The Inferential Pattern Matching Approach and Framework: A Holistic Framework for Systematic Partner Selection in Digital-, Innovation-, Sustainability-, and Circular-Oriented Business Ecosystems

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“Collaboration equals innovation.”

Michael Dell

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Abstract

As a result of the rapid advancements in digital and sustainability trends, businesses are becoming more and more reliant on outside expertise (Thalenhorst et al., 2022, p. 72; Just et al., 2023, pp. 1–2; Wallo et al., 2024, p. 1). Business ecosystems as external sources of competitive advantage and innovation have therefore proven to be a successful strategy (Adner, 2017, pp. 49–53; Tsujimoto et al., 2018, p. 49). Despite their strengths, business ecosystem failure is a quite common phenomenon (Reeves et al., 2019, p. 1), which is often due to an insufficient care in the initial selection of partners (Cummings & Holmberg, 2012, p. 137; Pidun et al., 2020b). Several authors thus highlight the importance and challenge of a thorough and systematic partner selection process (Meckl & Kengelbach, 2020, p. 139; Wei et al., 2020, p. 1). Despite its high relevance, partner selection in business ecosystems is a topic which is largely unexplored in the scientific literature (Wei et al., 2020, p. 1). This doctoral thesis therefore investigates the **systematic partner selection in business ecosystems**.

As scientific rigor and the building of a strong theory is at the core of this doctoral thesis (Eisenhardt, 1989b, p. 547; Morse et al., 2002, p. 14; Sutton & Staw, 1995, p. 378), this topic is addressed through originality and its fundamental contribution to both, theory and practice (Stokes, 1997 and Corley & Gioia, 2011 in Nenonen et al., 2017, p. 1131). Based on a constructivist-pragmatist research paradigm (Nonhoff, 2011, p. 91), this study builds a strong theory for a systematic framework for partner selection in business ecosystems in the major part of this investigation in applying a novel rigorous scientific research method (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377; Sutton & Staw, 1995, p. 378) proposed by this doctoral thesis: the **Inferential Pattern Matching Approach** – a qualitative research approach based on an extension of the flexible pattern matching approach by the inferential process of abduction: patterns of abduction, deduction, and induction are flexibly and inferentially matched to provide rich evidence (Sinkovics, 2018 in Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252; Minnameier, 2010, pp. 241-242; Linneberg & Korsgaard, 2019, p. 264; Timmermans & Tavory, 2012, pp. 179–180). Together with theoretical-conceptual and analytical frameworks developed throughout the investigation, this approach forms the **Inferential Pattern Matching Framework** proposed by this thesis, which builds the research framework of the investigation. The iterative design of the **Inferential Pattern Matching Framework** involves the constant redirection of the research question based on the new insights discovered with new data collection and data analysis (Jacobsson & Åkerström, 2013 and Nairn et al., 2005 in CohenMiller et al., 2020, p. 5; Dewey, 1938, p. 142 in Casula et al., 2021, p. 1709; Tecuci et al., 2018, p. 10) applied within the three major steps, abduction, deduction, and induction and the evidencing among at least two of the three approaches. The **Inferential Pattern Matching Approach and Framework** thus provide useful tools for this study, as multiple data collection and analysis techniques, which are iteratively developed, and perspectives from other disciplines as for instance based on systems theory are employed, leading to a holistic framework for systematic partner selection in business ecosystems. Several qualitative data collection and data analysis methods inform this thesis and lead to rich evidence (Eisenhardt, 1989b, p. 538).

To achieve high contribution to managerial practice alike, this thesis is enriched by further inductive insights with single evidence arising during the investigation. These insights are generated, but not fully confirmed by the **Inferential Pattern Matching Approach**, and propose strategic decision heuristics for best fit partner selection based on decision-making methods and a partner configuration function, as well as an **Abductive Taxonomy** (Sinkovics, 2018, pp. 6-8; Minnameier, 2010, pp. 241-242; Nickersen et al., 2013, p. 336), a research approach invented by this study dedicated to highlight differences in characteristics among digital-, innovation-, sustainability-, and circular-oriented business ecosystems to provide a **holistic framework for systematic partner selection in business ecosystems**.

Besides the strong contribution to theory and practice due to the depth and holisticness of the main topic validated by a strong theory, this doctoral thesis provides an innovative and rich methodological contribution with the novel scientific research approaches invented by this doctoral thesis: the **Inferential Pattern Matching Approach**, the **Inferential Pattern Matching Framework,** and the **Abductive Taxonomy.**

Keywords: framework, abduction, deduction, induction, inferential process of abduction, inference to the best explanation, flexible pattern matching, theory, taxonomy, multi-criteria decision making, partner selection, business ecosystem, digital business ecosystem, innovation ecosystem, sustainability innovation ecosystem, circular ecosystem

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List of Abbreviations

AHP	Analytic Hierarchy Process
AI	Artificial Intelligence
ANP	Analytic Network Process
API	Application Programming Interface
CGTLRM	Constructivist Grounded Theory Literature Review Method
CE	Circular Ecosystem
CF	Coding Framework
DBE	Digital Business Ecosystem
FPM	Flexible Pattern Matching
GM	Gioia Methodology
GT	Grounded Theory
IE	Innovation Ecosystem
IP	Intellectual Property
IPMA	Inferential Pattern Matching Approach
IPR	Interview Protocol Refinement Framework
MCDM	Multi-Criteria Decision Making
MVE	Minimum Viable Ecosystem
POC	Proof-of-Concept
RDT	Resource Dependence Theory
ROT	Resource Orchestration Theory
RQ	Research Question
SE	Sustainability Innovation Ecosysten
SLR	Systematic Literature Review
WH	Working Hypothesis

List of Symbols and Formulae

f_0	Surprising Facts
$f_{0'}, f_{0''}, f_{0'''}, \ldots$	Specific Facts deduced from f_0
T_E	Established Theory
T_N	New Theory
j	Evaluation Criterion
w_j	Weight of the Evaluation Criterion j
i	Alternatives / Alternative Partners to Choose from
n	Number of Alternatives
λ_i	Eigenvalue of i
λ_{max}	Maximum Eigenvalue
M	Matrix
μ	Consistency Index
U	Payoff Function
$\sum_{j=1}^{n} w_j x_{ij}$	General Arithmetic Mean-Function for Evaluation Criterion j and Alternatives to Choose from i

"We cannot begin with complete doubt. We must begin with all the prejudices which we actually have when we enter upon the study [...]."

Charles Sanders Peirce

(Peirce CP 5.265, 1893 in Friedman, 1999, p. 731)

1 Introduction

1.1 Motivation, Research Topic and Research Method

Due to the fast pace of digital and sustainability trends, companies are increasingly dependent on external know-how (Thalenhorst et al., 2022, p. 72; Just et al., 2023, pp. 1–2; Wallo et al., 2024, p. 1) and are no longer independent strategic actors (Jacobides, 2019, p. 128). The importance of business ecosystems for companies as sources of competitive advantage and innovation is thus apparent (Adner, 2017, pp. 49–53; Tsujimoto et al., 2018, p. 49). Business ecosystems are complex systems, involving multiple different actors, activities, and trends (Basole et al., 2024, p. 1). Understanding their structure is thus an important strategic imperative in light of the rapid evolution of competitive actions, emerging trends, innovation, and technology (Jacobides, 2019 and Weill & Woerner, 2015 in Basole et al., 2024, p. 1). The role of actors as the most important resources of business ecosystems and their mutual fit is emphasized by many researchers (Trevisan et al., 2022, p. 286; Tsujimoto et al., 2018, p. 56). Several authors highlight the importance and challenge of building a business ecosystem of compatible partners. Their thorough and systematic selection within a structured process is thus a major concern to successfully exploit arising opportunities (Meckl & Kengelbach, 2020, p. 139; Wei et al., 2020, p. 1).

Relevance of the topic and research gaps: the building of a strong theory is at the core of this doctoral thesis (Eisenhardt, 1989b, p. 547; Sutton & Staw, 1995, p. 378). The relevance of the topic in practice and its gaps in scientific research therefore evolves from three perspectives and involves the topic itself, an increasing theory-praxis gap (Nenonen et al., 2017, p. 1131) in recent literature in general, as well as gaps in existent research methodology:

As business ecosystem failure is a quite common phenomenon, this topic is particularly relevant: a viability rate of less than 15% in the long-term (Reeves et al., 2019, p. 1) and 85% of observed failures in the business ecosystem design are worryingly high numbers with the biggest challenge in the decision on the partner level, including the right level of openness, the business ecosystem configuration, the implementation of dedicated partner roles, the identification of the minimum of requested partners, and the convincing of partners to join the business ecosystem (Pidun et al., 2020b).

Despite its relevance for managerial practice, this topic remains largely unexplored in scientific research: it is shown that even good partner management can never compensate for a poor initial partner identification and selection. While the strategic alliance literature emphasizes the relevance of partner selection, this topic remains largely unexplored within business ecosystems (Cummings & Holmberg, 2012, p. 137; Wei et al., 2020, p. 1). Previous research has, for instance, emphasized the alignment of business ecosystem partners (Lingens et al., 2022, p. 560), partner selection in platform-oriented types of business ecosystems (Tsou et al., 2019, p. 1609; Wei et al., 2020, p. 1), the partner selection as one element influencing the innovation performance (Tsou et al., 2019, p. 1609), and frameworks to aid companies in attracting the right partners in software ecosystems (Beelen et al., 2022, p. 1). Generally, prior literature majorly focuses on other core topics, such as the development of a business ecosystem framework or the business ecosystem strategy, in which the partner selection only plays a subordinate role (Jacobides, 2022, p. 115; Visscher et al., 2021, p. 622). Overall, the investigation of systematic partner selection in business ecosystems remains very fragmented, **lacking a systematic and holistic process that can be applied by companies to successfully select partners**.

