales derived from Hill and Lynchehaun (2002) and Harper and Makatouni (2002) as well as Lee (2008) and Dunlap et al. (2000) respectively. The egoistic motive health consciousness was measured with items from Schifferstein and Oude Ophuis (1998). Items for perceived consumer effectiveness were adopted from Roberts (1996) and Webster (1975). Subjective norm was assessed with items of Ajzen and Madden (1986). For the measurement of purchase intention, we utilized the scales of Tarkiainen and Sundqvist (2005) as well as Michaelidou and Hassan (2008). Only attitude was measured with semantic-differential scales of Taylor and Todd (1995), which were adapted from Ajzen (1985, 1991) and Ajzen and Fishbein (1980). Appendix B provides all items. The questionnaires' last part inquired about the respondents' demographics.

3.2 Data collection and descriptive statistics

Data collection was conducted over five weeks in July and August 2020. Qualtrics was used to capture the responses. In total, 1793 questionnaires were collected. After removing incompletes, 1442 observations were retained. Checking for straightliners and speeders, it was not necessary to exclude data points.

The respondents' age ranged between 15 and 78, with a mean of 25.55 years and a standard deviation of 7.97. However, assessing quartiles and the median value revealed that the sample primarily consists of participants in their twenties (lower quartile = 21, median = 24, upper quartile = 27). Hence, the sample appears to correspond to Generation Y roughly. Still, outlier detection was based on standard statistical techniques, and observations exceeding 1.5 standard deviations were excluded. Consequently, 79 data points above the age threshold of 37 were omitted. Thus, in total, 1363 questionnaires were used for analysis. The majority of participants were women (n=1276, 93.6 %). Our sample comprises 341 omnivores (25.0 %), 412 flexitarian (30.2 %), eight pescetarian (0.6 %), 415 vegetarians (30.4 %), nine mostly-vegans (0.7%), and 178 vegans (13.1 %). Most participants indicated having no food intolerance (n=1,037, 76.1 %), and 140 participants indicated to be lactose intolerant (10.3 %). Two hundred ninety-seven respondents (21.8 %) are eating meat several times per week, and only 11 respondents (0.8 %) indicated to eat meat daily. Most participants' income (n=360, 26.4 %) is between 501 and 1000 Euros and the majority of the respondents are students (n=715, 52.5 %).

4 Results

4.1 Measurement model evaluation

PLS-SEM is employed for model calculation, and the SmartPLS 3.3.2 software was used (Ringle et al. 2015). As we focus on verifying our model structure and testing hypotheses, as opposed to prediction, we employ the consistent PLS algorithm (Dijkstra and Henseler 2015). The calculation is carried out using a path weighting scheme with 300 maximum iterations and a stop criterion of 10^{-7}. Convergence was reached after five iterations.

An assessment of the outer loadings, calculated through confirmatory composite analysis (Hair et al. 2020), reveals that five indicators fall short of the recommended threshold of 0.708 (Hair et al. 2019), which are AWEL2 (outer loading = 0.494), ECON1 (0.622), HCON1 (0.656), HCON3 (0.524), and SNORM2 (0.696). Albeit the construct's validity and reliability could be confirmed by drawing on Cronbach's Alpha, composite reliability, and the average variance extracted (AVE) (Benitez et al. 2020), AWEL2 is removed from the outer model. As all constructs pass the recommended threshold for validity and reliability, the remaining indicators are kept in the model. A bootstrapping procedure with 10,000 draws is used to derive 95 percent confidence intervals for each of the criteria, confirming that they neither fall short nor exceed their acceptable ranges (0.70 to 0.95 for Cronbach's Alpha, composite reliability, and ρA, higher than 0.50 for AVE) (Henseler et al. 2016). Table 1 summarizes the results. The empirical covariance matrix is provided in Appendix A. Appendix B provides the items' loadings.

Table 1: Assessment of convergent validity and internal consistency reliability.

Note: DIET is a single-item construct. Ninety-five percent confidence interval (bias-corrected and accelerated) in parentheses. ATT = attitude towards plant-based food substitutes, AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness, PI = purchase intention, SNORM = subjective norm.

	Cronbach's Alpha	ρ_A	Composite Reliability	AVE
ATT	0.925 [0.915, 0.933]	0.926 [0.916, 0.934]	0.925 [0.915, 0.933]	0.804 [0.782, 0.823]
AWEL	0.846 [0.830, 0.861]	0.848 [0.830, 0.862]	0.847 [0.830, 0.861]	0.649 [0.620, 0.675]
DIET	Single-item	Single-item	Single-item	Single-item
PCE	0.881 [0.865, 0.895]	0.882 [0.865, 0.895]	0.881 [0.865, 0.895]	0.712 [0.681, 0.740]
PI	0.917 [0.904, 0.929]	0.928 [0.917, 0.937]	0.919 [0.906, 0.930]	0.741 [0.711, 0.770]
SNORM	0.778 [0.753, 0.801]	0.784 [0.755, 0.807]	0.782 [0.756, 0.804]	0.545 [0.508, 0.578]
ECON	0.835 [0.816, 0.853]	0.846 [0.826, 0.862]	0.837 [0.818, 0.855]	0.565 [0.532, 0.597]
HCON	0.805 [0.786, 0.822]	0.837 [0.813, 0.865]	0.803 [0.783, 0.822]	0.515 [0.485, 0.544]

To ensure discriminant validity, the Fornell-Larcker criterion, an evaluation of cross-loadings, and the heterotrait-monotrait ratio (HTMT) (Henseler et al. 2015) are used. For the HTMT ratio, HTMTinference is calculated using bootstrapping with 10,000 draws. All 95 percent confidence intervals are far off the null value of 1, corroborating discriminant validity (the highest value is 0.874 for the pair PI/ATT; all other values are 0.685 or lower). Computation of the 99 percent confidence intervals moves the upper boundary, i.e., PI/ATT, to 0.882, with the second-highest value of 0.695. Table 2 displays the HTMT ratios; the Fornell-Larcker criterion and the cross-loadings are provided in Appendices C and D. Discriminant validity could be confirmed and, as such, the assessment of the outer model is complete. Drawing on the Standardized Root Mean Square Residual (SRMR, 0.043) and the Normed Fit Index (NFI, 0.938), the model's structure is verified as well.

Table 2: Assessment of discriminant validity (HTMT ratios).

Note: ATT = attitude towards plant-based food substitutes, AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness, PI = purchase intention, SNORM = subjective norm.

	ATT	AWEL	DIET	ECON	HCON	PCE	PI	SNORM
ATT								
AWEL	0.398							
DIET	0.455	0.651						
ECON	0.400	0.416	0.366					
HCON	0.270	0.428	0.288	0.311				
PCE	0.651	0.389	0.403	0.403	0.302			
PI	0.850	0.438	0.511	0.441	0.246	0.607		
SNORM	0.369	0.279	0.256	0.268	0.174	0.275	0.390	

4.2 Structural model evaluation

The inner model is evaluated drawing on variance inflation factors (VIFs) to check potential collinearity problems. All values are relatively low and range between 1.157 and 2.021. Consequently, the absence of collinearity issues is assumed (Hair et al. 2019). Common method bias is addressed using the approach suggested by Kock (2015), demanding that in a full collinearity check, all VIF values need to

remain below the threshold of 3.3. This assessment is passed, indicating that common method bias is not a threat to the study at hand. Complementary usage of the Harman's single-factors test (Podsakoff and Organ 1986) confirms this result.

To assess the structural model's explanatory power, the coefficient of determination (R^2) is employed. As Table 3 shows, predictive relevance could be established. Interpretations of R^2 values may follow a standardized guideline, as provided in Table 3; however, it is essential to acknowledge that these values are context-dependent. As there is no benchmark from similar studies so far, it is difficult to provide an evaluation. In the case of PI, it is reasonably straightforward to assume a good explanation of variance. For ATT and DIET, about half of the variance could be explained. Regarding that four constructs were used as predictors in both cases, the R^2 value may be interpreted as moderate.

Table 3: Explanatory power evaluation.

Note: Interpretation adopted from Hair et al. (2019). ATT = attitude towards plant-based food substitutes, DIET = consumers' dietary behavior, PI = purchase intention.

	R^2 value	R^2 adjusted	Interpretation
ATT	0.478	0.476	Moderate
DIET	0.456	0.454	Moderate
PI	0.726	0.726	Moderate to substantial

After assessing the inner model's properties, hypotheses testing is carried out using bootstrapping with 10,000 draws. Table 4 displays our findings, revealing that most hypotheses, except H5a, H6a, and H6b, could be corroborated. As a result, we found evidence that neither AWEL nor HCON influence ATT (H5a and H6a), and HCON further appears not to impact DIET (H6b).

Table 4: Hypotheses testing.

Note: ATT = attitude towards plant-based food substitutes, AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness, PI = purchase intention, SNORM = subjective norm.

Hypothesis				Path coefficient (f^2 value)	95 percent confidence interval (BCa)	T-value (p-value)
H1	ATT	→	PI	0.816 (2.101)	[0.781, 0.847]	49.085 (< 0.001)
H2	SNORM	→	PI	0.088 (0.024)	[0.046, 0.129]	4.177 (< 0.001)
H3	DIET	→	ATT	0.190 (0.038)	[0.126, 0.250]	5.984 (< 0.001)
H4a	ECON	→	ATT	0.108 (0.017)	[0.045, 0.170]	3.380 (0.001)
H4b	ECON	→	DIET	0.075 (0.008)	[0.020, 0.127]	2.756 (0.006)
H5a	AWEL	→	ATT	0.025 (0.001)	[-0.054, 0.107]	0.600 (0.548)
H5b	AWEL	→	DIET	0.572 (0.423)	[0.519, 0.624]	21.560 (< 0.001)
H6a	HCON	→	ATT	0.005 (< 0.001)	[-0.054, 0.060]	0.173 (0.862)
H6b	HCON	→	DIET	-0.034 (0.002)	[-0.085, 0.018]	1.275 (0.202)
H7a	PCE	→	ATT	0.518 (0.382)	[0.456, 0.580]	16.432 (< 0.001)
H7b	PCE	→	DIET	0.161 (0.036)	[0.099, 0.217]	5.349 (< 0.001)

Using the f^2 values to interpret statistically significant relations, PCE has a large effect on ATT, while ECON falls slightly short of being considered a small effect (Hair et al. 2019). Regarding DIET, however, AWEL is the strongest predictor with a large effect ($f^2 = 0.423$), followed by PCE with a small effect ($f^2 = 0.036$). ECON does not strikingly influence DIET ($f^2 = 0.008$).

Finally, ATT has a strikingly large impact on PI ($f^2 = 2.101$), and the path coefficient indicates a symmetric relation (0.816) (Woodside 2013). In contrast, the impact of SNORM on PI can be considered small. In total, PI is more substantially shaped by behavioral beliefs (in the form of ATT) than by normative beliefs (in the form of SNORM); however, both influences are statistically convincing. Further, our model can explain DIET reasonably well, finding that AWEL is the most significant factor. Figure 2 provides a more parsimonious depiction of the most fundamental results.