Further to the gap in literature regarding partner selection in business ecosystems, academic research in management is confronted with a widening of the theory-praxis gap (Nenonen et al., 2017, p. 1131). Besides its **originality**, academic research is evaluated according to its fundamental **contribution to both, theory and practice** (Stokes, 1997 and Corley & Gioia, 2011 in Nenonen et al., 2017, p. 1131). The focus on both is thus imperative, and particularly for this topic, which is relevant for practice and theory alike.

The **interplay between theory and method** is highly relevant as well, as theories without a methodological support are mere speculations (van Maanen et al., 2007, pp. 1145–1146). With regard to the application of an inferential process, including the iterative steps of abduction, deduction, and induction, the prior literature further reveals a fragmented picture: authors form prior literature mention the use of all types of reasoning, but usually apply only one or two types of reasoning in their investigations (Tecuci et al., 2018, p. 10); or all types, but not in the typical inferential process structure (Beltagui, 2011; Tecuci, 1993). To the best of the author’s knowledge, the typical inferential process including the steps of abduction, deduction, and induction in this chronological order is only implemented by Tecuci et al. (2018, p. 10) and therefore its use remains largely unexplored.

To address these gaps in research topic, contribution to theory and practice, and research methodology, this explorative empirical study investigates **the systematic partner selection in business ecosystems** by the application of the **Inferential Pattern Matching Approach**, a novel research approach proposed by this study contributing to both, strong theory and deep managerial insights. The research topic is consciously focused, as **strong theory** typically originates from one single or a small number of research ideas (Sutton & Staw, 1995, p. 377). Theory building based on qualitative research requires a sophisticated research design, enabling the interconnection of multiple bodies of theory with a large data base (Timmermans & Tavory, 2012, p. 181). Methodologically, this study invents the **Inferential Pattern Matching Approach**, an innovative combination of the inferential process including abductive, deductive, and inductive reasoning (Minnameier, 2010, pp. 241-242) and the flexible pattern matching approach (Sinkovics, 2018, pp. 6–8). The flexible pattern matching approach is thus extended by the inferential process of abduction (Minnameier, 2010, pp. 241-242). Instead of merely confirming existing theory, the **Inferential Pattern Matching Approach** including abductive reasoning is particularly useful for the discovering of a strong new theory (Dubois & Gadde, 2002, p. 559).

Research aim: initially, this research aimed to focus on partner selection in digital business ecosystems. From the extremely limited insights of the systematic literature reviews about digital-specific components and the very different types of business ecosystems complicating a generalization arose the idea to redirect the research to holistically investigate the partner selection process regarding business ecosystems in general. Taking a resource-based perspective, the aim is thus to provide a systematic framework for partner selection in business ecosystems in general and to identify strategic decision heuristics for best fit partner selection based on decision-making methods and a partner configuration function as well as key themes important to partner selection in different business ecosystem types, including digital-, innovation-, sustainability-, and circular-related business ecosystems, by the application of an **Abductive Taxonomy** (Sinkovics, 2018, pp. 6-8; Minnameier, 2010, pp. 241-242; Nickersen et al., 2013, p. 336), a novel approach proposed by this thesis. A strong theory is established by the proposition of a systematic partner selection framework. A further analysis of the data provides new approaches to complete the investigation and build a **holistic framework for partner selection in digital-, innovation-, sustainability-, and circular-related business ecosystems.**

Research design: together with the theoretical, conceptual, and analytical frameworks built within each step of the investigation, the **Inferential Pattern Matching Approach** forms the **Inferential Pattern Matching Framework**, the overall qualitative research approach (Abram et al., 2020, p. 1) of this study. The iterative design of the **Inferential Pattern Matching Framework** involves the constant redirection of the research question based on the new insights discovered with new data collection and data analysis (Jacobsson & Åkerström, 2013 and Nairn et al., 2005 in CohenMiller et al., 2020, p. 5; Dewey, 1938, p. 142 in Casula et al., 2021, p. 1709; Tecuci et al., 2018, p. 10) applied within the three major steps, ABDUCTION, DEDUCTION, and INDUCTION. The **Inferential Pattern Matching Approach and Framework** thus provide useful tools for this study, as multiple data collection and analysis techniques, which are iteratively developed, and perspectives from other disciplines as for instance based on systems theory are employed, leading to a holistic framework for systematic partner selection in business ecosystems. The investigation is based on a pragmatist research paradigm (Dewey, 1916, p. 711) combined with a constructivist perspective (Nonhoff, 2011, p. 91), a rationale for flexible and rigorous scientific research (Mitchell, 2018, p. 103; Morse et al., 2002, p. 14; Ormerod, 2021, p. 816; Prager et al., 2019, p. 377), which is actively constructed by the researcher providing the direction for the investigation, as a study is not based on a complete doubt of the researcher, but always accompanied by the preconceived ideas of the researcher, which are integral part of the study (Peirce CP 5.265, 1893 in Friedman, 1999, p. 731; Charmaz, 2006, p. 187; Sobh & Perry, 2006, p. 1198; Timmermans & Tavory, 2012, p. 179).

The overall research question is as follows:

Research Question

How should a holistic framework for systematic partner selection be designed to successfully select partners in digital-, innovation-, sustainability-, and circular-oriented business ecosystems?

This research question leads to the following five research questions (RQ), which will be addressed and iteratively redirected throughout this thesis (Jacobsson & Åkerström, 2013 and Nairn et al., 2005 in CohenMiller et al., 2020, p. 5; Dewey, 1938, p. 142 in Casula et al., 2021, p. 1709; Tecuci et al., 2018, p. 10), which means that they do not each pursue an independent, isolated objective, but represent the modifications of the research question throughout the investigation:

RQ 1: How do companies systematically select partners in digital business ecosystems? (ABDUCTION chapter **5.1**)

RQ 2: How do companies systematically select partners in business ecosystems and how should a systematic partner selection framework be designed?
(ABDUCTION chapter **5.4.2.1**)

RQ 3: How do companies systematically select partners in business ecosystems? What are the major elements and interrelationships within a systematic partner selection framework? (ABDUCTION chapter **5.8** → transition to chapter DEDUCTION)

RQ 4: How do companies systematically select partners in business ecosystems and what are the interrelationships among its major elements?
(DEDUCTION chapter **6.6** → transition to chapter INDUCTION)

RQ 5: Which decision-making tools can support the different steps in the partner selection process to obtain an adequate selection of partners? What are the differences among the partner selection in different business ecosystem types?
(INDUCTION chapter **7.6** → transition to chapter 8, the development of a holistic framework)

Method-fit: this thesis in form of a monograph provides an adequate framework for this large investigation. Despite the complexity of the topic and the multiplicity of research methods inherent in the **Inferential Pattern Matching Framework**, this thesis remains clearly focused, as it provides a structured and rigorous research framework to develop a systematic partner selection framework in business ecosystems due to its guidance by and close tie to the research questions, the theoretical-conceptual and analytical frameworks, as well as the hypotheses, which are developed throughout this thesis and are therefore termed working hypothesis (WH) as long as they are provisional (Casula et al., 2021, p. 1709; Grodal et al., 2021, p. 605). This novel research method thus perfectly fits this comprehensive topic.

Scope of the investigation: in contrast to the orchestration of business ecosystem actors, which is referred to as the guidance and orchestration of multiple stakeholders (Bosch & Olsson, 2018, p. 4) in identifying and structuring their roles (Valkokari et al., 2017, p. 13), and the development of a business ecosystem structure, which starts with the value proposition to determine the set of actors (Adner, 2017, pp. 41–44), this investigation clearly focuses on the initial stage in the business ecosystem creation or development process: the partner selection process in correspondence to the objectives of the company and the business ecosystem objectives and strategy. The result of this investigation is not a mere list with a rich amount of selection criteria, but a strong theory with an overall instruction on how to design a systematic partner selection process in business ecosystems (Eisenhardt, 1989b, p. 547). The aim is to provide a systematic framework for partner selection in business ecosystems, which can be applied to all types of business ecosystems. The focus is thus on generalizability (Eisenhardt, 1989b, p. 546). As business ecosystems have diverse objectives and structures, this study further pays special attention to digital-, innovation-, sustainability-, and circular-related characteristics in a second step. These individual characteristics are classified by the **Abductive Taxonomy**. The characteristics of platforms are investigated for the purpose of identifying the demarcation to digital business ecosystems as the focus of this study is clearly the investigation of the partner selection process for different business ecosystem types and not the considering of platforms.

Contributions: several theoretical, managerial, and methodological contributions are made based on the following core contributions: this study provides a **systematic and holistic partner selection framework**, which is general enough to be applied to all types of business ecosystems. The following key categories are proposed, which form the systematic partner selection framework, incorporating the corporate objectives of the company (1), the framework conditions and influencing factors (2), the business ecosystem objectives and / or strategy (2), identification strategies and selection processes (3), partner selection criteria (4), and a constant reevaluation of the partner fit (5). Simultaneously, strategic decision heuristics for best fit partner selection based on decision-making methods and a partner configuration function are uncovered. Together with key topics relevant for specific business ecosystem types, such as digital business ecosystems, innovation ecosystems, sustainability innovation ecosystems and circular ecosystems, this study provides a holistic framework for partner selection in business ecosystems. Overall, these deep insights contribute equally to theory and practice.

The investigation further advances a novel research method, the **Inferential Pattern Matching Approach**, which, together with the theoretical-conceptual and analytical frameworks, forms the **Inferential Pattern Matching Framework** proposed by this study.

Additionally, and to the best of this author's knowledge, this thesis is the first one in providing a clear definition and approach for the combination of a typology and a taxonomy relying on flexibly and inferentially gathered conceptual and empirical qualitative data: an **Abductive Taxonomy**.

1.2 Thesis Structure

The thesis is structured as follows: the overall research framework is developed in **chapter 2**, as the **Inferential Pattern Matching Framework**, the extension of the flexible pattern matching approach by abduction, represents the common thread throughout the entire work. The **chapters 3 and 4** cover the basic foundations: while **chapter 3** gives an overview of the antecedents and characteristics of digital-, innovation-, sustainability-, and circular-oriented business ecosystems, **chapter 4** covers the foundations of partner selection in business collaborations. The **chapters 5 to 7** represent the data collection and data analysis parts of this investigation and iteratively build, together with the theoretical-conceptual and analytical frameworks, the **Inferential Pattern Matching Framework.** The iterative procedure applied across these chapters is the essence for the systematic and in-depth investigation of the topic, which will lead to a strong theory (Sutton & Staw, 1995, p. 378). Therefore, the chapters 5 to 7 build on one another, such as to iteratively complete the systematic partner selection framework for business ecosystems. **Chapter 8** includes the extension of the systematic framework for partner selection in business ecosystems generated by the **Inferential Pattern Matching Approach** and analyzes further insights inductively, which are generated by, but not completely confirmed by the **Inferential Pattern Matching Approach**, to propose **strategic decision heuristics** for best fit partner selection based on decision-making methods and a partner configuration function, as well as an **Abductive Taxonomy** to highlight differences in characteristics among digital-, innovation-, sustainability-, and circular-oriented business ecosystems to provide an overall holistic framework for systematic partner selection in business ecosystems. The thesis concludes with **chapter 9** and a discussion referring to the theoretical and methodological contributions, as well as the managerial implications of this study and finalizes with limitations and notes on further research.

To provide **transparency**, every confirmatory evidence by the **Inferential Pattern Matching Approach** among the chapters is explicitly stated in the text. Furthermore, every move back among the chapters, using the **Inferential Pattern Matching Approach**, is explicitly marked at every point by its symbol as indicated in **Figure 1**:

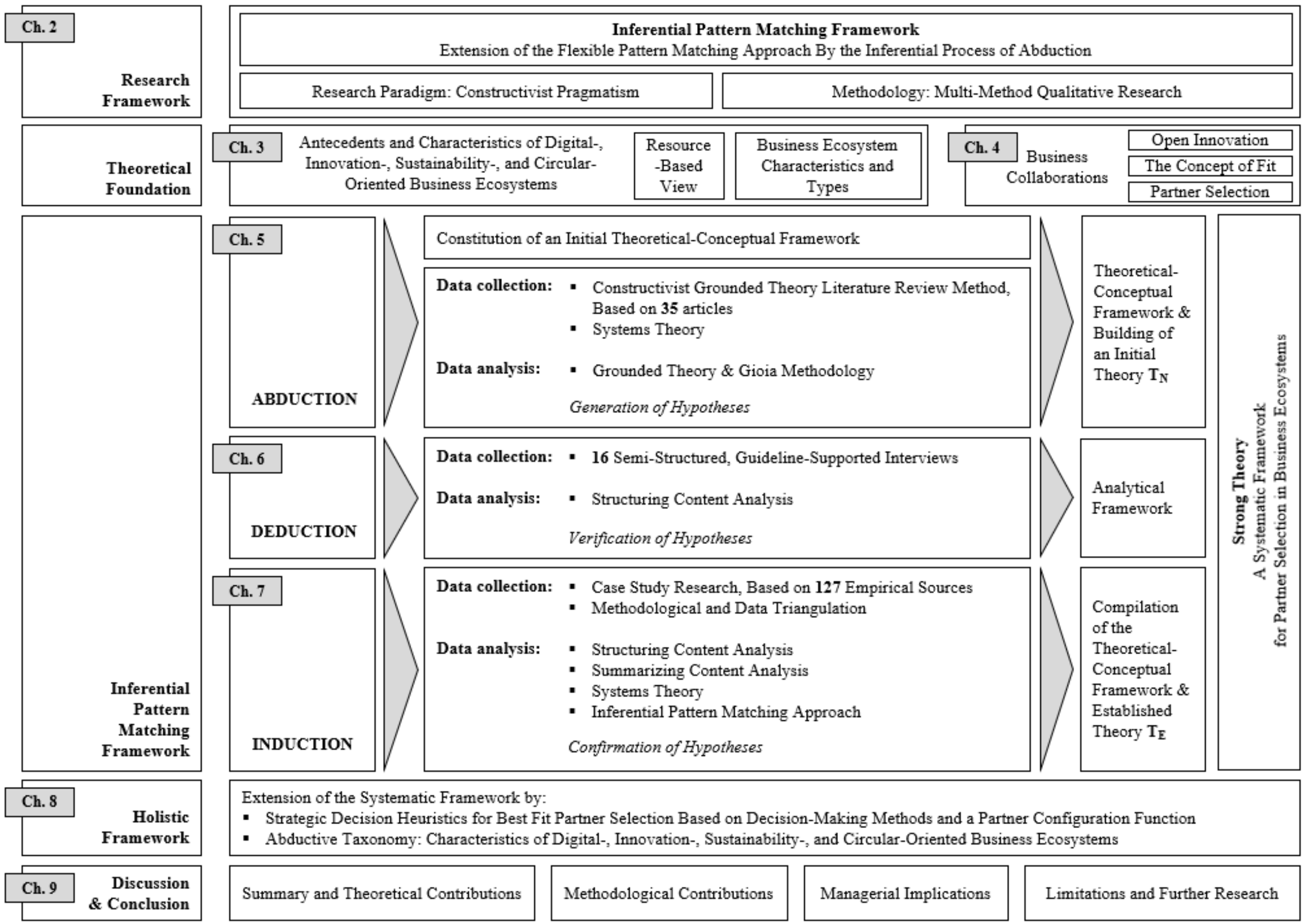
Figure 1. Inferential Pattern Matching Approach

Source: Author's representation

For the purpose of building a strong theory (Sutton & Staw, 1995, p. 378), this thesis is based on rigorous scientific research (Morse et al., 2002, p. 14) and clearly guided by the **Inferential Pattern Matching Framework** so that the final systematic partner selection framework developed throughout the study will contain knowledge only, which is strongly evidenced by the **Inferential Pattern Matching Approach** among the main chapters. This means that confirmation must be made through pattern matchings among at least two of the three chapters ABDUCTION, DEDUCTION, or INDUCTION, either as a move forward, for instance from ABDUCTION to DEDUCTION, or a move backward, for instance from INDUCTION to ABDUCTION.

The thesis structure is demonstrated in **Figure 2**.

Figure 2. Overview of the Thesis Structure



Source: Author's representation

"If you carefully consider the question of pragmatism[,] you will see that it is nothing else than the question of the logic of abduction."

Charles Sanders Peirce

(Peirce CP 5.196 in Frankfurt, 1958, p. 597)

2 Research Framework: The Inferential Pattern Matching Approach and Framework

2.1 Development of the Research Framework

2.1.1 The Research Paradigm as the Rationale for Rigorous Scientific Research

Due to the large qualitative empirical part, it is appropriate to situate this investigation within the **foundations of scientific research** (Fife & Gossner, 2024, p. 2). The essence of research is scientific **rigor** (Morse et al., 2002, p. 14). Its importance can thus not be overemphasized (Enworo, 2023, p. 372). Maintaining rigor in data collection, analysis, interpretation, and reporting entails following rules, guidelines, and practices that reduce bias and error (Ogawa & Malen, 1991, p. 267). **Rigorous scientific research** involves transparency about the procedures used to obtain results and completeness of the research methods (Prager et al., 2019, p. 377). Transparency is reached through reflexiveness and explicitness about the processes which will lead to theory development (Grodal et al., 2021, pp. 591–593). A well-defined structuring helps to achieve a strong theoretical contribution (Grodal et al., 2021, p. 594). To demonstrate rigorous scientific research (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377), this study is based on Denzin and Lincoln's (1998) **structure of research** containing the following steps and hence provide transparency on the proceeding and as well as on each single step: 1. the research paradigm of the study design, 2. the precise object to be studied, 3. the research strategy to be used and 4. the research methods to be applied to collect and analyze the data. (Yilmaz, 2013, p. 312).

Scientific research is guided by **research paradigms**, which are more important than the actual research method, as they guide the investigation. Research paradigms can be defined "as the basic belief system or worldview that guides the investigation, not only in choices of method but in ontologically and epistemologically fundamental ways" (Guba & Lincoln, 1994, p. 105 in Tashakkori & Teddlie, 1998, pp. 20–21).

A research paradigm thus guides the research direction and framework (Morgan, 2007, pp. 68, 73). The main characteristics of the most relevant paradigms are presented in the following:

Positivism is clearly objective, value free (Neuman, 1997, p. 64 in Healy & Perry, 2000, p. 123), rational (Behfar & Okhuysen, 2018, p. 324) and emphasizes the verification of facts (Comte, 1975 in Behfar & Okhuysen, 2018, p. 324). Theories are verified empirically so that the truth is based on sensory observation (Hacking, 1983 in Godfrey & Hill, 1995, p. 523). It is a hypothetico-deductive paradigm of science which operationalizes variables and measures and builds upon experimental and a priori hypothesis verification (Park et al., 2020, pp. 690–692). The positivist approach distinguishes between theory, which is based on the justification provided by empirical facts and direct observation, which is not theory laden (Bendassolli, 2013, p. 5). **Post-positivism** addresses the weakness of positivism in acknowledging the potential for the researcher's personal values and views to influence what is being observed (Rehman & Alharthi, 2016, p. 53).

Realism assumes a realistic world with interdependently operating people or objects instead of mere constructions (Sobh & Perry, 2006, pp. 1199–1200). The real world might be imperfectly apprehensible (Godfrey & Hill, 1995, p. 520; Healy & Perry, 2000, p. 120). Realism believes in the truth of both, observable and unobservable information, which contrasts the positivist view (Godfrey & Hill, 1995, p. 520; Sobh & Perry, 2006, p. 1201). The survival of repeated attempts of falsification leads to the assumption that unobservable information are true (Popper, 1972 in Godfrey & Hill, 1995, p. 526). The research approach is majorly qualitative, but can contain quantitative parts (Sobh & Perry, 2006, p. 1201).

Interpretivism enables seeing the world from the participants' perspectives and experiences and has thus a subjective focus (Willis, 2007 in Thanh & Thanh, 2015, pp. 24–25). Based on realism, interpretivism tries to understand a complex phenomenon by the interpretation of its meanings (Nordqvist et al., 2009, p. 298) by the interpretative skills of the researcher (Gummesson, 2003, p. 482).