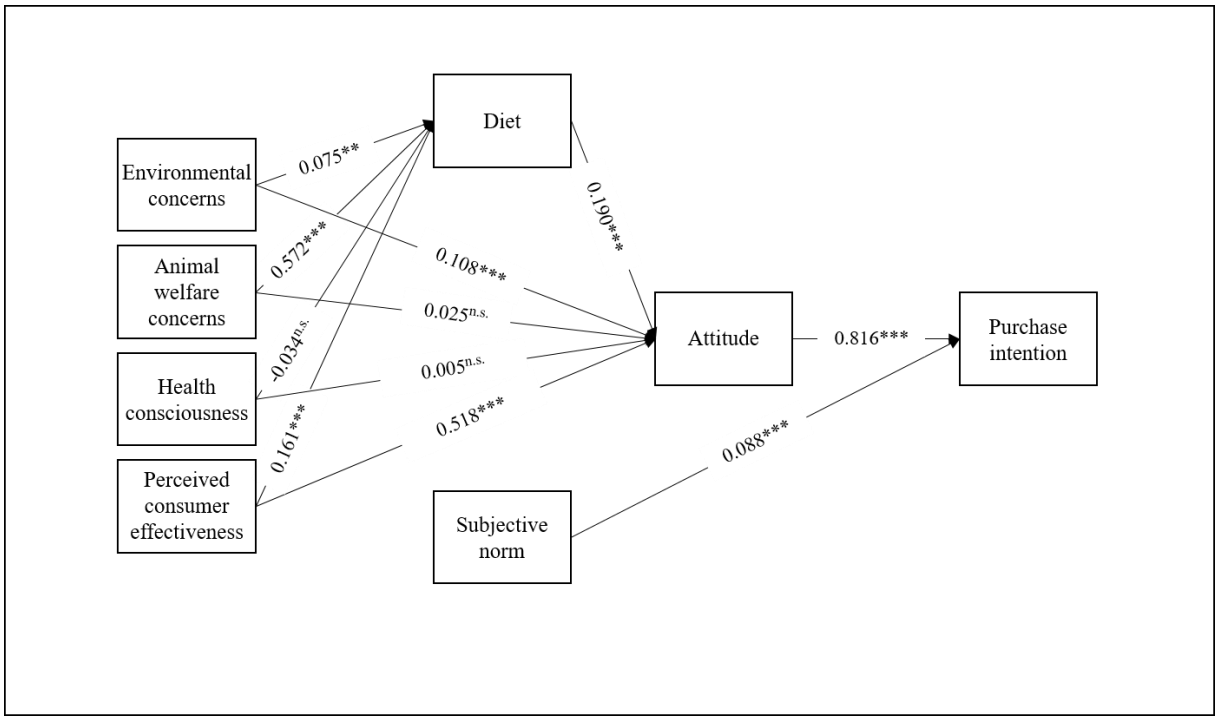

Figure 2: PLS-SEM results.

Note: Values indicate path coefficients; ** $p \leq 0.01$, *** $p \leq 0.001$, n.s. = not significant.

4.3 Necessary condition analysis

Consistent with recommendations by Richter et al. (2020), PLS-SEM findings are treated as providing information about the constructs' sufficiency for the outcome. As a complement, NCA (Dul 2016a) is performed using latent variable scores as input (Richter et al. 2020). To do so, we derived scores by using the PLS algorithm for composites (path weighting scheme, 300 maximum iterations, stop criterion of 10^{-7}), and performed the regular assessment we used for the consistent PLS-SEM, which confirmed the viability of both our measurement and our structural model. Our model includes three endogenous variables – ATT, DIET, and PI – and, consequently, three NCAs need to be run. Due to all latent variables being measured reflectively, only the latent variable scores are required in the analyses.

The first NCA run tests for the necessity of AWEL and PCE for the occurrence of ATT. To test the effects for statistical significance, a bootstrapping procedure with 10,000 draws was implemented. For drawing the ceiling line, ceiling regression – free disposal hull (CR-FDH) was used (Dul 2016b). Table 5 summarizes the results.

Table 5: NCA results for ATT as the outcome.

Note: Observations indicate the number of data points above the ceiling line. ATT = attitude towards plant-based food substitutes, AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness.

Condition	Observations	Accuracy	p-accuracy	Effect size d	p-value
ECON	1	99.9 %	< 0.001	0.029	0.002
HCON	1	99.9 %	0.007	0.012	0.138
AWEL	0	100.0 %	0.002	0.012	0.008
PCE	0	100.0 %	< 0.001	< 0.001	1
DIET	0	100.0 %	< 0.001	< 0.001	1

On a significance level of 0.05, which was also employed for the PLS-SEM, both PCE and AWEL are identified as necessary conditions for ATT. Regarding interpretation recommendations for d, the effects of ECON, HCON, and AWEL may be considered small, while for PCE and DIET, no influence could be detected (Dul 2016b). More detailed insights can be gained from the bottleneck technique, which is provided in Table 6.

Table 6: Bottleneck table for ATT.

Note: NN = not necessary. Y = outcome, i.e., ATT. All values in percent. ATT = attitude towards plant-based food substitutes, AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness.

Y	ECON	HCON	AWEL	PCE	DIET
0	NN	NN	NN	NN	NN
10	NN	NN	NN	NN	NN
20	NN	NN	NN	NN	NN
30	0.2	NN	NN	NN	NN
40	1.3	NN	NN	NN	NN
50	2.4	NN	NN	NN	NN
60	3.6	NN	NN	NN	NN
70	4.7	< 0.1	NN	NN	NN
80	5.8	2.7	1.9	NN	NN
90	6.9	5.4	5.7	NN	NN
100	8.0	8.0	9.4	NN	NN

As the bottleneck table displays, ECON is the first variable to impose constraints; however, its impact is reasonably weak, with only 8.0 % of the range of ECON being required for ATT to unfold its full potential. Similar observations can be made for HCON (however, its impact is not statistically significant) and AWEL, and in the cases of PCE and DIET, no necessity was identified at all.

The second analysis run seeks to examine the constraint imposed on DIET. Table 7 displays the results, indicating that AWEL has a significant effect on DIET, while all other constructs do not yield striking influence.

Table 7: NCA results for DIET as the outcome.

Note: Observations indicate the number of data points above the ceiling line. AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness.

Condition	Observations	Accuracy	p-accuracy	Effect size d	p-value
ECON	0	100.0 %	0.010	0.032	0.426
HCON	1	99.9 %	0.009	0.045	0.365
AWEL	2	99.9 %	< 0.001	0.233	< 0.001
PCE	0	100.0 %	0.006	0.050	0.106

Table 8 shows the bottleneck table for DIET as the outcome. For all four variables, constraints can be observed; however, as only AWEL's effect was found to be statistically significant, we deem it adequate to restrict interpretation to this factor. AWEL comes into play for rather small outcome values (Y = 0.30) and quickly gains importance. For example, in the case of Y = 0.50 as the desired outcome, 19.5 % of AWEL's range needs to be realized, while for Y = 0.60, this value increases to about a quarter. For Y = 70, more than a third is required, and Y = 80 may only be observed when about half of AWEL's range is in place.

Table 8: Bottleneck table for DIET.

Note: NN = not necessary. Y = outcome, i.e., DIET. All values in percent. AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness.

Y	ECON	HCON	AWEL	PCE
0	NN	NN	NN	NN
10	NN	NN	NN	NN
20	< 0.1	NN	NN	NN
30	1.0	NN	1.3	NN
40	2.0	0.3	10.4	NN
50	3.0	2.7	19.5	NN
60	4.0	5.0	28.6	NN
70	5.0	7.4	37.8	6.2
80	6.0	9.8	46.9	12.5
90	7.0	12.2	56.0	18.7
100	8.0	14.6	65.1	25.0

The third and final run examines the occurrence of PI. Table 9 summarizes the results for the bootstrapping procedure, finding ATT to exhibit an impact, while SNORM is identified as not being a necessary condition.

Table 9: NCA results for PI as the outcome.

Note: Observations indicate the number of data points above the ceiling line. ATT = attitude towards plant-based food substitutes, PI = purchase intention, SNORM = subjective norm.

Condition	Observations	Accuracy	p-accuracy	Effect size d	p-value
ATT	1	99.9 %	< 0.001	0.201	< 0.001
SNORM	0	100.0 %	< 0.001	< 0.001	1

Again, the bottleneck technique is employed for further examination. The results are provided in Table 10. SNORM is found not to yield any constraints at all. ATT, however, imposes constraints even for

small values of the outcome and requires moderate values (30.9 % to 48.2 % of range) to allow high outcome levels to occur.

Table 10: Bottleneck table for PI.

Note: NN = not necessary. Y = outcome, i.e., PI. All values in percent. ATT = attitude towards plant-based food substitutes, PI = purchase intention, SNORM = subjective norm.

Y	ATT	SNORM
0	NN	NN
10	NN	NN
20	2.0	NN
30	7.8	NN
40	13.6	NN
50	19.4	NN
60	25.1	NN
70	30.9	NN
80	36.7	NN
90	42.5	NN
100	48.2	NN

Altogether, NCA complements the results derived from PLS. First, no evidence for SNORM being a necessary condition could be found, and only a weak (but statistically significant) impact in the role of a sufficient condition was detected.

Altogether, we observe three cases that are both necessary and sufficient conditions: ECON (for ATT; however, both effects are small), AWEL (for DIET, with medium constraints in terms of necessity and a large effect in terms of sufficiency), and ATT (for PI, with medium constraints in terms of necessity and a very large effect in terms of sufficiency). Qualities of sufficiency have further been found for the impact of PCE on ATT (large effect), the impact of PCE on DIET (small effect), the influence of DIET on ATT (small effect), and the influence of SNORM on PI (small effect). Necessity without being a sufficient condition was detected for AWEL's constraint on ATT (small effect). Table 11 integrates our findings.

Table 11: Result summary of both analyses.

Note: ATT = attitude towards plant-based food substitutes, AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness, PI = purchase intention, SNORM = subjective norm.

Hypothesis				Necessary condition	Sufficient condition
H1	ATT	→	PI	Yes; medium effect (d = 0.201)	Yes; large effect (f^2 = 2.101)
H2	SNORM	→	PI	No	Yes; small effect (f^2 = 0.024)
H3	DIET	→	ATT	No	Yes; small effect (f^2 = 0.038)
H4a	ECON	→	ATT	Yes; small effect (d = 0.029)	Yes; small effect (f^2 = 0.017)
H4b	ECON	→	DIET	No	No
H5a	AWEL	→	ATT	Yes; small effect (d = 0.012)	No
H5b	AWEL	→	DIET	Yes; medium effect (d = 0.233)	Yes; large effect (f^2 = 0.423)
H6a	HCON	→	ATT	No	No
H6b	HCON	→	DIET	No	No
H7a	PCE	→	ATT	No	Yes; large effect (f^2 = 0.382)
H7b	PCE	→	DIET	No	Yes; small effect (f^2 = 0.036)

5 Discussion

Regarding the PLS model's results, it is particularly interesting to discuss the explanation of variance. PI could be explained to a satisfactory extent ($R^2 = 0.726$), which fits the research model's theoretical underpinning in the form of TRA. ATT was identified as a necessary and sufficient condition for PI, which provides evidence from a novel methodological perspective that TRA's mechanisms offer a valid framework to explain behavioral intentions. Further, the strength of the relation (path coefficient = 0.816) indicates a quasi-symmetric link (Woodside 2013); i.e., while high values of ATT evoke high values of PI, low values of ATT lead to the opposite. In the sustainability field, symmetric relations are not the norm, and, as such, this finding is fairly surprising.

DIET and ATT could be explained to a moderate extent (R^2 values of 0.456 and 0.478, respectively). In both cases, we used the same predictors and achieved very similar results; however, we also included a link between DIET and ATT. This additional influence on ATT leads to the slightly increased R^2 in comparison to DIET (without the link, the value decreases to 0.458). Consequently, although the order of independent variables differs in terms of their effect sizes, both ATT and DIET are affected similarly in total. In both cases, HCON yields only a negligible impact. The role of ECON is ambiguous in our data: for DIET, its impact is far below being considered a small effect ($f^2 = 0.008$), and for ATT, although still falling short of the threshold, the miss is reasonably close ($f^2 = 0.017$). However, based on interpretation guidelines for effect size, we may conclude that in both cases, ECON does not have a substantial influence. Concerning the remaining two predictors, PCE exhibits the largest effect on ATT but only a small impact on DIET. AWEL does not appear to play a role for ATT; however, it is the most substantial predictor for DIET with a large effect ($f^2 = 0.423$). Altogether, ECON and HCON behave similarly as predictors for ATT and DIET, and PCE and AWEL switch their roles. We explain this alteration as a result of consumers' different perceptions regarding DIET and ATT: individuals that are worried about animal welfare may exert a direct, immediate impact by avoiding meat-based products in their nutrition; however, in the case of ATT, this influence is more indirect in nature, as buying substitutes naturally does not exclude purchasing meat but may be a complement. The link between DIET and ATT provides further evidence, indicating that after having selected nutrition to follow, consumers that decrease or abandon meat intake are willing to try out novel, plant-based products in addition to their current food choice. For ATT, on the other hand, an individual's belief of being able to make a change (i.e., PCE) yields the most substantial influence, which appears reasonable as plant-based food substitutes are not restricted to replacing meat, and instead may also compensate for other products such as honey, milk, and eggs. That is, consumers that are not worried about animal welfare may nevertheless note negative environmental impacts exerted through current practices of large-scale production and seek alternatives.

Consumer's ATT may also be affected by negative framings of meat-based nutrition, such as reports of factory farming and multi-resistant germs, and define plant-based diets as a reasonable alternative. Consequently, adverse beliefs about a meat-based diet, e.g., food safety concerns (Michaelidou and Hassan 2008), could predict ATT as well.

A surprising result is the absence of an effect of AWEL on ATT. It appears reasonable to assume the influence of consumers' concerns for animal welfare on their attitude towards plant-based food substitutes; however, our empirical data did not reveal such a relation. This finding might be explained by the vast amount of vegetarian and vegan groceries that render it optional to consume food substitutes. Consequently, DIET plays only a minor role in shaping individuals' ATT ($f^2 = 0.038$). Still, DIET is not a necessary condition for ATT, indicating that plant-based food substitutes are of interest to consumers regardless of their diet. Similarly, concerns for one's health (i.e., HCON) were not found to play any role in intention formation, and, more striking, they do not appear to impact consumers' dietary behavior.

ECON, which captures individuals' environmental concerns, is altruistic in nature and, thus, conceptually close to AWEL. Nevertheless, its impact on ATT is weak, and the influence on DIET is far off being considered even a small effect ($f^2 = 0.008$). This result seems counter-intuitive, as factory farming is commonly associated with adverse environmental impact, and similar effects of ECON and AWEL might be assumed. Our results indicate that, against the backdrop of ECON's vanishingly small influence, AWEL may be viewed as an ethical perception as opposed to a more rational, ecological perspective. At large, consumers' intention formation is not about the environment but about avoiding harmful treatment of animals. This conclusion is also supported by the strong impact of AWEL on DIET ($f^2 = 0.423$).

PCE, on the other hand, yields expected results: it does not significantly shape consumers' dietary behavior, as a variety of reasons, such as feeling morally obligated to avoid meat, may impact DIET. The influence on ATT is substantial, indicating that individuals are convinced that their purchase decisions contribute to the environment.

The small influence of social pressure, in the form of SNORM, appears striking. This finding indicates that extrinsic motivation or seeking social approval is not an essential driver of PI. In combination with NCA findings, i.e., SNORM is not a necessary condition for PI, it plays only a minor role.

5.1 Theoretical implications

Within this study, we primarily aimed at gathering insights into the determinants of consumers' dietary behavior and the impact of dietary behavior on plant-based food substitutes. Exploratory research provided a first glimpse on the perceived benefits of a plant-based diet (Dyett et al. 2013; Janssen et al. 2016; Lea et al. 2006b; Mullee et al. 2017), but also on the negative associations related to a vegetarian or vegan diet (Corrin and Papadopoulos 2017; Lea et al. 2006a; Lea and Worsley 2001; Pohjolainen et

al. 2015). Nevertheless, the importance of the different determinants of dietary behavior and, in turn, its impact on the attitude towards plant-based food substitutes remained unclear.

As extant literature found omnivores to associate a plant-based diet with – inter alia – health concerns (Corrin and Papadopoulos 2017; Lea et al. 2006a; Lea and Worsley 2001; Pohjolainen et al. 2015) and negative stereotypes (Lea and Worsley 2001), it appeared likely that they might not be interested in purchasing plant-based food substitutes. However, we found consumers' dietary behavior to play only a minor role in consumers' attitude formation towards plant-based food substitutes, and thus, omnivores, as well as vegans and vegetarians, are equally interested in purchasing plant-based substitutes. This further aligns with our finding that consumers' dietary behavior is not affected by consumers' health consciousness, i.e., consumers do not choose a specific dietary behavior due to health reasons, contradicting findings of Dyett et al. (2013) and Lea et al. (2006b). Further, health consciousness does not impact consumers' attitude towards plant-based substitutes, which is in contrast to preceding findings of organic food literature (Magnusson et al. 2001; Squires et al. 2001).

Instead, we found animal welfare concerns to be the most important determinant of an individual's dietary behavior, i.e., consumers choose a specific dietary behavior due to ethical considerations with respect to the humane treatment of livestock. However, as many consumers draw on the standard of animal welfare as an indicator of food safety and healthiness (Harper and Makatouni 2002), following a plant-based diet due to animal welfare concerns might be an altruistic excuse for egoistic motives like health concerns. Only a few exploratory studies (Jabs et al. 1998; Mullee et al. 2017) considered animal welfare as a potential determinant on consumers' diet.

Consumers do not follow a certain diet to express their environmental concerns or to protect the environment, aligning with exploratory findings of Fox and Ward (2008) as well as Povey et al. (2001), which found environmental concerns to play only a minor role with respect to dietary behavior. Its effect on attitude towards plant-based food substitutes was only marginal. Nevertheless, consumers' belief to mitigate their environmental impact when purchasing plant-based food substitutes influenced attitude formation, similar to organic food and green literature (Jaiswal and Kant 2018; Vermeir and Verbeke 2008).

5.2 Practical implications

Our results suggest several starting points for both organizations offering plant-based food substitutes and policy-makers. As PCE was identified as a major influence on individuals' attitude towards plant-based food, they believe that reducing their meat intake contributes to environmentally friendly behavior. It is important to help consumers make an informed decision about their grocery purchases by providing data on their ecological impact. Organizations may approach this demand through transparent communication of their supply chains, such as CO2 emissions/carbon footprint, water usage, distance traveled, and other environmentally impactful factors that are easy to grasp and integrate into decision-

making. Where it is not feasible to disclose information, e.g., because it is difficult to understand by laypeople, policy-makers may support both organizations and consumers by specifying standardized representation in the form of equivalents. These equivalents may be formulated similarly to 'The amount of water used for production could fill 100 bathtubs' (in the case of one kilogram beef) (Institute of Mechanical Engineers 2013). To facilitate comparisons across various products, it is essential to provide standardized equivalents, which may be ensured by policy-making. Research has also found that organizations following environmentally responsible practices can evoke favorable consumer perceptions and may induce more sustainable behavior (see, e.g., the overview presented in White et al. 2019).

In general, however, sustainable goods frequently suffer from the so-called attitude-behavior gap (Rausch and Kopplin 2021), indicating that consumers' positive attitude towards these products may not translate into action. Hence, from a managerial perspective, it is important to provide boundary conditions that render it attractive to purchase sustainable goods. One critical aspect is the products' availability within the channels consumers commonly employ for their purchases, such as local supermarkets. Restricted access such as certain products being only available on the organization's website, thus, is deemed rather counterproductive.

Another critical aspect is that of habit – human beings are creatures of habit. Organizations may make use of this fact by inducing purchases for test purposes to establish a first consumer contact with the plant-based food substitute. Such purchases may be elicited through social media campaigns embracing a dedicated hashtag or featuring consumer posts as a part of the organization's online appearance, e.g., on Instagram. Other possibilities are lotteries, preferably ones utilizing precise settings such as a holiday season theme, and in-store sales stalls.

Interestingly, consumers' dietary behavior is not a necessary condition for a positive attitude towards plant-based food substitutes, and further, its influence is also reasonably small. Consequently, individuals may be viewed as potential buyers regardless of their dietary choices, and plant-based food substitutes appear not to be restricted to a market niche.

In the case of social influences (captured in the form of SNORM), which is neither a necessary condition nor yields substantial effects on an individual's purchase intention, it appears justifiable from a managerial perspective to neglect the variable. However, as green consumption increases, it may well be the case that social influences gain traction and serve, e.g., as a basis for social comparisons, and there is research from other sustainability contexts that find social influence to play a role (Abrahamse and Steg 2013). Organizations creating awareness through marketing campaigns, particularly employing social media channels, enable social processes to kick in, such as spreading word-of-mouth, and may yield benefits when sustainable food in general and plant-based food substitutes, in particular, have become household goods. Still, it is important to bear in mind that the impact of social influences was less substantial than behavioral beliefs, and as such, the latter should be emphasized.

As consumers' dietary behavior is primarily affected by consumers' concerns for animal welfare, producers, and retailers of vegan and vegetarian products should bear that in mind and adapt their marketing claims. However, as consumers associate a high standard of animal welfare with healthy products, marketers should link animal welfare claims with health claims.

6 Conclusion

Within this study, we found evidence that consumers' dietary behavior only slightly influences consumers' attitude towards plant-based food substitutes, and thus, all dietary groups may be targeted by the plant-based food substitute industry. Concerns for animal welfare exhibited the largest effect on consumers' dietary behavior, whereas environmental concerns and health consciousness did not impact dietary behavior.

Regarding the purchase intention for plant-based food substitutes, consumers' intrinsic motive (i.e., attitude) was strikingly strong. Among the respective behavioral beliefs, individuals' perceived consumer effectiveness, i.e., their impression of being able to make a change depending on their purchase decisions, showed a large influence on consumers' attitude towards plant-based food substitutes. These behavioral beliefs were accompanied by normative beliefs (i.e., the extrinsic motive in the form of subjective norm), indicating that the social surrounding also plays a role, although a reasonably small one, in purchasing plant-based food substitutes. We might expect this effect to increase over time, as plant-based food substitutes become common parts of daily nutrition.

7 Limitations and future research opportunities

Nevertheless, some limitations need to be addressed. While our sample is quite large, we find it fairly homogeneous, as it primarily consists of female students and young professionals in their twenties. Consequently, our findings of intrinsic motivation being an important driver of dietary behavior and purchase intention concerning plant-based food substitutes, while social influences do not play a vital role, need to be handled with care. It is likely that a different sample that represents, e.g., the whole German population finds lower proportions of inviduals that consider themselves vegetarians or vegans. Further, it is possible that consumer groups less involved in the social media sphere, where green consumption is an increasingly prominent topic, may yield a lower awareness and less information, and thus be more hestitant regarding the purchase of plant-based food substitutes. A sample that is balanced considering gender may also find a shift in the average assessment, probably towards lower values of environmental concerns and altruistic motives in general, as men are commonly less agreeable than women (Weisberg et al. 2011).

It may well be the case that young people with high education, who represent a vast majority of our sample, yield motivations that differ from other social groups. Hence, social processes should not be neglected in future research but treated as a possible discriminant. Also, we used a multivariate, large-N approach, which provides insights on a general level but neglects details on the individual level. As

is typical for such applications, we captured the responses using self-report scales, which may impose a social desirability bias. Many participants indicated a plant-focused or even entirely plant-based diet and may give similar responses to environmental-related questions to align their answers with their life style.

Future research could also address the interdependence between animal welfare concerns and health considerations. As we already claimed in the discussion, following a plant-based dietary behavior due to animal welfare concerns might just be an altruistic pretext for health concerns as an egoistic motive.

References

Abrahamse, W.; Steg, L. (2013). Social influence approaches to encourage resource conservation: A meta-analysis. Global Environmental Change 23(6):1773–1785.

Agriculture and Agri-Food Canada (2017) Vegetarian and Vegan Food in Germany. https://www.agr.gc.ca/resources/prod/Internet-Internet/MISB-DGSIM/ATS-SEA/PDF/6840-eng.pdf

Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In: Kuhl J, Beckmann J (eds) Action control: From cognition to behavior, 1st edn. Springer, Berlin, pp 11–39.

Ajzen, I. (1988). Attitudes, Personality and Behavior. Open University Press, Milton Keynes.

Ajzen, I. (1991). The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes 50:179–211. https://doi.org/10.1016/0749-5978(91)90020-t

Ajzen, I. (2001). Nature and operation of attitudes. Annual Review of Psychology 52(1):27–58. https://doi.org/10.1146/annurev.psych.52.1.27

Ajzen, I.; Driver, B.L. (1991). Prediction of leisure participation from behavioral, normative, and control beliefs: An application of the theory of planned behavior. Leisure Sciences 13(3):185–204. https://doi.org/10.1080/01490409109513137

Ajzen, I.; Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Prentice-Hall, Englewood Cliffs, NJ.