Historically, **pragmatism** as a research paradigm has its roots in "praktisch" or "pragmatisch", first mentioned by the German philosopher Immanuel Kant and further developed by Charles Sanders Peirce (Dewey, 1916, p. 710). According to Peirce, pragmatism is defined as the development of a habit, an action with the highest degree of generality (Dewey, 1916, p. 711). Pragmatism can be applied to different situations. Regarding pragmatism in relation to the choice of research methods, Tashakkori and Teddlie (1998) state: "study what interests and is of value to you, study it in the different ways that you deem appropriate, and use the results in ways that can bring about positive consequences within your value system" (p. 30). In other words, methods should be tailored to the research question so that the choice of research method depends largely on what the researcher intends to do. The focus is not on one specific method, but on meaningful results (Bryman et al., 2008, pp. 270-271). According to Tashakkori and Teddlie (1998), the **research question** is of utmost importance and will best be answered using different kinds of research methods (p. 21) to enable research from multiple perspectives (Charmaz, 2021, p. 158). In conclusion, pragmatism is a rationale for flexible and rigorous scientific research (Mitchell, 2018, p. 103; Morse et al., 2002, p. 14; Ormerod, 2021, p. 816; Prager et al., 2019, p. 377).

The concept of **constructivism** is attributed to a scientific perspective assuming that reality is actively constructed by people, including researchers (Charmaz, 2006, p. 187) and that these should provide the direction for the investigation (Sobh & Perry, 2006, p. 1198). This implies, that the observer plays a major role within this research paradigm.

A classification of the four research paradigms with their characteristics and associated research approaches is summarized in **Table 1**. Epistemology refers to the value of a point of view, which can be objective, which is value free, or subjective, which is value laden. While ontology addresses the nature of reality. They are considered interrelated (Fife & Gossner, 2024, p. 2).

Table 1. Classification of Research Paradigms and Research Approaches

	Positivism	**Realism**	**Interpretivism**	**Pragmatism**	**Constructivism**
Epistemology	Objectivist: Findings True	Modified Objectivist: Findings Probably True	Subjectivist: Interpretative Findings	Subjective and Objective	Subjectivist: Created Findings
Ontology	Reality is Real and Apprehensible	Reality is "Real" but Partially Unobservable and thus Probabilistic	Reality from Participants' Perspectives and Experiences	Realities from Multiple Perspectives	"Constructed" Realities
Methodology	Quantitative	Quantitative and/or partially qualitative	Qualitative	Qualitative / Quantitative or Qualitative / Qualitative	Qualitative

Source: Author's representation, adapted from Guba and Lincoln (1994, p. 109); Perry et al. (1999) in Sobh and Perry (2006, p. 1195)

2.1.2 Methodology: Qualitative Research

Qualitative research is characterized by analyzing large amounts of contextualized, unstructured data. Due to the increasing amount of diverse data types, qualitative research has gained considerable importance in recent years (Abram et al., 2020, p. 1). Qualitative studies were not taken seriously by the quantitative community for a long time, as they were not seen as science, but as opinions (Eisenhardt, 2021, pp. 147–148). Quantitative research alone was considered the only important method of rigorous scientific research in terms of reliability, validity and objectivity until the 1960s (Kirk & Miller, 1986 in Flick, 2022, pp. 533–535; Morse et al., 2002, p. 14; Prager et al., 2019, p. 377). Later then, quality criteria of quantitative research should equally apply to qualitative research, which is questionable, as the respective methods are diametrically different and general guidelines would neglect the complexity and unique characteristics of qualitative research studies (Glaser & Strauss, 1979, p. 92 and Lüders & Reichertz, 1986, p. 97 in Flick, 2022, p. 535). The superiority of each approach has thus been subject to long-standing debates, as representatives of quantitative research claim scientific rigor as unique position for numerical, quantitative research, while advocates for qualitative research argue that data from experimental study are never purely quantitative (Libarkin & Kurdziel, 2002, p. 78). The choice of method should rather be based on what goal the research is pursuing, striving for **the best theory-method fit**, so that ultimately both methods have their justified existence (Gehman et al., 2018, p. 285). The chosen research method is very much **dependent on the research question** and the assessment of the general characteristics of research – the method of data collection, analysis, and presentation and the way in which data is interpreted (Glaser & Strauss, 1979, p. 92 in Flick, 2022, pp. 535, 539).

The **strength of qualitative research in contrast to quantitative research** is that instead of simply measuring a phenomenon as pursued by quantitative research, qualitative research places more emphasis on understanding it, **deeper meanings** can be tracked down by the researcher, striving to understand the context of certain phenomena or **interpret phenomena** in light of the interpretations people bring to them (Guba & Lincoln, 1994, pp. 106–107; Watkins & Gioia, 2015, p. 6; Yilmaz, 2013, p. 313). Qualitative data is particularly useful to understand the underlying relationships (Eisenhardt, 1989b, p. 542) and is hence strongly **researcher dependent** (Libarkin & Kurdziel, 2002, p. 78). Watkins and Gioia (2015) provide a good summary in distinguishing the two research approaches into: quantitative research answering the questions of "what" and "how many" and qualitative research addressing "**why**", "**how**" and "**under what circumstances**" things occur (p. 6). Qualitative research starts, where quantitative research ends and acquires information, which cannot be captured with quantitative research (Watkins & Gioia, 2015, p. 8) and enables the investigation of very **complex phenomena** (Watkins & Gioia, 2015, p. 6). Advocates of qualitative research methods see clear advantages, such as **rigid flexibility**, which is "[…] defined as maintaining a clear and unwavering goal in research with a willingness to be flexible in how it is reached" (CohenMiller et al., 2020, p. 5). **Research is redirected iteratively** and **constantly adapted** with emerging data sources, but remains faithful to the overarching research goal (Jacobsson & Åkerström, 2013 and Nairn et al., 2005 in CohenMiller et al., 2020, p. 5). Subjectivity cannot be eliminated, but is explicit part of the method, as this supports the depth of the study, generating a **rich understanding of the phenomena** (Watkins & Gioia, 2015, p. 8). While quantitative research has a more deductive, explanative character, qualitative research enables an **exploratory** investigation and can enable all types of reasoning, **inductive, deductive and abductive** reasoning (Casula et al., 2021, pp. 1707–1709). The main characteristics of qualitative and quantitative research are compared in **Table 2**.

Table 2. Comparison of Qualitative and Quantitative Research

	Qualitative	**Quantitative**
Strategy	Exploration	Exploitation
Analytical Objectives	Describe the phenomena Describe and explains relationships Describe individual experiences Describe group norms Emphasis is on causes, meanings, interpretations and implications	Quantify phenomena Predict causal relationships Describe characteristics of a population Quantitative scores Statistical and mathematical analysis
Research Question	"why", "how" and "under which circumstances"	"what" and "how"
Scale	A small number of population	A high number of population
Question Format	Open-ended, discovery-oriented	Closed-ended, verification-oriented
Data Format	Textual (obtained from interviews, observations and field notes)	Numerical (obtained by experiments, surveys)
Orientation	Process and meaning oriented	Result oriented
Nature	Flexible and holistic	Rigid and generalist
Flexibility in Study Design	Flexible (i.e., the addition, exclusion, or wording of particular interview questions) Participant responses affect how and which questions researchers ask next Study design is iterative, that is, data collection and research questions are adjusted according to what is learned	Stable from the beginning to the end Participant responses do not influence or determine how and which questions researchers ask next Study design is subject to statistical assumptions and conditions
Bias	Subjective, bias is made explicit, capturing of unique and individual perceptions, reflections, or experiences	Objective, not biased
Type of Reasoning	Inductive, deductive and abductive, or a combination of all, develops theory or tests theory / hypotheses	Deductive, tests theory / hypotheses

Source: Author's representation, adapted from Eisenhardt (1989b, pp. 534–535); Corley (2015, p. 602); Watkins and Gioia (2015, p. 6); Morgan (2007, p. 73); Wheeldon (2010, p. 94); Mack et al. (2005, p. 3)

The comparison reveals that the distinction between qualitative and quantitative research is neither fuzzy nor completely sharp, as they overlap partially (Allwood, 2012, p. 1419): for instance, the deductive reasoning is possible with both approaches. Hence, the basic difference is in the research question and hence the purpose and the procedure of the study. Qualitative research enables deep and insightful interactions of the data (Maher et al., 2018, p. 1).

In contrast to well-known **quality criteria** for quantitative research, the debate about the quality criteria to apply for **qualitative research** is still an issue (Bryman et al., 2008, pp. 261–262). Nevertheless, **validity** and **reliability** have proven to be the most important quality criteria for qualitative research (Bryman et al., 2008, p. 274; Morse et al., 2002, p. 13; Yadav, 2022, p. 679). According to Morse et al. (2002), **rigor** is not ensured by a subsequent evaluation of trustworthiness upon completion of the study, but by a verification process, which guides the study and involves **constant interactions within the study** (p. 17). Validity and reliability is obtained by using incremental and interactive **verification techniques**, including methodological coherence, sample adequacy, concurrent collecting and analyzing of data to create interaction, theoretical thinking involving constant checking and rechecking, data saturation and theory development (Creswell, 1997 and Kvale, 1989 in Morse et al., 2002, p. 17; Morse et al., 2002, pp. 16-19). This will lead to **pragmatic scientific evidence** (Morse et al., 2002, p. 19).

2.1.3 Reasoning, Inference and Abduction – Disentangling the Concepts

Although, the basic idea of empirical research has its initial roots in the works of Aristotle (Adler, 1997), the trichotomy of the basic types of reasoning for empirical investigation, inductive, deductive, and abductive reasoning, was introduced by Charles Sanders Pierce (1839-1914), a prolific thinker and writer (Flach & Kakas, 2000, p. 5; Shank, 1998, p. 843).

A detailed explanation of the three types of reasoning and process of inference is important as they are the essential part of the **Inferential Pattern Matching Framework**, representing the research framework throughout the course of this study.