Ajzen, I.; Madden, T.J. (1986). Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. Journal of Experimental Social Psychology 22(5):453–474. https://doi.org/10.1016/0022-1031(86)90045-4

Anderson, W.T.; Cunningham, W.H. (1972). The Socially Conscious Consumer. Journal of Marketing 36(3):23–31. https://doi.org/10.1177/002224297203600305

Antil, J.H. (1984). Socially Responsible Consumers: Profile and Implications for Public Policy. Journal of Macromarketing 4(2):18–39. https://doi.org/10.1177/027614678400400203

Bandura, A. (1982). Self-efficacy mechanism in human agency. American Psychologist 37(2):122–147. https://doi.org/10.1037/0003-066X.37.2.122

Benitez, J.; Henseler, J.; Castillo, A.; Schuberth, F. (2020). How to perform and report an impactful analysis using partial least squares: Guidelines for confirmatory and explanatory IS research. Information & Management 57(2):103168. https://doi.org/10.1016/j.im.2019.05.003

Berger, I.E.; Corbin, R.M. (1992). Perceived Consumer Effectiveness and Faith in Others as Moderators of Environmentally Responsible Behaviors. Journal of Public Policy & Marketing 11(2):79–89. https://doi.org/10.1177/074391569201100208

Boer, J. de; Schösler, H., Aiking, H. (2017). Towards a reduced meat diet: Mindset and motivation of young vegetarians, low, medium and high meat-eaters. Appetite 113:387–397. https://doi.org/10.1016/j.appet.2017.03.007

Chan, R.Y.K. (2001). Determinants of Chinese consumers' green purchase behavior. Psychology & Marketing 18(4):389–413. https://doi.org/10.1002/mar.1013

Corrin, T.; Papadopoulos, A. (2017). Understanding the attitudes and perceptions of vegetarian and plant-based diets to shape future health promotion programs. Appetite 109:40–47. https://doi.org/10.1016/j.appet.2016.11.018

Davies, A.; Titterington, A.J.; Cochrane, C. (1995). Who buys organic food? British Food Journal 97:17–23. https://doi.org/10.1108/00070709510104303

Dijkstra, T.K.; Henseler, J. (2015). Consistent partial least squares path modeling. MIS Quarterly 39(2):297–316.

Dul, J. (2016a). Identifying single necessary conditions with NCA and fsQCA. Journal of Business Research 69(4):1516–1523.

Dul, J. (2016b). Necessary condition analysis (NCA) logic and methodology of "necessary but not sufficient" causality. Organizational Research Methods 19(1):10–52.

Dunlap, R.E.; van Liere, K.D.; Mertig, A.G.; Jones, R.E. (2000). New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. Journal of Social Issues 56(3):425–442. https://doi.org/10.1111/0022-4537.00176

Dyett, P.A.; Sabaté, J.; Haddad, E.; Rajaram, S.; Shavlik, D. (2013). Vegan lifestyle behaviors: an exploration of congruence with health-related beliefs and assessed health indices. Appetite 67:119–124. https://doi.org/10.1016/j.appet.2013.03.015

Ellen, P.S.; Wiener, J.L.; Cobb-Walgren, C. (1991). The Role of Perceived Consumer Effectiveness in Motivating Environmentally Conscious Behaviors. Journal of Public Policy & Marketing 10(2):102–117. https://doi.org/10.1177/074391569101000206

Fishbein, M.; Ajzen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Addison-Wesley, Reading, MA.

Fox, N.; Ward, K. (2008). Health, ethics and environment: a qualitative study of vegetarian motivations. Appetite 50:422–429. https://doi.org/10.1016/j.appet.2007.09.007

Goh, S.K.; Balaji, M.S. (2016). Linking green skepticism to green purchase behavior. Journal of Cleaner Production 131:629–638.

Gould, S.J. (1988). Consumer Attitudes Toward Health and Health Care: A Differential Perspective. Journal of Consumer Affairs 22(1):96–118. https://doi.org/10.1111/j.1745-6606.1988.tb00215.x

Hair, J.F.; Risher, J.J.; Sarstedt, M.; Ringle, C.M. (2019). When to use and how to report the results of PLS-SEM. European Business Review 31(1):2–24.

Hair, J.F.; Howard, M.C.; Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. Journal of Business Research 109:101–110.

Harper, G.C.; Makatouni, A. (2002). Consumer perception of organic food production and farm animal welfare. British Food Journal 104:287–299. https://doi.org/10.1108/00070700210425723

Henseler, J.; Ringle, C.M.; Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science 43(1):115–135.

Henseler, J.; Hubona, G.; Ray, P.A. (2016). Using PLS path modeling in new technology research: updated guidelines. Industrial Management & Data Systems 116(1):2–20.

Hill, H.; Lynchehaun, F. (2002). Organic milk: attitudes and consumption patterns. British Food Journal 104:526–542. https://doi.org/10.1108/00070700210434570

Hughner, R.S.; McDonagh, P.; Prothero, A.; Shultz, C.J.; Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. Journal of Consumer Behaviour 6(2-3):94–110. https://doi.org/10.1002/cb.210

Institute of Mechanical Engineers (2013). Global Food Report: Waste not, Want not. https://www.imeche.org/docs/default-source/reports/Global_Food_Report.pdf

Jabs, J.; Devine, C.M.; Sobal, J. (1998). Model of the Process of Adopting Vegetarian Diets: Health Vegetarians and Ethical Vegetarians. Journal of Nutrition Education 30(4):196–202. https://doi.org/10.1016/S0022-3182(98)70319-X

Jaiswal, D.; Kant, R. (2018). Green purchasing behaviour: A conceptual framework and empirical investigation of Indian consumers. Journal of Retailing and Consumer Services 41:60–69. https://doi.org/10.1016/j.jretconser.2017.11.008

Janssen, M.; Busch, C.; Rödiger, M.; Hamm, U. (2016). Motives of consumers following a vegan diet and their attitudes towards animal agriculture. Appetite 105:643–651. https://doi.org/10.1016/j.appet.2016.06.039

Kautish, P.; Sharma, R. (2019). Value orientation, green attitude and green behavioral intentions: an empirical investigation among young consumers. Young Consumers 20(4):338–358. https://doi.org/10.1108/YC-11-2018-0881

Kautish, P.; Sharma, R. (2020). Determinants of pro-environmental behavior and environmentally conscious consumer behavior: An empirical investigation from emerging market. Business Strategy & Development 3(1):112–127.

Kautish, P.; Paul, J.; Sharma, R. (2019). The moderating influence of environmental consciousness and recycling intentions on green purchase behavior. Journal of Cleaner Production 228(10):1425–1436. https://doi.org/10.1016/j.jclepro.2019.04.389

Kinnear, T.C.; Taylor, J.R.; Ahmed, S.A. (1974). Ecologically Concerned Consumers: Who are They? Journal of Marketing 38(2):20–24. https://doi.org/10.1177/002224297403800205

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of e-Collaboration (ijec) 11(4):1–10.

Kraft, F.B.; Goodell, P.W. (1993). Identifying the health conscious consumer. Journal of Health Care Marketing 13(3):18–25.

Latvala, T.; Niva, M.; Mäkelä, J.; Pouta, E.; Heikkilä, J.; Kotro, J.; Forsman-Hugg, S. (2012). Diversifying meat consumption patterns: consumers' self-reported past behaviour and intentions for change. Meat Science 92(1):71–77. https://doi.org/10.1016/j.meatsci.2012.04.014

Lea, E.; Worsley, A. (2001). Influences on meat consumption in Australia. Appetite 36:127–136. https://doi.org/10.1006/appe.2000.0386

Lea, E.J.; Crawford, D.; Worsley, A. (2006a). Consumers' readiness to eat a plant-based diet. European Journal of Clinical Nutrition 60(3):342–351. https://doi.org/10.1038/sj.ejcn.1602320

Lea, E.J.; Crawford, D.; Worsley, A. (2006b). Public views of the benefits and barriers to the consumption of a plant-based diet. European Journal of Clinical Nutrition 60(7):828–837. https://doi.org/10.1038/sj.ejcn.1602387

Lee, K. (2008). Opportunities for green marketing: young consumers. Markting Intelligence & Plan 26:573–586. https://doi.org/10.1108/02634500810902839

Liska, A.E. (1984). A Critical Examination of the Causal Structure of the Fishbein/Ajzen Attitude-Behavior Model. Social Psychology Quarterly 47:61–74. https://doi.org/10.2307/3033889

Macdiarmid, J.I.; Douglas, F.; Campbell, J. (2016). Eating like there's no tomorrow: Public awareness of the environmental impact of food and reluctance to eat less meat as part of a sustainable diet. Appetite 96:487–493. https://doi.org/10.1016/j.appet.2015.10.011

Magnusson, M.K.; Arvola, A.; Hursti U.-K.K.; Åberg, L.; Sjödén, P.-O. (2001). Attitudes towards organic foods among Swedish consumers. British Food Journal 103:209–227. https://doi.org/10.1108/00070700110386755

Maloney, M.P.; Ward, M.P.; Braucht, G.N. (1975). A revised scale for the measurement of ecological attitudes and knowledge. American Psychologist 30(7):787–790. https://doi.org/10.1037/h0084394

Michaelidou, N.; Hassan, L.M. (2008). The role of health consciousness, food safety concern and ethical identity on attitudes and intentions towards organic food. International Journal of Consumer Studies 32(2):163–170. https://doi.org/10.1111/j.1470-6431.2007.00619.x

Mostafa, M.M. (2007). A hierarchical analysis of the green consciousness of the Egyptian consumer. Psychology & Marketing 24(5):445–473. https://doi.org/10.1002/mar.20168

Mullee, A.; Vermeire, L.; Vanaelst, B.; Mullie, P.; Deriemaeker, P.; Leenaert, T.; Henauw, S. de; Dunne, A.; Gunter, M.J.; Clarys, P.; Huybrechts, I. (2017). Vegetarianism and meat consumption: A comparison of attitudes

and beliefs between vegetarian, semi-vegetarian, and omnivorous subjects in Belgium. Appetite 114:299–305. https://doi.org/10.1016/j.appet.2017.03.052

Newsom, J.T.; McFarland, B.H.; Kaplan, M.S.; Huguet, N.; Zani, B. (2005). The health consciousness myth: implications of the near independence of major health behaviors in the North American population. Social Science & Medicine 60(2):433–437. https://doi.org/10.1016/j.socscimed.2004.05.015

Park, H.J.; Lin, L.M. (2018). Exploring attitude–behavior gap in sustainable consumption: Comparison of recycled and upcycled fashion products. Journal of Business Research 117:623–628.

PBFA, GFI (2020). U.S. Plant-Based Retail Market Worth $5 Billion, Growing at 5X Total Food Sales. https://plantbasedfoods.org/plant-based-foods-retail-sales-data-2020/

Petty, R.E.; Unnava, R.H.; Stratham, A.J. (1991). Theories of Attitude Change. In: Robertson TS, Kassarjian HH (eds) Handbook of consumer behavior. Prentice-Hall, Englewood Cliffs, NJ, pp 241–280.

Podsakoff, P.M.; Organ, D.W. (1986). Self-reports in organizational research: Problems and prospects. Journal of Management 12(4):531–544.

Pohjolainen, P.; Vinnari, M.; Jokinen, P. (2015). Consumers' perceived barriers to following a plant-based diet. British Food Journal 117:1150–1167. https://doi.org/10.1108/BFJ-09-2013-0252

Povey, R.; Wellens, B.; Conner, M. (2001). Attitudes towards following meat, vegetarian and vegan diets: an examination of the role of ambivalence. Appetite 37:15–26. https://doi.org/10.1006/appe.2001.0406

Prakash, G.; Pathak, P. (2017). Intention to buy eco-friendly packaged products among young consumers of India: A study on developing nation. Journal of Cleaner Production 141(10):385–393.

Rausch, T.M.; Kopplin, C.S. (2021). Bridge the gap: Consumers' purchase intention and behavior regarding sustainable clothing. Journal of Cleaner Production 278(1):123882.

Richter, N.F.; Schubring, S.; Hauff, S.; Ringle, C.M.; Sarstedt, M. (2020). When predictors of outcomes are necessary: guidelines for the combined use of PLS-SEM and NCA. IMDS ahead-of-print. https://doi.org/10.1108/IMDS-11-2019-0638

Ringle, C.M.; Wende, S.; Becker, J.-M. (2015). SmartPLS 3. SmartPLS GmbH., Boenningstedt. http://www.smartpls.com

Roberts, J.A. (1996). Green Consumers in the 1990s: Profile and Implications for Advertising. Journal of Business Research 36(3):217–231.

Schifferstein, H.N.J.; Oude Ophuis, P.A.M. (1998). Health-related determinants of organic food consumption in The Netherlands. Food Quality and Preference 9:119–133. https://doi.org/10.1016/S0950-3293(97)00044-X

Sharma, A.; Joshi, S. (2017). Green consumerism: overview and further research directions. International Journal of Process Management and Benchmarking 7(2):206–223.

Shepherd, R.; Towler, G. (2007). Nutrition knowledge, attitudes and fat intake: application of the theory of reasoned action. Journal of Human Nutrition and Dietetics 20:159–169. https://doi.org/10.1111/j.1365-277X.2007.00776.x

Singh, A.; Verma, P. (2017). Factors influencing Indian consumers' actual buying behaviour towards organic food products. Journal of Cleaner Production 167(20):473–483. https://doi.org/10.1016/j.jclepro.2017.08.106

Smith, S.; Paladino, A. (2010). Eating clean and green? Investigating consumer motivations towards the purchase of organic food. Australasian Marketing Journal 18(2):93–104. https://doi.org/10.1016/j.ausmj.2010.01.001

Squires, L.; Juric, B.; Bettina Cornwell, T. (2001). Level of market development and intensity of organic food consumption: cross-cultural study of Danish and New Zealand consumers. Journal of Consumer Marketing 18(5):392–409. https://doi.org/10.1108/07363760110398754

Stern, P.C.; Dietz, T.; Kalof, L. (1993). Value Orientations, Gender, and Environmental Concern. Environment and Behavior 25(5):322–348. https://doi.org/10.1177/0013916593255002

Tarkiainen, A.; Sundqvist, S. (2005). Subjective norms, attitudes and intentions of Finnish consumers in buying organic food. British Food Journal 107:808–822. https://doi.org/10.1108/00070700510629760

Taufique, K.M.R.; Vaithianathan, S. (2018). A fresh look at understanding Green consumer behavior among young urban Indian consumers through the lens of Theory of Planned Behavior. Journal of Cleaner Production 183(10):46–55.

Taylor, S.; Todd, P. (1995). Understanding Household Garbage Reduction Behavior: A Test of an Integrated Model. Journal of Public Policy & Marketing 14(2):192–204. https://doi.org/10.1177/074391569501400202

Thogersen, J. (2009). Consumer Decision-Making with Regard to Organic Food Products. In: Vaz TdN, Nijkamp P, Rastoin J-L (eds) Traditional food production and rural sustainable development: A European challenge. Ashgate, Farnham, UK, 173-194.

Tregear, A.; Dent, J.B.; McGregor, M.J. (1994). The Demand for Organically Grown Produce. British Food Journal 96:21–25. https://doi.org/10.1108/00070709410061032

Vermeir, I.; Verbeke, W. (2006). Sustainable Food Consumption: Exploring the Consumer "Attitude – Behavioral Intention" Gap. Journal of Agricultural and Environmental Ethics 19(2):169–194. https://doi.org/10.1007/s10806-005-5485-3

Vermeir, I.; Verbeke, W. (2008). Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. Ecological Economics 64(3):542–553. https://doi.org/10.1016/j.ecolecon.2007.03.007

Webb, T.L.; Sheeran, P. (2006). Does changing behavioral intentions engender behavior change? A meta-analysis of the experimental evidence. Psychological Bulletin 132(2):249–268. https://doi.org/10.1037/0033-2909.132.2.249

Webster, J.F.E. (1975). Determining the Characteristics of the Socially Conscious Consumer. Journal of Consumer Research 2(3):188. https://doi.org/10.1086/208631

Weigel, R.; Weigel, J. (1978). Environmental Concern. Environment and Behavior 10(1):3–15. https://doi.org/10.1177/0013916578101001

Weisberg, Y.J.; DeYoung, C.G.; Hirsh, J.B. (2011). Gender differences in personality across the ten aspects of the Big Five. Frontiers in Psychology 2:178–188.

White, K.; Habib, R.; Hardisty, D.J. (2019). How to SHIFT Consumer Behaviors to be More Sustainable: A Literature Review and Guiding Framework. Journal of Marketing 83(3):22–49. https://doi.org/10.1177/0022242919825649

Woodside, A.G. (2013). Moving beyond multiple regression analysis to algorithms: Calling for adoption of a paradigm shift from symmetric to asymmetric thinking in data analysis and crafting theory. Journal of Business Research 66(4):463–472.

Yadav, R.; Pathak, G.S. (2016). Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behavior. Journal of Cleaner Production 135(1):732–739. https://doi.org/10.1016/j.jclepro.2016.06.120

Yadav, R.; Pathak, G.S. (2017). Determinants of Consumers' Green Purchase Behavior in a Developing Nation: Applying and Extending the Theory of Planned Behavior. Ecological Economics 134:114–122. https://doi.org/10.1016/j.ecolecon.2016.12.019

Appendix

Appendix A: Indicator covariance matrix

	ATT1	ATT2	ATT3	AWEL	AWEL	AWEL	ECON1	ECON2	ECON3	ECON4	HCON1	HCON2	HCON3	HCON4	PCE1	PCE2	PCE3	PI1	PI2	PI3	PI4	SNORM1	SNORM2	SNORM3	DIET
ATT1	0.707	0.477	0.558	0.227	0.218	0.280	0.216	0.128	0.201	0.238	0.087	0.153	0.062	0.138	0.378	0.339	0.340	0.490	0.600	0.556	0.440	0.219	0.189	0.230	0.623
ATT2	0.477	0.512	0.473	0.174	0.170	0.216	0.166	0.108	0.155	0.184	0.065	0.117	0.061	0.117	0.348	0.304	0.307	0.377	0.456	0.421	0.335	0.203	0.149	0.213	0.433
ATT3	0.558	0.473	0.671	0.232	0.197	0.274	0.175	0.123	0.169	0.197	0.084	0.145	0.064	0.120	0.374	0.344	0.335	0.446	0.547	0.511	0.401	0.211	0.183	0.238	0.576
AWEL1	0.227	0.174	0.232	0.866	0.503	0.769	0.168	0.168	0.209	0.267	0.157	0.258	0.165	0.207	0.234	0.212	0.220	0.226	0.353	0.294	0.184	0.144	0.211	0.161	0.815
AWEL3	0.218	0.170	0.197	0.503	0.634	0.554	0.153	0.141	0.186	0.233	0.115	0.186	0.093	0.139	0.200	0.168	0.193	0.194	0.297	0.246	0.174	0.109	0.152	0.123	0.625
AWEL4	0.280	0.216	0.274	0.769	0.554	1.449	0.132	0.155	0.205	0.265	0.179	0.302	0.166	0.252	0.288	0.255	0.259	0.249	0.424	0.331	0.202	0.179	0.256	0.205	1.167
ECON1	0.216	0.166	0.175	0.168	0.153	0.132	0.821	0.273	0.361	0.438	0.035	0.067	0.072	0.144	0.206	0.176	0.161	0.196	0.274	0.234	0.188	0.149	0.095	0.152	0.301
ECON2	0.128	0.108	0.123	0.168	0.141	0.155	0.273	0.410	0.309	0.337	0.071	0.113	0.071	0.091	0.146	0.138	0.120	0.135	0.195	0.169	0.113	0.111	0.094	0.090	0.316
ECON3	0.201	0.155	0.169	0.209	0.186	0.205	0.361	0.309	0.559	0.416	0.094	0.142	0.094	0.130	0.193	0.172	0.183	0.195	0.262	0.234	0.155	0.140	0.102	0.142	0.374
ECON4	0.238	0.184	0.197	0.267	0.233	0.265	0.438	0.337	0.416	0.847	0.092	0.169	0.095	0.171	0.242	0.213	0.197	0.192	0.299	0.253	0.176	0.159	0.105	0.163	0.467
HCON1	0.087	0.065	0.084	0.157	0.115	0.179	0.035	0.071	0.094	0.092	0.478	0.377	0.270	0.274	0.099	0.092	0.088	0.066	0.104	0.091	0.071	0.052	0.060	0.062	0.203
HCON2	0.153	0.117	0.145	0.258	0.186	0.302	0.067	0.113	0.142	0.169	0.377	0.734	0.379	0.366	0.182	0.150	0.165	0.119	0.184	0.163	0.115	0.090	0.098	0.092	0.397
HCON3	0.062	0.061	0.064	0.165	0.093	0.166	0.072	0.071	0.094	0.095	0.270	0.379	0.642	0.341	0.109	0.090	0.095	0.054	0.099	0.081	0.035	0.045	0.078	0.040	0.156
HCON4	0.138	0.117	0.120	0.207	0.139	0.252	0.144	0.091	0.130	0.171	0.274	0.366	0.341	0.827	0.163	0.124	0.129	0.098	0.136	0.116	0.082	0.087	0.099	0.080	0.253
PCE1	0.378	0.348	0.374	0.234	0.200	0.288	0.206	0.146	0.193	0.242	0.099	0.182	0.109	0.163	0.843	0.564	0.552	0.349	0.450	0.387	0.302	0.164	0.140	0.196	0.529
PCE2	0.339	0.304	0.344	0.212	0.168	0.255	0.176	0.138	0.172	0.213	0.092	0.150	0.090	0.124	0.564	0.711	0.522	0.305	0.412	0.361	0.275	0.158	0.134	0.183	0.478
PCE3	0.340	0.307	0.335	0.220	0.193	0.259	0.161	0.120	0.183	0.197	0.088	0.165	0.095	0.129	0.552	0.522	0.752	0.303	0.389	0.341	0.274	0.150	0.125	0.174	0.489
PI1	0.490	0.377	0.446	0.226	0.194	0.249	0.196	0.135	0.195	0.192	0.066	0.119	0.054	0.098	0.349	0.305	0.303	0.660	0.626	0.600	0.490	0.212	0.200	0.234	0.576
PI2	0.600	0.456	0.547	0.353	0.297	0.424	0.274	0.195	0.262	0.299	0.104	0.184	0.099	0.136	0.450	0.412	0.389	0.626	1.018	0.752	0.552	0.263	0.254	0.279	0.883
PI3	0.556	0.421	0.511	0.294	0.246	0.331	0.234	0.169	0.234	0.253	0.091	0.163	0.081	0.116	0.387	0.361	0.341	0.600	0.752	0.815	0.510	0.259	0.240	0.275	0.736
PI4	0.440	0.335	0.401	0.184	0.174	0.202	0.188	0.113	0.155	0.176	0.071	0.115	0.035	0.082	0.302	0.275	0.274	0.490	0.552	0.510	0.737	0.187	0.166	0.233	0.456
SNORM1	0.219	0.203	0.211	0.144	0.109	0.179	0.149	0.111	0.140	0.159	0.052	0.090	0.045	0.087	0.164	0.158	0.150	0.212	0.263	0.259	0.187	1.149	0.483	0.762	0.331
SNORM2	0.189	0.149	0.183	0.211	0.152	0.256	0.095	0.094	0.102	0.105	0.060	0.098	0.078	0.099	0.140	0.134	0.125	0.200	0.254	0.240	0.166	0.483	1.093	0.574	0.328
SNORM3	0.230	0.213	0.238	0.161	0.123	0.205	0.152	0.090	0.142	0.163	0.062	0.092	0.040	0.080	0.196	0.183	0.174	0.234	0.279	0.275	0.233	0.762	0.574	1.129	0.342
DIET	0.623	0.433	0.576	0.815	0.625	1.167	0.301	0.316	0.374	0.467	0.203	0.397	0.156	0.253	0.529	0.478	0.489	0.576	0.883	0.736	0.456	0.331	0.328	0.342	2.801

Note: ATT = attitude towards plant-based food substitutes, AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness, PI = purchase intention, SNORM = subjective norm.