Several authors tend to confuse **abductive reasoning** with **abduction as an inferential process** (McAuliffe, 2015, p. 300). For this reason, this study first sheds light on their history and terminological differences, before their characteristics are explained in detail afterwards.

Evaluations of the evidence's relevance to theory are essential to science. The central aim of science therefore is to present conclusions that connect evidence with theory (Lipton, 2017).

Scientific **reasoning**, empirical reasoning, or reasoning is based on rules, explanations, and results and represents self-constrained thinking to generate justifiable conclusions (Mantere & Ketokivi, 2013, p. 71; Moshman, 1995, p. 53, 2004, p. 224; Sarbo & Cozijn, 2019, p. 246). The process of drawing a potential causal conclusion from premises is known as **inference** and is based on the establishment of causal relationships between two demonstrated causes and effects by empirical observations, theoretical inferences, and/or statistical regulations (Bender, 1996; Wang, 2007, p. 75). A **logic** is a theory considering what happens after what and why (Priest, 2021, p. 3207).

The controversy of the term **abduction**, which is often defined interchangeably as a type of reasoning and as an inferential process is certainly attributable to Peirce's imprecise definition of abduction: his syllogistic theory in his earlier life has been interpreted as abductive reasoning, while he later referred to abduction as an inferential theory (Flach & Kakas, 2000, pp. 5–6). According to McAuliffe (2015), this controversy is due to a false interpretation of authors who cited Peirce's idea abduction (pp. 300-305). Basically, Peirce's definition of the term abduction is referred to a recursive process beginning with a hypothesis and concludes with observations to test the hypothesis (McAuliffe, 2015, p. 302). Rather than a logic, it is a path of reasoning based on conjectures (van Maanen et al., 2007, p. 1149). Abduction as it is understood by most authors, however, refers to a single step of generating a plausible hypothesis explaining evidence (Harman, 1965, p. 89; McAuliffe, 2015, p. 305). In order to avoid confusion about the terms, Harman (1965), for instance, introduced the terminology "**inference to the best explanation**" (p. 89) to differentiate this single step of abduction from the inferential process of abduction.

The terms are used differently in the literature, referring to the steps of deduction, induction, and abduction as types of reasoning (McAuliffe, 2015, p. 300) or inference making methods (Mukumbang et al., 2021, p. 2). To avoid misunderstandings and according to Järvensivu and Törnroos' (2010) suggestion to specify the type of abduction (p.102), this study will differentiate the terms as follows:

The term "**reasoning**" refers to **deduction, induction, and abduction** (McAuliffe, 2015, p. 300). The term "**inference**" is dedicated to abduction as an "**inferential process**" (Minnameier, 2010, p. 242), the process which begins with abductive reasoning and is followed by deductive and inductive reasoning. This clear distinction of the terms guarantees consistency throughout this study and a focus on the relevant content.

In the following chapters, the characteristics of each **type of reasoning** as well as the **inferential process** will be discussed.

2.1.4 Types of Reasoning: Inductive, Deductive, and Abductive Reasoning

2.1.4.1 Deductive Reasoning

In the following, the three types of reasoning are listed in the order of their historical occurrence in empirical research: deductive, inductive, and abductive (Shank, 1998, pp. 843–846), even though the order is different from the inferential process later on described: abductive, deductive, inductive (Minnameier, 2010, p. 241-242). As abduction is the most controversial and poorly understood reasoning type in literature, it makes further sense to explain the concepts of deduction and induction first (McAuliffe, 2015, p. 301).

Deductive reasoning dominated all forms of empirical reasoning for centuries and allows for an empirical look at how the world of experience operates (Shank, 1998, p. 844). By definition, deductive reasoning generates predictions (Lawson, 2009, p. 339). It leads to legitimate conclusions that, given the truth of their premises, must also be true and therefore are assumed to be infallibly (Fillenbaum, 1993, p. 323; Johnson-Laird, 1999, p. 110). The explanation offered by deductive reasoning is certain and its conclusion is necessarily true (Behfar & Okhuysen, 2018, p. 325). Deduction is often associated with the notion hypothetico-deductive, indicating that empirical operationalizations and falsifiable hypotheses must be logically derived from theory (Mantere & Ketokivi, 2013, p. 77). The basic idea of deductive reasoning is demonstrated by Peirce's (1878) famous beans example, depicted in **Figure 3**.

Figure 3. Deductive Reasoning

All the beans from this bag are white.	**rule**
These beans are from this bag.	**explanation**
⇨ These beans are white.	**result**

Source: Author's representation, adapted from Peirce (1878); Sarbo and Cozijn (2019, p. 246)

With deductive reasoning theories are tested (Mantere & Ketokivi, 2013, p. 75; Rumelt et al., 1991, p. 8). Deduction is used to fill in gaps with data collected and to develop an explanatory theory (Nathaniel, 2023, p. 2). In detail, deduction begins with the hypothesis and ends with the verification of this hypothesis (Behfar & Okhuysen, 2018, p. 326). Deductive reasoning moves from the general to the specific and never reveals new knowledge, as all is already implicitly contained in the assumption (Behfar & Okhuysen, 2018, p. 325; Popper, 1959, p. 1). It has to be acknowledged that no new knowledge is created, but deduction tries to make explicit what is not directly stated (Fillenbaum, 1993, p. 348). It therefore uncovers specific knowledge contained in the hypotheses. Its key role is to structure and present interpretative findings and therefore makes it relevant for the descriptive and prescriptive point of view in research (Mantere & Ketokivi, 2013, p. 78). Further, it seeks to minimize subjectivity of the researcher (Behfar & Okhuysen, 2018, p. 327).

2.1.4.2 Inductive Reasoning

In contrast to deductive reasoning, **inductive reasoning** makes probabilistic predictions on novel situations based on existing knowledge and therefore addresses the question of how knowledge is generalized from known to unknown cases (Hayes et al., 2010, p. 278). Inductive reasoning extends our horizon, as it allows to move from a specific to a general explanation or theory (Behfar & Okhuysen, 2018, p. 325; Popper, 1959, p. 1). Conclusions from inductive reasoning are approximate as a result of a series of inferences which are **generally true**. In contrast to deduction, induction concludes from a result and an explanation, as illustrated in **Figure 4**. This conclusion is plausibly true (Sarbo & Cozijn, 2019, p. 246).

Figure 4. Inductive Reasoning

These beans are white.	**result**
These beans are from this bag.	**explanation**
⇨ All beans from this bag are white.	**rule**

Source: Author's representation, adapted from Peirce (1878); Sarbo and Cozijn (2019, p. 246)

Inductive reasoning is associated with building hypothesis or theory, or in confirming hypothesis (Flach & Kakas, 2000, p. 118). In a broad sense, the notion of **induction englobes** a variety of non-deductive forms of reasoning, including **abduction**. In a narrower sense induction is an iterative process by which the generality of **observed properties and relations**

in the data are tested against more evidence, supporting the researcher's invariance and therefore inductive generalizations emerge from the data (Flach & Kakas, 2000, p. 3; Mantere & Ketokivi, 2013, p. 72). Flach and Kakas (2000) stress the importance of considering that not all inductive hypotheses are explanatory, so that generalizations confirmed by a sample merely represent **descriptive or confirmatory** and not **explanatory induction** (pp. 10-11; Mantere & Ketokivi, 2013, p. 79). Explanatory induction, in contrast, is closely linked to abduction and determines hypotheses which explain the observations (Flach & Kakas, 2000, p. 111). Additionally, induction allows for the systematic **exploration** of new insights based on previous hypotheses (Mantere & Ketokivi, 2013, p. 78; Morse & Mitcham, 2002, p. 33) to **generate untested conclusions** (Mitchell, 2018, p. 105). To conclude, "[i]nduction determines how well the consequences deduced from a hypothesis accord with the facts" (McAuliffe, 2015, p. 303).

2.1.4.3 Abductive Reasoning

Abductive reasoning is defined as "[…] using imagination, in which the simplest and most likely hypothesis is posited to explain observed phenomena [… and] is the process whereby one finds the simplest and most likely explanation of what one has observed and it is imagination that enables one to carry out this process" (Peirce, 1931-1958a in Logan & Tandoc, 2018, pp. 1–2). It is described as moving from specific observations to particular explanations (Behfar & Okhuysen, 2018, p. 325) and "follows a pragmatist perspective, taking incomplete (or 'messy') observations from experience and reality that may then lead to a best prediction of the truth[,] and perhaps even to a new **theory**" (Mitchell, 2018, p. 105). The aim of abduction is thus to theorize (Mantere & Ketokivi, 2013, p. 72). Abduction introduces **new knowledge** or suggestions for further inquiry and the guessing instinct is a major element (Paavola, 2005, p. 132; Timmermans & Tavory, 2012, p. 171). It requires creative thinking and the ability to restructure and connect patterns (Logan & Tandoc, 2018, p. 2). Abductive reasoning hence "[…] leads to **plausible knowledge** claims that are untested, held tentatively, and subject to continuous revision" (Behfar & Okhuysen, 2018, p. 325). Peirce further used the term retroduction, which, however, is nothing else than abduction, as he used the terms interchangeably (Lawson, 2009, p. 338).

In contrast to inductive and deductive reasoning, abductive reasoning is the only mode of reasoning being both, **logical and innovative** (Paavola, 2005, p. 133; Reichertz, 2019, p. 161). Abduction adopts a provisional hypothesis, the consequences of the hypothesis being verified experimentally, so that a discrepancy with the facts can be identified (Sarbo & Cozijn, 2019, p. 246). “Abduction invents or proposes hypotheses; it is the **initial proposal of a hypothesis** because it accounts for the facts” (Burks, 1946, p. 302). As opposed to deduction and induction, this type of reasoning concludes from a rule and a result, with a conclusion being hypothetically **plausible** (Sarbo & Cozijn, 2019, p. 246). Its basic idea is demonstrated in **Figure 5**.