Appendix B: Constructs and items (translated from German)

Construct	Item		Loading
Attitude towards plant-based food substitutes (ATT)	ATT1	I … the idea of purchasing plant-based food substitutes (dislike-like)	0.932
	ATT2	Purchasing plant-based food substitutes is a … idea (very bad-very good)	0.866
	ATT3	I have a … attitude towards plant-based food substitutes (very unfavorable-very favorable)	0.890
Animal welfares concerns (AWEL)	AWEL1	I would rather buy more expensive animal products if animals were treated better	0.820
	AWEL3	I do not purchase products for which animals had to suffer	0.772
	AWEL4	It is important to me that animals do not have to suffer	0.822
Perceived consumer effectiveness (PCE)	PCE1	Purchasing plant-based food substitutes saves valuable environmental resources	0.868
	PCE2	I can protect the environment when purchasing plant-based food substitutes	0.845
	PCE3	I am able to decrease environmental problems with the purchase of plant-based food substitutes	0.818
Purchase intention (PI)	PI1	I will buy plant-based food substitutes in the future	0.861
	PI2	I intend to buy plant-based food substitutes instead of animal-based products in the future	0.931
	PI3	I consider buying plant-based food substitutes	0.921
	PI4	I would consider purchasing plant-based food substitutes if I happen to see them in a (grocery) store	0.712
Subjective norm (SNORM)	SNORM1	My family expects me to buy plant-based food substitutes	0.725
	SNORM2	People who are important to me expect me to buy plant-based food substitutes	0.696
	SNORM3	My friends expect me to buy plant-based food substitutes	0.789
Environmental concerns (ECON)	ECON1	I am concerned about the long-term consequences of non-sustainable behavior	0.622
	ECON2	I often think about the potential negative development of the environmental situation	0.732
	ECON3	I am concerned about future environmental development	0.830
	ECON4	I am concerned to worsen our environment's quality	0.805
Health consciousness (HCON)	HCON1	My health is so valuable to me that I am prepared to sacrifice many things for it	0.656
	HCON2	I consider myself very health-conscious	0.919
	HCON3	I think that I take health into account a lot in my life	0.524
	HCON4	I take care of my health	0.714

Appendix C: Evaluation of the Fornell-Larcker criterion

	ATT	AWEL	DIET	ECON	HCON	PCE	PI	SNORM
ATT	0.932							
AWEL	0.351	0.875						
DIET	0.439	0.601	1.000					
ECON	0.353	0.352	0.338	0.818				
HCON	0.230	0.351	0.260	0.254	0.821			
PCE	0.587	0.336	0.379	0.347	0.252	0.899		
PI	0.786	0.387	0.493	0.388	0.211	0.547	0.895	
SNORM	0.314	0.225	0.226	0.217	0.134	0.229	0.331	0.834

Note: ATT = attitude towards plant-based food substitutes, AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness, PI = purchase intention, SNORM = subjective norm.

Appendix D: Cross-loadings

	ATT	AWEL	ECON	HCON	PCE	PI	SNORM	DIET
ATT1	**0.933**	0.338	0.352	0.224	0.531	0.774	0.287	0.443
ATT2	**0.927**	0.307	0.325	0.207	0.567	0.694	0.299	0.362
ATT3	**0.935**	0.336	0.308	0.213	0.544	0.726	0.292	0.420
AWEL1	0.306	**0.901**	0.338	0.335	0.303	0.353	0.208	0.523
AWEL3	0.331	**0.850**	0.346	0.279	0.297	0.356	0.181	0.469
AWEL4	0.288	**0.873**	0.245	0.305	0.282	0.311	0.200	0.580
ECON1	0.278	0.201	**0.749**	0.126	0.253	0.306	0.166	0.198
ECON2	0.253	0.288	**0.822**	0.216	0.268	0.298	0.173	0.295
ECON3	0.317	0.318	**0.862**	0.243	0.310	0.353	0.194	0.299
ECON4	0.304	0.329	**0.836**	0.231	0.300	0.311	0.176	0.303
HCON1	0.153	0.255	0.171	**0.818**	0.171	0.149	0.095	0.176
HCON2	0.219	0.339	0.228	**0.893**	0.245	0.211	0.123	0.277
HCON4	0.186	0.255	0.222	**0.746**	0.193	0.148	0.110	0.166
PCE1	0.542	0.307	0.326	0.240	**0.901**	0.505	0.207	0.345
PCE2	0.529	0.294	0.316	0.218	**0.906**	0.500	0.213	0.339
PCE3	0.512	0.304	0.292	0.222	**0.890**	0.470	0.196	0.337
PI1	0.728	0.324	0.338	0.174	0.498	**0.920**	0.300	0.424
PI2	0.716	0.417	0.389	0.212	0.525	**0.905**	0.298	0.523
PI3	0.743	0.378	0.377	0.208	0.511	**0.928**	0.324	0.487
PI4	0.618	0.257	0.277	0.158	0.420	**0.824**	0.259	0.317
SNORM1	0.267	0.157	0.199	0.106	0.186	0.268	**0.842**	0.185
SNORM2	0.224	0.230	0.147	0.121	0.162	0.257	**0.766**	0.188
SNORM3	0.290	0.179	0.194	0.110	0.220	0.300	**0.889**	0.193
DIET	0.439	0.601	0.338	0.260	0.379	0.493	0.226	**1.000**

Note: Loadings of indicators on their assigned constructs are highlighted in bold. ATT = attitude towards plant-based food substitutes, AWEL = animal welfare concerns, DIET = consumers' dietary behavior, ECON = environmental concerns, HCON = health consciousness, PCE = perceived consumer effectiveness, PI = purchase intention, SNORM = subjective norm.

Concluding remarks

6.1 Contributions to Theory and Implications for Practice

The topic of sustainability is assessed from two critical perspectives: that of work, and that of consumption. Within the field of work, the novel phenomenon of CWS was examined for its properties and requirements regarding technological infrastructure. To do so, the impact of the coworking values on communication and collaboration, particularly knowledge exchange and creativity, was investigated. Indeed, collaboration orientation was found to be a critical quality of coworking and coworkers' behavior. In this context, WCT were introduced to the literature as a powerful inter-device software application class, and matchmaking tools are described as a major benefit of this integrated, basal infrastructure that takes these critical demands into account. Next, the recent phenomenon of ubiquitously available chatbots was introduced to the CWS literature, examining their potential for the enhancement of the creative and social atmosphere. This conceptual implementation from the consumer context into the organizational context also offered the characterization of office-automation chatbots, which were described and defined. The underlying goal was to derive technology acceptance models to shed light on user perceptions and their effects on usage intention. The final essay of Part One displays the multiplicity of insights that have been gained by proposing a funnel-based view on technology acceptance.

Within the field of consumption, contributions to the knowledge of purchase intention formation were made to the essential fields of nutrition, transportation, and clothing. In the first step, a methodological plurality was introduced to these fields, ensuring a more holistic framing of the target phenomena. To do so, multivariate statistics, namely PLS-SEM, were combined with the set-theoretic methods of fsQCA and NCA. In this vein, causal configurations, i.e., interactions among causal variables, were identified, and the balance between case-oriented and variable-oriented analysis (which may be described as a balance of qualitative and quantitative research) allowed for fine-grained segmentation and heterogeneity assessment. Further, the importance of necessity assessment could be corroborated by finding instances of necessary conditions that were not sufficient, and hence, would have gone unnoticed by predominant regression-based techniques.

On a methodological level, the combination of multivariate and set-theoretic methods was shown to be an insightful approach and allows detailed information about sufficient and necessary conditions, both in kind and in degree. This procedure is context-independent and may be used in other work beyond the scope of this thesis. Its viability is corroborated by first studies suggesting combinations of PLS and NCA (Richter et al., 2020).

6.2 Limitations

All empirical studies presented in Part One were conducted in German CWS, and quantitative models were used for analysis. Although the integration of fsQCA and NCA sought to provide additional perspectives on the data, these approaches do not override the inherent limitations of quantitative research.

For example, although set-theoretic methods do not suffer from multicollinearity, which is the case with regression-based techniques, they still focus on a fairly small number of conditions, such as five or six. Hence, their implementation constitutes an advancement of multivariate methods, but also cannot capture the vast amount of complexity present in real-life situations. However, the thesis at hand focuses on causal relationships, which renders a reasonable degree of simplification in terms of model construction necessary. Further, the interpretation of causal relationships mainly relies on the Theory of Reasoned Action and views behavioral intentions as adequate proxies for actual behavior. Depending on the context, this link may be rather weak. This attitude-behavior gap (also referred to as the intention-behavior gap) may be particularly important for the studies presented in Part Two as they consider immediate sustainability phenomena. However, as this gap was known from the beginning of the compilation of the research design, countermeasures were integrated. Still, these findings may show an ovely positive picture due to social desirability bias. Besides, sampling was conducted in Germany, and the results may not be applicable to other cultural or socio-economic contexts.

6.3 Conclusion

The role of technology in CWS and its interplay with coworking, in general, was investigated from a technology acceptance perspective. The findings suggest that technology plays a complementary instead of a conflicting role in CWS. Coworkers may profit from software applications by increased efficiency through means of automation, and they further provide a basal infrastructure that may be accessed anytime and anywhere to get in touch, save or access critical data, identify potential for cooperation, and connect the physical and the digital realm. Coworkers acknowledge the benefits they may derive from software applications and perceive them as helpful tools that enhance the coworking experience. However, a lot of potential remains unused due to a lack of implementation and interconnection, offering rich opportunities for ongoing theoretical elaboration and practical implementation.

Regarding sustainability in consumption behavior, a mixed picture was presented. In general, sustainability is a hot topic both among organizations and consumers. However, consumers are rather fragmented considering the role their environmental concerns play in their purchase decisions. This heterogeneity implies that organizations need to manage their communication strategy carefully, as an overemphasis on sustainability aspects may scare off large customer segments and may lead to fatigue among consumers. Further, it appears that some perceptions that appear plausible in the context of sustainable consumption do not influence purchase decisions. Hence, the results also suggest that further elaboration on the topic is required to gain an understanding of consumers' motives, demands, and needs. The combined analyses of sufficiency and necessity help comprehend the decision-making process, and several necessary-but-not-sufficient conditions have been found that corroborate the fruitfulness of this integrated approach.

6.4 Outlook

Future research might advance the quantitative findings by employing qualitative perspectives. Within the CWS literature, qualitative methods are prevailing and have allowed deep insights into the topic. Hence, it appears fruitful to extend this approach to technology in this context. Valuable insights may be achieved through Grounded Theory. Further, eye-tracking is a powerful method to examine user behavior when interacting with software applications and digital devices. This approach may be employed to investigate technology within natural settings in CWS. Observing scanpaths and user interaction with online shops or shelves in brick-and-mortar stores also appears promising for the perspective of sustainability in consumption. Ethnographic research in general may also help understand the role of sustainability aspects in consumption better. Many studies rely on self-report measures for purchase intention and purchase behavior, and these may be prone to different forms of bias. Thus, less instrusive approaches may complement the existing body of knowledge.

References

Ajzen, I. (1985). From Intentions to Actions: A Theory of Planned Behavior. In Julius Kuhl, Jürgen Beckmann (Eds.): Action control. From cognition to behavior. Softcover reprint of the hardcover 1. ed. 1985. Berlin: Springer (Springer series in social psychology), 11–39.

Ajzen, I. (1988). Attitudes, Personality and Behavior. Milton Keynes: Open University Press.

Ajzen, I. (1991). The Theory of Planned Behavior. Organizational Behavior and Human Decision Processes, 5(2), 179–211.

Ajzen, I., & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs NJ: Prentice-Hall.

Ali, A., Khan, A. A., Ahmed, I., & Shahzad, W. (2011). Determinants of Pakistani consumers' green purchase behavior: Some insights from a developing country. International Journal of Business and Social Science, 2(3), 217–226.

Arcury, T. A., & Christianson, E. H. (1990). Environmental worldview in response to environmental problems: Kentucky 1984 and 1988 compared. Environment and Behavior, 22(3), 387–407.

Armstrong, C. M., Niinimäki, K., Lang, C., & Kujala, S. (2016). A use-oriented clothing economy? Preliminary affirmation for sustainable clothing consumption alternatives. Sustainable Development, 24(1), 18–31.

Auty, S., & Elliott, R. (1998). Fashion involvement, self-monitoring and the meaning of brands. Journal of Product & Brand Management, 7(2), 109–123.

Baier, D., Rausch, T. M., & Wagner, T. F. (2020). The drivers of sustainable apparel and sportswear consumption: A segmented kano perspective. Sustainability, 12(7), 2788.

Belk, R. (2014). You are what you can access: Sharing and collaborative consumption online. Journal of Business Research, 67(8), 1595–1600.