Figure 5. Abductive Reasoning

All beans from this bag are white.	**rule**
These beans are white.	**result**
These beans are from this bag.	**explanation**

Source: Author’s representation, adapted from Peirce (1878); Sarbo and Cozijn (2019, p. 246)

The abductive research process typically starts with an empirical phenomenon which cannot be explained by existing theories. At the start of research, there are usually **incomplete observations** from experience and reality, which will be answered by the researcher by choosing the best answers among the empirical alternatives (Mitchell, 2018, p. 105). In abductive reasoning, a collection of data is observed and the most straightforward and likely explanation for the data is then translated into a hypothesis which explains the data. The hypothesis is **guessed**, imagined, or invented, but not purely instinctual, as formed based on rational grounds (Logan & Tandoc, 2018, p. 9; McAuliffe, 2015, p. 303). Conclusions are not asserted, but **most likely or probable** and are considered being scientifically valid as long as they must be falsifiable, which means that they can never be proven, but can, if necessary, be refuted (Popper, 1959 in Logan & Tandoc, 2018, p. 9). The result of abduction can serve as a **basis for empirical testing** and is therefore subject to validation through deduction or induction (Behfar & Okhuysen, 2018, p. 326; Shank, 1998, p. 846).

The strength of abduction is its **innovative potential** (Reichertz, 2019, p. 261; Timmermans & Tavory, 2012, p. 171). The special nature of abduction is to **find the novel** (Reichertz, 2019, p. 268). For Peirce, abduction is both, logical inference and flash of insight, when people face **surprising phenomena**:

> “It is an act of insight, although of extremely fallible insight. It is true that the different elements of the hypothesis were in our minds before; but it is the idea

> of putting together what we had never before dreamed of putting together which flashes the new suggestion before our contemplation" (Peirce, 1934, p. 181; Timmermans & Tavory, 2012, pp. 171–172).

Despite the surprising character of abduction, one must not underestimate its **scientific strength**. According to Reichertz (2019), its intangibility makes abduction so difficult to describe. Indeed, abduction is not about pure guessing, nor the reduction to its main components, it is more about mental constructs which the researcher builds intuitively. Reichertz (2019) sums it up as doing something intuitively right and states "abduction is something we all do when there is a crisis or when we do not know what to do next" (Reichertz, 2019, p. 267). Thus, the search for order is definitely not complete, but intuitively correct and involves much analytical work and knowledge of the researcher (Reichertz, 2019, pp. 266–267). **Preconceived ideas** of the researcher are not put aside during the research process, but are integral part of it (Timmermans & Tavory, 2012, p. 179). The major strength of abduction is its **high flexibility** in both, the empirical process at the beginning and the **new theory building** at the end of the investigation (Linneberg & Korsgaard, 2019, p. 264).

2.1.4.4 Comparison of the Three Types of Reasoning

Comparing the three types of reasoning indicates a very clear distinction of deduction versus induction and abduction in the sense that deduction verifies theory by using data, while induction and abduction start with observing data, followed by an iterative process which is tightly linked to the data to build theory (Eisenhardt, 1989b, p. 532; Reichertz, 2019, p. 268). It has to be stated that abductive reasoning is neither a simple combination of inductive and deductive reasoning, nor is it superior to the latter ones (Dubois & Gadde, 2002, p. 559; Okoli, 2023, p. 305). Both, inductive and abductive reasoning, **involve exploration and discovery** (Mantere & Ketokivi, 2013, p. 78; Behfar & Okhuysen, 2018, p. 325). Abduction begins with the same process as induction, but ends differently (Bryant, 2019, p. 649). The main difference between induction and abduction is that induction just summarizes and generalizes what has been found in the data, while abduction discovers something new, construes innovative ideas, a new concept or theory, proposes the likeliest possible explanation and creates a hypothesis (Reichertz, 2019, p. 268). The following **Table 3** illustrates the major differences among the three types of reasoning.

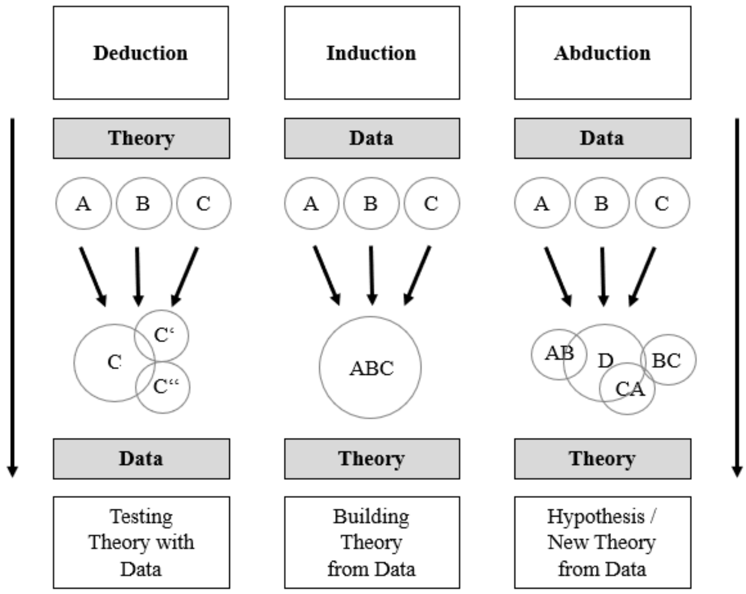
Table 3. Comparison of the Three Types of Reasoning

	Deduction	**Induction**	**Abduction**
Target	Question in search of answers	Hypothesis in search of evidence	Evidentiary assessment of hypotheses
Logic	In a deductive reasoning, when the premises are true, the conclusion must also be true.	In an inductive reasoning, known premises are used to generate untested conclusions.	In an abductive reasoning, known premises are used to generate testable conclusions. Helps in generating Hypothesis
From / To	Generalize from the general to the specific.	Generalize from the specific to the general.	Theorizing. Generalize from the interactions between the specific and the general.
Use of Data	Data collection is used to evaluate propositions or hypotheses related to an existing theory.	Data collection is used to explore a phenomenon, identify themes and patterns and create a conceptual framework.	Data collection is used to explore a phenomenon, identify themes and patterns, locate these in a conceptual framework and test this through subsequent data collection and so forth.
Truth of Conclusion	Necessarily	Probably	Possibly
Theory	Theory falsification or verification.	Theory generation and building.	Theory generation or modification; incorporating existing theory where appropriate, to build new theory or modify existing theory

Source: Author's representation, adapted from Dudovskiy (2016) in Mitchell (2018, p. 105); Mantere and Ketokivi (2013, p. 72); Popper (1959, p. 1); Tecuci et al. (2018, p. 10)

According to Behfar and Okhuysen (2018, p. 325), the three types of reasoning differ in two major ways: First, the generality of the explanations: deduction moves from the general to the specific and induction moves from the specific to the general, while abduction moves from specific observations to particular explanations. Second, the certainty of knowledge in the way that with deduction explanations are **certain**, with induction they are **probable** and with abduction they are **plausible**. A summary of this trichotomy of reasonings is given by Mantere and Ketokivi (2013): "We predict, confirm, and disconfirm through deduction, generalize through induction, and theorize through abduction" (p. 72). A visualization of the main differences between the three types of reasoning is depicted in **Figure 6**.

Figure 6. Visual Representation of the Differences Between the Three Types of Reasoning



Source: Author's representation, with elements from Kim et al. (2021, p. 909)

The **three types of reasoning** refer to different **research paradigms**. Since positivism is a quantitatively oriented, hypothetico-deductive paradigm the type of reasoning is deductive (Park et al., 2020, p. 690). Realism as being methodologically pluralist can be deductive, inductive and/or abductive (Mukumbang et al., 2021, p. 1). Interpretivism as being clearly subjective does not promote deductive, but inductive and abductive reasoning (Okoli, 2023, pp. 309–310). Similarly, constructivism is subjective and related to abduction (Charmaz, 2008, pp. 157–160). Pragmatism favors the use of multiple research methods as well as high flexibility (Mitchell, 2018, p. 103). Considering that Peirce is seen as being the originator of **pragmatism**, **all types of reasoning** can be assigned to pragmatism, alone or in different combinations, and **are possible within a flexible research framework** (Lawson, 2009**,** pp. 337, 341). The research paradigms with their respective point of view (objective or subjective), the type of research method (qualitative or quantitative) and the type of reasoning (deductive, inductive, abductive) are classified in **Table 4**.

Table 4. Classification of Research Paradigms with the Respective Point of View, Type of Research Method and Logic Reasoning

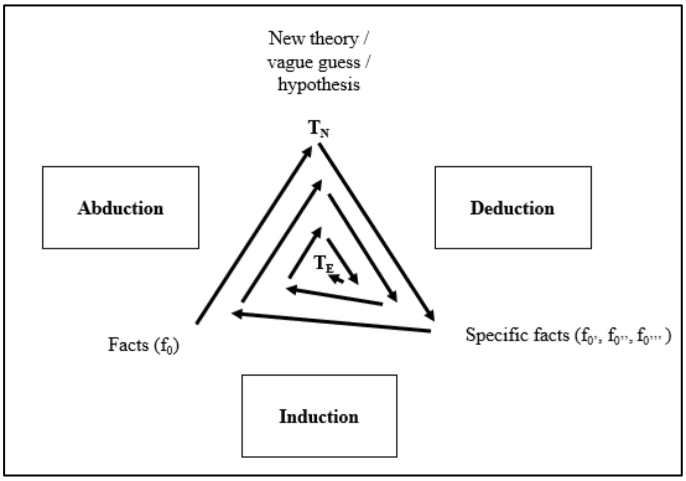
	Point of view	Qualitative or Quantitative	Type of Reasoning
Positivism	Objectivism	Quantitative	Deduction
Realism	Combined Objectivism and Subjectivism	Quantitative and/or Partially Qualitative	Deduction, Induction and / or Abduction
Interpretivism	Subjectivism	Qualitative	Induction or Abduction
Pragmatism	Objectivism and Subjectivism	Qualitative / Quantitative or Qualitative / Qualitative	Induction, Deduction and / or Abduction
Constructivism	Subjectivism	Qualitative	Abduction

Source: Author's representation, adapted from Guba and Lincoln (1994, p. 109); Perry et al. (1999) in Sobh and Perry (2006, p. 1195); Park et al. (2020, p. 690); Mukumbang et al. (2021, p. 1); Okoli (2023, pp. 309-310); Charmaz (2008, pp. 157-160); Dudovskiy (2016) in Mitchell (2018, p. 105)

2.1.5 Abduction as an Inferential Process

This dynamical interaction of abduction, deduction, and induction can be illustrated by the following **Figure 7**.