Bilandzic, M., & Foth, M. (2013). Libraries as coworking spaces: Understanding user motivations and perceived barriers to social learning. Library Hi Tech, 31(2), 254–273.

BIS Research. (2019). Global Plant-Based Food & Beverage Alternatives Market - Analysis and Forecast, 2019-2024: Focus On Product Type (Plant-Based Meat and Plant-Based Dairy), Source (Soy, Almond, Corn And Wheat), And Distribution Channel. Available at https://bisresearch.com/industry-report/plant-based-food-beverages-alternatives-market.html.

Blagoev, B., Costas, J., & Kärreman, D. (2019). 'We are all herd animals': Community and organizationality in coworking spaces. Organization, 26(6), 894–916.

Boari, G., & Nai Ruscone, M. (2015). A procedure simulating Likert scale item responses. Electronic Journal of Applied Statistical Analysis, 8(3), 288–297.

Bouncken, R. B., Fredrich, V., & Kraus, S. (2020). Configurations of firm-level value capture in coopetition. Long Range Planning, 53(1), 101869.

Bouncken, R. B., Laudien, S. M., Fredrich, V., & Görmar, L. (2018). Coopetition in coworking-spaces: value creation and appropriation tensions in an entrepreneurial space. Review of Managerial Science, 12(2), 385–410.

Bouncken, R. B., & Reuschl, A. J. (2018). Coworking-spaces: how a phenomenon of the sharing economy builds a novel trend for the workplace and for entrepreneurship. Review of Managerial Science, 12(1), 317–334.

Brand, B. M., & Rausch, T. M. (2020). Examining sustainability surcharges for outdoor apparel using Adaptive Choice-Based Conjoint analysis. Journal of Cleaner Production, 289, 125654.

Bray, J., Johns, N., & Kilburn, D. (2011). An Exploratory Study into the Factors Impeding Ethical Consumption. Journal of Business Ethics, 98(4), 597–608.

Brinks, V. (2012). Netzwerke (n) und nestwärme im coworking space–arbeiten zwischen digitalisierung und relokalisierung. Geographische Zeitschrift, 100(3), 129–145.

Capdevila, I. (2014). Different inter-organizational collaboration approaches in coworking spaces in Barcelona. SSRN 2502816.

Chan, R. Y. K. (2001). Determinants of Chinese consumers' green purchase behavior. Psychology & Marketing, 18(4), 389–413.

Che, M., Lum, K. M., & Wong, Y. D. (2020). Users' attitudes on electric scooter riding speed on shared footpath: A virtual reality study. International Journal of Sustainable Transportation, 15(2), 1–10.

Chen, Y. S., & Chang, C. H. (2013). Greenwash and Green Trust: The Mediation Effects of Green Consumer Confusion and Green Perceived Risk. Journal of Business Ethics, 114(3), 489–500.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. Modern Methods for Business Research, 295(2), 295–336.

Chinnici, G., D'Amico, M., & Pecorino, B. (2002). A multivariate statistical analysis on the consumers of organic products. British Food Journal, 14(3-5), 187–199.

Chuah, S. Hui-Wen; Rauschnabel, P. A., Krey, N., Nguyen, B., Ramayah, T., & Lade, S. (2016). Wearable technologies: The role of usefulness and visibility in smartwatch adoption. Computers in Human Behavior, 65, 276–284.

Connell, K. Y. H. (2010). Internal and external barriers to eco-conscious apparel acquisition. International Journal of Consumer Studies, 34(3), 279–286.

Connolly, J., & Prothero, A. (2003). Sustainable consumption: consumption, consumers and the commodity discourse. Consumption Markets & Culture, 6(4), 275–291.

Cooper, B., & Glaesser, J. (2016). Exploring the robustness of set theoretic findings from a large n fsQCA: an illustration from the sociology of education. International Journal of Social Research Methodology, 19(4), 445–459.

Cordera, R., Dell'Olio, L., Ibeas, A., & Ortúzar, J. D. D. (2019). Demand for environmentally friendly vehicles: A review and new evidence. International Journal of Sustainable Transportation, 13(3), 210–223.

Csikszentmihalyi, M. (2000). The costs and benefits of consuming. Journal of Consumer Research, 27(2), 267–272.

Davies, A., Titterington, A. J., & Cochrane, C. (1995). Who buys organic food? A profile of the purchasers of organic food in Northern Ireland. British Food Journal, 97(10), 17–23.

Dul, J. (2016a). Identifying single necessary conditions with NCA and fsQCA. Journal of Business Research, 69(4), 1516–1523.

Dul, J. (2016b). Necessary condition analysis (NCA) logic and methodology of "necessary but not sufficient" causality. Organizational Research Methods, 19(1), 10–52.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. Journal of Social Issues, 56(3), 425–442.

Elkington, J. (1998). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. Environmental Quality Management, 8(1), 37–51.

Ellen, P. S., Eroğlu, D., & Webb, D. (1997). Consumer judgments in a changinginformation environment: How consumers respond to "green marketing claims". Working Paper. Georgia State University.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention, and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley.

Fisher, R. J., & Price, L. L. (1992). An investigation into the social context of early adoption behavior. Journal of Consumer Research, 19(3), 477–486.

Fransson, N., & Gärling, T. (1999). Environmental concern: Conceptual definitions, measurement methods, and research findings. Journal of Environmental Psychology, 19(4), 369–382.

Gandini, A. (2015). The rise of coworking spaces: A literature review. Ephemera, 15(1), 193–205.

Garrett, L. E., Spreitzer, G. M., & Bacevice, P. A. (2017). Co-constructing a sense of community at work: The emergence of community in coworking spaces. Organization Studies, 38(6), 821–842.

Gartner. (2019). Market Guide for Workstream Collaboration. Available at https://www.gartner.com/en/documents/3975373/market-guide-for-workstream-collaboration.

Gerdenitsch, C., Scheel, T. E., Andorfer, J., & Korunka, C. (2016). Coworking spaces: A source of social support for independent professionals. Frontiers in Psychology, 7, 581.

GFA, and BCV. (2017). Pulse of the Fashion Industry. Available at https://globalfashionagenda.com/wp-content/uploads/2017/05/Pulse-of-the-Fashion-Industry_2017.pdf.

Gifford, R., & Nilsson, A. (2014). Personal and social factors that influence pro-environmental concern and behaviour: A review. International Journal of Psychology, 49(3), 141–157.

Goh, S. K., & Balaji, M. S. (2016). Linking green skepticism to green purchase behavior. Journal of Cleaner Production, 131, 629–638.

Gössling, S. (2020). Integrating e-scooters in urban transportation: Problems, policies, and the prospect of system change. Transportation Research Part D: Transport and Environment, 79, 102230.

Gray, S. G., Raimi, K. T., Wilson, R., & Árvai, J. (2019). Will Millennials save the world? The effect of age and generational differences on environmental concern. Journal of Environmental Management, 242, 394–402.

Guerra, E. (2019). Electric vehicles, air pollution, and the motorcycle city: A stated preference survey of consumers' willingness to adopt electric motorcycles in Solo, Indonesia. Transportation Research Part D: Transport and Environment, 68, 52–64.

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). A primer on partial least squares structural equation modeling (PLS-SEM). Sage Publications.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. European Business Review, 31(1), 2–24.

Hardt, C., & Bogenberger, K. (2019). Usage of e-scooters in urban environments. Transportation Research Procedia, 37, 155–162.

Harris, F., Roby, H., & Dibb, S. (2016). Sustainable clothing: challenges, barriers and interventions for encouraging more sustainable consumer behaviour. International Journal of Consumer Studies, 40(3), 309–318.

Hartmann, P., & Apaolaza-Ibáñez, V. (2012). Consumer attitude and purchase intention toward green energy brands: The roles of psychological benefits and environmental concern. Journal of Business Research, 65(9), 1254–1263.

Haustein, S., & Jensen, A. F. (2018). Factors of electric vehicle adoption: A comparison of conventional and electric car users based on an extended theory of planned behavior. International Journal of Sustainable Transportation, 12(7), 484–496.

Hawlitschek, F., Notheisen, B., & Teubner, T. (2018). The limits of trust-free systems: A literature review on blockchain technology and trust in the sharing economy. Electronic Commerce Research and Applications, 29, 50–63.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135.

Hill, H., & Lynchehaun, F. (2002). Organic milk: attitudes and consumption patterns. British Food Journal, 104(7), 526–542.

Hiller C., & Kim Y. (2010). Internal and external barriers to eco-conscious apparel acquisition. International Journal of Consumer Studies, 34(3), 279–286.

Ho, J., Plewa, C., & Lu, V. N. (2016). Examining strategic orientation complementarity using multiple regression analysis and fuzzy set QCA. Journal of Business Research, 69(6), 2199–2205.

Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., & Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. Journal of Consumer Behaviour, 6(2-3), 94–110.

Hustvedt, G., & Dickson, M. A. (2009). Consumer likelihood of purchasing organic cotton apparel. Journal of Fashion Markting and Managementt, 13(1), 49–65.

IfD Allensbach. (2020). AWA Allensbacher Markt- und Werbeträgeranalyse. Available online at https://www.ifd-allensbach.de/awa/startseite.html.

Jaiswal, D., & Kant, R. (2018). Green purchasing behaviour: A conceptual framework and empirical investigation of Indian consumers. Journal of Retailing and Consumer Services, 41, 60–69.

Jenn, A., Laberteaux, K., & Clewlow, R. (2018). New mobility service users' perceptions on electric vehicle adoption. International Journal of Sustainable Transportation, 12(7), 526–540.

Joergens, C. (2006). Ethical fashion: myth or future trend? Journal of Fashion Marketing and Management: An International Journal, 10(3), 360–371.

Joshi, Y., & Rahman, Z. (2015). Factors affecting green purchase behaviour and future research directions. International Strategic Management Review, 3(1-2), 128–143.

Jung, H. J., Choi, Y. J., Oh, K. W. (2020). Influencing factors of Chinese consumers' purchase intention to sustainable apparel products: Exploring consumer "attitude–behavioral intention" gap. Sustainability, 12(5), 1770.

Kang, J., Liu, C., & Kim, S. H. (2013). Environmentally sustainable textile and apparel consumption: the role of consumer knowledge, perceived consumer effectiveness and perceived personal relevance. International Journal of Consumer Studies, 37(4), 442–452.

Kautish, Pradeep; Paul, Justin; Sharma, Rajesh (2019). The moderating influence of environmental consciousness and recycling intentions on green purchase behavior. In Journal of Cleaner Production 228, 1425–1436.

Kim, J., Choi, K., Kim, S., & Fujii, S. (2017). How to promote sustainable public bike system from a psychological perspective? International Journal of Sustainable Transportation, 11(4), 272–281.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental Education Research, 8(3), 239–260.

Kopplin, C. S., & Baier, D. (2020). How to Construct an Ideal Collaboration Tool for Coworking Spaces: A SP-CBC Application. Archives of Data Science Series A, 6(2).

Kraus, S., Ribeiro-Soriano, D., & Schüssler, M. (2018). Fuzzy-set qualitative comparative analysis (fsQCA) in entrepreneurship and innovation research–the rise of a method. International Entrepreneurship and Management Journal, 14(1), 15–33.

Krogslund, C., Choi, D. D., Poertner, M. (2015). Fuzzy sets on shaky ground: Parameter sensitivity and confirmation bias in fsQCA. Political Analysis, 23(1), 21–41.

Kumar, B., Manrai, A. K., & Manrai, L. A. (2017). Purchasing behaviour for environmentally sustainable products: A conceptual framework and empirical study. Journal of Retailing and Consumer Services, 34, 1–9.

Kwong, G. S., & Balaji, M. S. (2016). Linking green skepticism to green purchase behavior. Journal of Cleaner Production, 131(10), 629–638.

Lasuin, C. A., & Ng, Y. C. (2014). Factors influencing green purchase intention among university students. Malaysian Journal of Business and Economics, 1(2), 1–14.

Lea, E., & Worsley, T. (2005). Australians' organic food beliefs, demographics and values. British Food Journal, 107(11), 855–869.

Lee, K. (2008). Opportunities for green marketing: young consumers. Markting Intelligence & Plan, 26(6), 573–586.

De Leeuw, A., Valois, P., Ajzen, I., & Schmidt, P. (2015). Using the theory of planned behavior to identify key beliefs underlying pro-environmental behavior in high-school students: Implications for educational interventions. Journal of Environmental Psychology, 42, 128–138.