Figure 7. Abduction as an Inferential Process



Source: Author's representation, adapted from Minnameier (2010, p. 241)

Abduction as an **inferential process** is described as follows: **abductive** reasoning is the foundation for inquiry (van Maanen et al., 2007, p. 1149) and suggests a new concept explaining surprising facts (f_0) and demonstrates that something **may be**, leading to the best explanation, to the formulation of a long-list of daring hypothesis and the beginning of theory-building. This **new theory (T_N)** must be verified by **deduction**. Deduction rejects or confirms hypothesis. In the latter one deduction draws consequences from hypothesis that are testable and results in specific facts ($f_{0'}$, $f_{0''}$, $f_{0'''}$, …) derived from f_0. **Induction** looks for empirical phenomena explaining these facts, trying to validate if these phenomena confirm the initial hypothesis with the newly identified specific facts and generates a general conclusion which is probably true. This process is demonstrated as an ongoing triangle, as it is not a linear, but a recursive process, refined at each step, with the objective to infer an **established theory (T_E)**. The order of the three types of reasoning is therefore set by the nature of their characteristics. It needs to be considered that T_E is evidenced with current data so that future evidence could challenge T_E (Minnameier, 2010, pp. 241-242; Peirce, 1931-58 in Ormerod, 2024, p. 59). The inferential process is hence based on the interplay between observational and conceptual work (van Maanen et al., 2007, p. 1149).

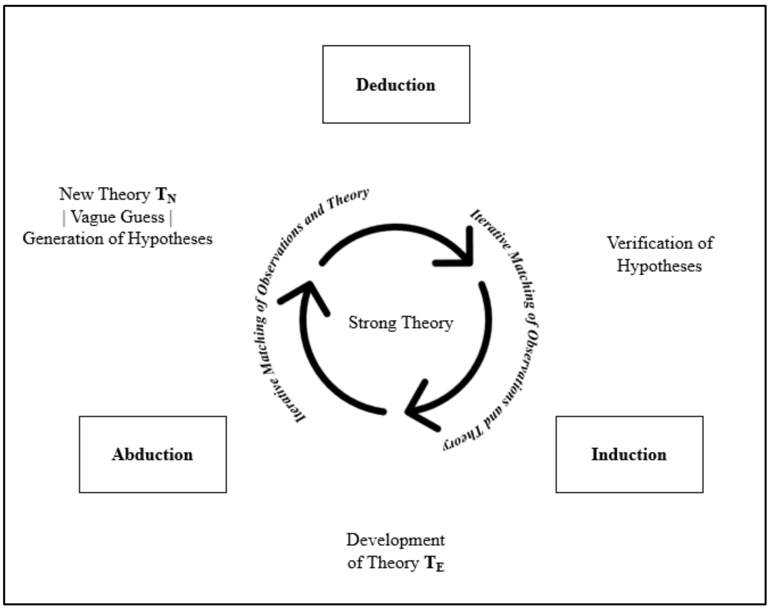
Further to the explanations of Minnameier (2010, p. 242) this study regards the **inferential process** as a **recursive process** in two ways:

First, from a methodological point of view, abduction is one phase in an inquiry process, in which hypotheses and ideas are generated with abduction and then be tested with deduction, where predictions are derived from suggested hypothesis and finally credibility is estimated through predictions made with induction (Flach & Kakas, 2000, p. 6; Minnameier, 2010, pp. 242-246; Paavola, 2005, p. 133).

Second, the abduction process itself is recursive, as the researcher tries to constantly match observing data, double-fitting data and theories and his own knowledge for a step-by-step development of the likeliest possible theory by the cycling of coding (Linneberg & Korsgaard, 2019, p. 264; Timmermans & Tavory, 2012, pp. 179–180).

This constant matching and double-fitting of observation and theory between each type of reasoning further to the official process allows for more fine-grained research. **Figure 8** illustrates this double recursive inferential process. In contrast to Minnameier's (2010) triangle (pp. 241-242), the process resembles more an ongoing cycle with recursive matches among each step (Linneberg & Korsgaard, 2019, p. 264; Timmermans & Tavory, 2012, pp. 179–180). to develop strong theory (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377; Sutton & Staw, 1995, p. 378).

Figure 8. The Recursive Inferential Process of Abduction



Source: Author's representation, with elements from Minnameier (2010, p. 241)

2.1.6 Coding in Qualitative Analysis

The coding of qualitative data is the core operation of assigning data material to a code or vice versa, a code is assigned to a data material. The aim of coding is to reduce the amount of empirical data and to simplify data analysis (Miles & Huberman, 1994, p. 11 in Linneberg & Korsgaard, 2019, p. 259). Labels are assigned to segments of data and describe the meaning of the data and analyze their relationships (Fife & Gossner, 2024, p. 5). Even if the coding process is time-consuming and requires analytical and creative capabilities, it has many **advantages**: **coding translates data into patterns** and enables creative analysis and interpretation of data. This allows for an acquiring of deep, comprehensive, and thorough insights and facilitates retrieval and easy access to the data. Data is structured and sorted, ensuring transparency and validity (Linneberg & Korsgaard, 2019, pp. 261–262).

In **deductive** research, codes are developed before viewing the data material to be analyzed and the phenomena found there can then be classified and assigned accordingly, which is also referred to as category application (Haug et al., 2021, p. 3; Rädiker & Kuckartz, 2019, p. 69). During the coding process, an adjustment of the coding frame is possible, if new data emerge which were not captured before (Linneberg & Korsgaard, 2019, p. 264). While in the **deductive** method the focus is on the **coding guide**, the **inductive or abductive** method represents the essential content-analytical interpretation rules and represent the determination of the **category**

definition and the level of abstraction (Mayring, 2020, p. 6). In inductive research, codes can be viewed as condensed descriptions of recognized phenomena. This process is called category formation (Rädiker & Kuckartz, 2019, p. 69).

The coding process is not linear, but recursive and contains two or more **cycles of coding** which progress with each step of research. This is especially helpful in inductive or abductive research, such as to have a descriptive initial phase, in which the coding cycle uses informant-centric terms. The second coding cycle is more researcher-centric so that concepts, themes and dimensions from existing theories bring the analysis to a higher level of abstraction (Gioia et al., 2013, p. 18; Linneberg & Korsgaard, 2019, p. 264).

2.1.7 Characteristics of Theory and Theory Building

Researchers highlight the importance of **theory building**, but often have difficulties to achieve it (Hambrick, 2007, p. 1346; Sætre & van de Ven, 2021, p. 684). Generally, theory building occurs by combining observations from previous literature, common sense, experience, and empirical reality (Eisenhardt, 1989b, p. 532; Glaser & Strauss, 1967, p. 3). The process of theorizing is iterative and involves both, inductive (including abductive) and deductive elements (Shepherd & Sutcliffe, 2011, p. 362; Thompson, 1956, p. 104). Internal validity is enhanced by the iterative connection of emergent theory to existing literature (Eisenhardt, 1989b, p. 545).

As theory building is one major part of this investigation, it is necessary to understand what exactly a **theory** is. This is even more important given that it threatens to become meaningless, as its using is so diverse that it leads to confusion rather than to create clarity. The confusion of the term highlights the difficulty to develop strong theory (Merton, 1967, p. 39; Sutton & Staw, 1995, p. 371).

Eisenhardt (2021), who provided the fundamentals of theory building (Eisenhardt, 1989b, p. 532), defines theory as "[…] a set of constructs linked together in relationships that are supported by theoretical arguments (i.e. mechanisms) that seek to explain a focal phenomenon" (p. 148).

The inventors of Grounded Theory, Glaser and Strauss (1967), define theory as follows:

> "Theory […] is a strategy for handling data in research, providing modes of conceptualization for describing and explaining. The theory should provide clear enough categories and hypotheses so that crucial ones can be verified in present and

> future research; they must be clear enough to be readily operationalized […]. The theory must also be readily understandable to sociologists of any viewpoint, to students and to significant laymen. Theory that can meet these requirements must fit the situation being researched, and work when put into use. By "fit" we mean that the categories must be readily (not forcibly) applicable to and indicated by the data under study, by "work" we mean that they must be meaningfully relevant to and be able to explain the behavior under study." (p. 3)

A more fine-grained definition of theory is given by Sutton and Staw (1995), who investigated what theory is not, namely it is not a set of references of theories, it is not data, it is not lists of variables or constructs, nor diagrams or hypotheses, as hypotheses are statements about the what and not the why (Sutton & Staw, 1995, p. 378). They argue:

> "Theory is about the connections among phenomena, a story about why acts, events, structure, and thoughts occur and emphasizes the nature of causal relationships, identifying what comes first as well as the timing of such events. Strong theory, in our view, delves into underlying processes so as to understand the systematic reasons for a particular occurrence or nonoccurrence. It often burrows deeply into microprocesses, laterally into neighboring concepts, or in an upward direction, tying itself to broader social phenomena. It usually is laced with a set of convincing and logically interconnected arguments" (Sutton & Staw, 1995, p. 378).

Sutton and Staw (1995) therefore appeal for investigating **deep causal relationships** and thus for more **balance in using theoretical and empirical research** (p. 383).

The length of the two different citations underscores the difficulty of defining theory. This obviously has nothing to do with the age of the studies, as many authors have already tried to define theory and even a very young study is not able to define theory using a single sentence (Kivunja, 2018, p. 44). The definition of van Evera (1997) is less detailed and describes the more general idea of theories: "Theories are general statements that **describe and explain the causes of effects of classes of phenomena**. They are composed of causal laws or hypotheses, explanations, and antecedent conditions" (pp. 7-8).