Li, L. Y. (1997). Effect of Collectivist Orientation and Ecological Attitude on Actual Environmental Commitment. Journal of International Consumer Marketing, 9(4), 31–53.

Liobikienė, G., & Bernatonienė, J. (2017). Why determinants of green purchase cannot be treated equally? The case of green cosmetics: Literature review. Journal of Cleaner Production, 162, 109–120.

Lu, L., Bock, D., & Joseph, M. (2013). Green marketing: what the Millennials buy. Journal of Business Strategy, 34(6), 3–10.

Lundblad, L., & Davies, I. A. (2016). The values and motivations behind sustainable fashion consumption. Journal of Consumer Behaviour, 15(2), 149–162.

Madden, T. J., Ellen, P. S., & Ajzen, I. (1992). A comparison of the theory of planned behavior and the theory of reasoned action. Personality and Social Psychology Bulletin, 18(1), 3–9.

Maggetti, M., & Levi-Faur, D. (2013). Dealing with errors in QCA. Political Research Quarterly, 66(1), 198–204.

Maichum, K., Parichatnon, S., & Peng, K. C. (2016). Application of the Extended Theory of Planned Behavior Model to Investigate Purchase Intention of Green Products among Thai Consumers. Sustainability, 8(1077), 1–20.

McKenzie, G. (2020). Urban mobility in the sharing economy: A spatiotemporal comparison of shared mobility services. Computers, Environment and Urban Systems, 79, 101418.

Mendel, J. M., & Korjani, M. M. (2012). Charles Ragin's fuzzy set qualitative comparative analysis (fsQCA) used for linguistic summarizations. Information Sciences, 202, 1–23.

Merkel, J. (2015). Coworking in the city. Ephemera, 15(2), 121–139.

Mikalef, P., & Pateli, A. (2017). Information technology-enabled dynamic capabilities and their indirect effect on competitive performance: Findings from PLS-SEM and fsQCA. Journal of Business Research, 70, 1–16.

Miller, K. M., Hofstetter, R., Krohmer, H., & Zhang, Z. J. (2011). How should consumers' willingness to pay be measured? An empirical comparison of state-of-the-art approaches. Journal of Marketing Research, 48(1), 172–184.

Milne, M. J., & Gray, R. (2013). W(h)ither ecology? The triple bottom line, the global reporting initiative, and corporate sustainability reporting. Journal of Business Ethics, 118(1), 13–29.

Mohr, L. A., Eroğlu, D., & Ellen, P. S. (1998). The Development and Testing of a Measure of Skepticism Toward Environmental Claims in Marketers' Communications. Journal of Consumer Affairs, 32(1), 30–55.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. Information Systems Research, 2(3), 192–222.

Moreau, H., De Jamblinne de Meux, L., Zeller, V., D'Ans, P., Ruwet, C., & Achten, W. M. J. (2020). Dockless e-scooter: A green solution for mobility? comparative case study between dockless e-scooters, displaced transport, and personal e-scooters. Sustainability, 12(5), 1803– 1819.

Morgan, L. R., & Birtwistle, G. (2009). An investigation of young fashion consumers' disposal habits. International Journal of Consumer Studies, 33(2), 190–198.

Moriset, B. (2013). Building new places of the creative economy. The rise of coworking spaces. Available at https://halshs.archives-ouvertes.fr/halshs-00914075.

Mostafa, M. M. (2006). Antecedents of Egyptian Consumers' Green Purchase Intentions. Journal of International Consumer Marketing, 19(2), 97–126.

Mostafa, M. M. (2007). A hierarchical analysis of the green consciousness of the Egyptian consumer. Psychology & Marketing, 24(5), 445–473.

Niinimäki, K., & Hassi, L. (2011). Emerging design strategies in sustainable production and consumption of textiles and clothing. Journal of Cleaner Production, 19(16), 1876–1883.

Oldenburg, R., & Brissett, D. (1982). The third place. Qualitative Sociology, 5(4), 265–284.

Ordanini, A., Parasuraman, A., & Rubera, G, (2014). When the recipe is more important than the ingredients: A qualitative comparative analysis (QCA) of service innovation configurations. Journal of Service Research, 17(2), 134–149.

Orel, M. (2019). Supporting work–life balance with the use of coworking spaces. Equality, Diversity and Inclusion: An International Journal, 39(5), 549–565.

Padel, S., & Foster, C. (2005). Exploring the gap between attitudes and behaviour: Understanding why consumers buy or do not buy organic food. British Food Journal, 107(8), 606–625.

Paetz, F., & Guhl, D. (2017). Understanding differences in segment-specific willingness-to-pay for the fair trade label. Marketing: ZFP–Journal of Research and Management, 39(4), 37–46.

Pappas, I. O., Kourouthanassis, P. E., Giannakos, M. N., & Chrissikopoulos, V. (2016). Explaining online shopping behavior with fsQCA: The role of cognitive and affective perceptions. In Journal of Business Research, 69(2), 794–803.

Park, H. J., & Lin, L. M. (2018). Exploring attitude-behavior gap in sustainable consumption: comparison of recycled and upcycled fashion products. Journal of Business Research, 117, 623–628.

Paul, J., Modi, A., & Patel, J. (2016). Predicting green product consumption using theory of planned behavior and reasoned action. Journal of Retailing and Consumer Services, 29, 123–134.

Pham, T. T., Kuo, T. C., Tseng, M. L., Tan, R. R., Tan, K., Ika, D. S., & Lin, C. J. (2019). Industry 4.0 to accelerate the circular economy: A case study of electric scooter sharing. Sustainability, 11(23), 6661.

Pinto, D. C., Nique, W. M., Añaña, E. S., & Herter, M. M. (2011). Green consumer values: how do personal values influence environmentally responsible water consumption? International Journal of Consumer Studies, 35(2), 122–131.

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. Journal of Management, 12(4), 531–544.

Prakash, G., & Pathak, P. (2017). Intention to buy eco-friendly packaged products among young consumers of India: A study on developing nation. Journal of Cleaner Production, 141, 385–393.

Puschmann, T., & Alt, R. (2016). Sharing economy. Business & Information Systems Engineering, 58(1), 93–99.

Ragin, C. C. (2006). Set relations in social research: Evaluating their consistency and coverage. Political Analysis, 14(3), 291–310.

Ragin, C. C. (2009). Qualitative comparative analysis using fuzzy sets (fsQCA). Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques, 51, 87–121.

Rausch, T. M., & Kopplin, C. S. (2020). Bridge the gap: Consumers' purchase intention and behavior regarding sustainable clothing. Journal of Cleaner Production, 278, 123882.

Richter, N. F., Schubring, S., Hauff, S., Ringle, C. M., & Sarstedt, M. (2020). When predictors of outcomes are necessary: guidelines for the combined use of PLS-SEM and NCA. Industrial Management & Data Systems, 120(12), 2243–2267.

Saricam, C., & Okur, N. (2019). Analysing the Consumer Behavior Regarding Sustainable Fashion Using Theory of Planned Behavior. Consumer Behaviour and Sustainable Fashion Consumption: Springer, 1–37.

Schlegelmilch, B. B., Bohlen, G. M., & Diamantopoulos, A. (1996). The link between green purchasing decisions and measures of environmental consciousness. European Journal of Marketing, 30(5), 35–55.

Schmidt, S., & Brinks, V. (2017). Open creative labs: Spatial settings at the intersection of communities and organizations. Creativity and Innovation Management, 26(3), 291–299.

Schneider, C. Q., & Wagemann, C. (2012). Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis: Cambridge University Press.

Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people, and the biosphere. Journal of Environmental Psychology, 21(4), 327–339.

Schürmann, M. (2013). Coworking Space: Geschäftsmodell für Entrepreneure und Wissensarbeiter: Springer-Verlag.

Sichtmann, C., Wilken, R., & Diamantopoulos, A. (2011). Estimating Willingness-to-pay with Choice-based Conjoint Analysis–Can Consumer Characteristics Explain Variations in Accuracy? British Journal of Management, 22(4), 628–645.

Squires, L., Juric, B., & Cornwell, T. B. (2001). Level of market development and intensity of organic food consumption: cross-cultural study of Danish and New Zealand consumers. Journal of Consumer Marketing, 18(5), 392–409.

Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. Journal of Social Issues, 50(3), 65–84.

Taufique, K, Md.Raziuddin; Vaithianathan, S. (2018). A fresh look at understanding Green consumer behavior among young urban Indian consumers through the lens of Theory of Planned Behavior. Journal of Cleaner Production, 183, 46–55.

Tien, I. (2018). Workstream Collaboration: What It is & Why You Need It. Available at https://mattermost.com/blog/why-workstream-collaboration/.

Torelli, R., Balluchi, F., & Lazzini, A. (2020). Greenwashing and environmental communication: Effects on stakeholders' perceptions. Business Strategy and the Environment, 29(2), 407–421.

Van Huylenbroek, G., Mondelaers, K., Aertsens, J., Verbeke, W. (2009). Personal determinants of organic food consumption: a review. British Food Journal, 111(10), 1140–1167.

Van Liere, K. D., & Dunlap, R. E. (1980). The social bases of environmental concern: A review of hypotheses, explanations and empirical evidence. Public Opinion Quarterly, 44(2), 181–197.

Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. Decision Sciences, 39(2), 273–315.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425–478.

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157–178.

Vermeir, I., & Verbeke, W. (2006). Sustainable food consumption: Exploring the consumer "attitude–behavioral intention" gap. Journal of Agricultural and Environmental Ethics, 19(2), 169–194.

Vermeir, I., & Verbeke, W. (2008). Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. Ecological Economics, 64(3), 542–553.

Wang, P., Liu, Q., & Qi, Y. (2014). Factors influencing sustainable consumption behaviors: a survey of the rural residents in China. Journal of Cleaner Production, 63, 152–165.

Waters-Lynch, J., & Potts, J. (2017). The social economy of coworking spaces: a focal point model of coordination. Review of Social Economy, 75(4), 417–433.

White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework. Journal of Marketing, 83(3), 22–49.

Wigley, S. M., Sinha, P., Goworek, H., Fisher, T., Cooper, T., Woodward, S., & Hiller, A. (2012). The sustainable clothing market: an evaluation of potential strategies for UK retailers. International Journal of Retail & Distribution Management, 40(12), 935–955.

Wong, K. K. K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. Marketing Bulletin, 24(1), 1–32.

Woodside, A. G. (2013). Moving beyond multiple regression analysis to algorithms: Calling for adoption of a paradigm shift from symmetric to asymmetric thinking in data analysis and crafting theory: Elsevier.

Woodside, A. G. (2016). The good practices manifesto: Overcoming bad practices pervasive in current research in business. Journal of Business Research, 69(2), 365–381.

Yadav, R., & Pathak, G. S. (2016). Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behavior. Journal of Cleaner Production, 135, 732–739.

Yadav, R., & Pathak, G. S. (2017). Determinants of Consumers' Green Purchase Behavior in a Developing Nation: Applying and Extending the Theory of Planned Behavior. Ecological Economics, 134, 114–122.

Yang, H., Ma, Q., Wang, Z., Cai, Q., Xie, K., & Yang, D. (2020). Safety of micro-mobility: analysis of E-Scooter crashes by mining news reports. Accident Analysis & Prevention, 143, 105608.

Young, W., Hwang, K., McDonald, S., & Oates, C. J. (2010). Sustainable consumption: green consumer behaviour when purchasing products. Sustainable Development, 18(1), 20–31.

Yu, S., & Lee, J. (2019). The effects of consumers' perceived values on intention to purchase upcycled products. Sustainability, 11(4), 1034.

Zagorskas, J., & Burinskienė, M. (2020). Challenges caused by increased use of e-powered personal mobility vehicles in European cities. Sustainability, 12(1), 273.

Zhang, L., Li, D., Cao, C., & Huang, S. (2018). The influence of greenwashing perception on green purchasing intentions: The mediating role of green word-of-mouth and moderating role of green concern. Journal of Cleaner Production, 187, 740–750.

Zhao, H. H., Gao, Q., Wu, Y. P., Wang, Y., & Zhu, X. D. (2014). What affects green consumer behavior in China? A case study from Qingdao. Journal of Cleaner Production, 63, 143–151.