The essence of the comparison of these different definitions of theory indicates that theory is a **complex phenomenon**. For the development of a **strong theory** researchers must consider several characteristics and underlying causal relationships instead of providing a collection of mere data and concepts (Sutton & Staw, 1995, pp. 373–376). Theory is based on in-depth research and analysis and therefore, this study encourages using several theoretical and empirical elements and not only describes but combines them thoroughly for the sake of generating deep insights into the underlying interrelationships for the purpose of creating a sound theory (Sutton & Staw, 1995, p. 378). Based on Grodal et al. (2021) the purpose of this study is to achieve **rigorous theory building** through the tracing and detailing of a **unique pathway of methods** (p. 605; Morse et al., 2002, p. 14; Sutton & Staw, 1995, p. 378).

2.1.8 Theoretical, Analytical and Conceptual Frameworks

2.1.8.1 Theoretical Framework

Creating a systematic and holistic framework for partner selection in business ecosystems is the objective of this study. This applies for the investigation of the topic as well as for the methodological framework. To do justice to both, a strong theory and a systematic and holistic framework, this study creates theoretical as well as analytical and conceptual frameworks representing the soul of this research project (Imenda, 2014, p. 185; Sutton & Staw, 1995, p. 378).

A **scientific framework** is a skeletal structure used by researchers to support or enclose their investigations (Eisenhart, 1991, p. 202). It guides the researcher throughout the research process (Imenda, 2014, p. 188). Despite being often used, the definitional boundaries of the terms theoretical, analytical, and conceptual framework are not sharp (Jabareen, 2009, p. 51). The following definitions shall provide a common understanding of each term.

A **theoretical framework** is the basis of a study and comprises the synthesis of the field of research, the research question which is going to be investigated and determines the route for data analysis and interpretation. It can be described as the initial starting point for an investigation such as to provide the structure reflecting the state of research, providing scientific rigor and highlighting clear findings. The theoretical framework helps making connections between the elements observed in data. It helps to raise questions and thus serves the coat hanger for data analysis and the interpretation and discussion of findings. It supports framing the arguments considering what can be expected and what is potentially true. In conclusion, a theoretical framework is about structuring and stating the theoretical assumptions very clearly such as to enabling rigorous contribution to research (Kivunja, 2018, pp. 46–48; Morse et al., 2002, p. 14; Prager et al., 2019, p. 377). It is “a structure that guides research by relying on a formal theory; that is, the framework is constructed by using an established, coherent explanation of certain phenomena and relationships” (Eisenhart, 1991, p. 205). A theoretical framework is **based on previous literature** (Eisenhart, 1991, p. 209). The development of the theoretical framework should ideally emerge from a systematic literature review, but can also be accomplished through a theory or a theoretic model (Kivunja, 2018, p. 48). The theoretical framework locates the argument and provides an anchor for the reader (Charmaz, 2006, pp. 168–169).

2.1.8.2 Conceptual Framework

Instead of offering a theoretical explanation, a **conceptual framework** provides understanding and gives an interpretative approach (Jabareen, 2009, p. 57). It "explains, either graphically or in narrative form, the main things to be studied – the key factors, constructs or variables – and the presumed relationships among them" (Miles & Huberman, 1994, p. 18). As it does not exist ready-made, it is not found but **constructed by the researcher** (Maxwell, 2013, p. 41). A conceptual framework is a synthesis of related concepts drawn from **multiple sources** and is time-bound, which means that it reflects the current state-of-affairs regarding a research problem and is **revised as new ideas emerge** (Eisenhart, 1991, pp. 209–210; Imenda, 2014, p. 189). A conceptual framework is essentially a conception or model of the phenomena the researcher intends to examine, along with an explanation of how and why these phenomena are occurring. It is a working theory of the phenomena being investigated. This theory serves as a **guide for the remainder of the design**, assisting with goal assessment and refinement, the creation of pertinent and realistic research questions, and the selection of suitable methodologies (Maxwell, 2013, p. 39). Rather than being a prediction, it can be developed through a qualitative analysis and results in a network of linked concepts enabling a comprehensive understanding of a phenomenon (Jabareen, 2009, p. 57). It is the synthesis of theoretical and empirical findings and is the end result of consolidating related concepts to explain a given event. A conceptual framework therefore represents an inductive process in which concepts are linked together to **visualize their relationships** (Imenda, 2014, p. 189).

2.1.8.3 Analytical Framework and Framework Analysis

An **analytical framework** can be described as a "set of codes organi[z]ed into categories that have been jointly developed by researchers involved in analysis that can be used to manage and organi[z]e the data. The framework **creates a new structure for the data** (rather than the full original accounts given by participants) that is helpful to summarize/reduce the data in a way that can support answering the research questions" (Gale et al., 2013, p. 1). The analytical framework therefore emphasizes the **data analysis** and the **data structuring** part of the work (Cope, 2004, p. 14). It supports the meaningful analysis and connection of data (Hughes, 2002, p. 39). An analytical framework enables to precisely reconsider and revise concepts by adhering to a well-defined protocol because the analytical process has been documented and is thus accessible. It is an analytical process involving several separate but highly interconnected stages (Ritchie & Spencer, 2002, p. 177). The challenge is **to link the topics together in a meaningful way** and thus requires the researcher to work systematically and dynamically (Goldsmith, 2021, p. 2062; Ritchie & Spencer, 2002, p. 186). An analytical framework is closely connected with a **framework analysis**, which consists of creating and applying the analytic framework. Framework analysis is a **pragmatic** epistemology and can be applied to various types of data. The "[…] objective of framework analysis is to identify, describe, and interpret key patterns within and across cases of and themes within the phenomenon of interest through being both grounded in and interpreting from the data" (Gale et al., 2013 and King & Brooks, 2018 in Goldsmith, 2021, p. 2061). It therefore employs inductively and deductively derived themes (Goldsmith, 2021, p. 2061) and is particularly useful in the sense of predictability and efficiency, as it provides a systematic and straightforward approach (Goldsmith, 2021, p. 2062).

2.2 The Technique of Pattern Matching

2.2.1 The Pattern Matching Approach and its Different Types

A **pattern** can be described as any arrangement of objects or entities and denotes that a pattern is, by definition, non-random and describable. Patterns are parts of theories and indicate a structural relationship between key constructs. A theory comprises patterns of expectations or patterns of predictions. These patterns of predictions can be developed by linking variables including predicted values with variables containing fixed variables (Trochim, 1989, p. 356).

Pattern matching can be traced back to Egon Brunswick's probabilistic functionalism in the field of psychology (Hammond, 1966 in Sinkovics, 2018, p. 2). The initial idea of pattern matching originates in the challenge of a realistic representation of a real object in research: when researchers attempt to explain an observation, they can only gather accessible knowledge and this knowledge is interpreted in a way that is familiar to the researchers, thus it is influenced by past experience and therefore is path dependent (Sinkovics, 2018, pp. 2-3). This leads to subjectivity and gaps in knowledge, which contrasts with rigorous scientific research (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377).

To overcome this gap in the research approach, Campbell (1966) built on Brunswick's work and proposed the process of pattern matching, as he stated that despite external knowledge being incomplete or containing errors, there are elements of knowledge which can be distinguished from incorrect knowledge or errors. Uncovering these elements of knowledge is realized by the comparison of two independent patterns, patterns of theory and patterns of data. It is important to remember that theory is not a summary of the data, even though the patterns influence each other. This means that a theory must be separable from data in order to be testable (Campbell, 1966 in Sinkovics, 2018, p. 3).

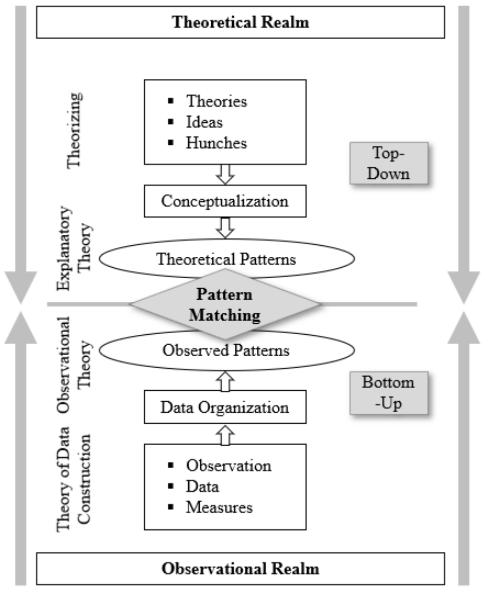
In qualitative research, pattern matching therefore involves the process of linking theoretical and observational patterns (Trochim, 1989, p. 356). Data is examined associated with each predetermined pattern to uncover meaning in comparison with ideal type (Reay & Jones, 2016, p. 443). Theories generally propose predictions, so that predicted patterns derived from theory are matched with observed patterns (Sinkovics, 2018, p. 3). It is important to show that there are no viable alternative theories that may explain the observed pattern and doing so is made considerably simpler when the theoretical pattern under consideration is unique. A complex theoretical pattern is like a special fingerprint that one is seeking in an observed pattern. Theoretical patterns that are more complex typically make it more challenging to develop logically sound alternate patterns that would similarly predict the same outcome. If theoretical and observed patterns do not match, either the theory may be flawed or poorly developed, the observations may be inappropriate or unreliable, or both have an impact (Trochim, 1989, p. 357).

Generally, the difference between pattern matching and traditional hypothesis testing and model building approaches is not significant, as a theoretical pattern is a hypothesis about what is expected in the data and the observed pattern is data which are used to examine the theoretical model. The major differences towards traditional hypothesis testing approaches are that pattern matching uses more complex or detailed hypotheses and treats the observations from a multivariate rather than a univariate perspective and yields **greater validity** (Trochim, 1989, p. 357).

The **overall advantage** of pattern matching is that it is simultaneously rigorous and flexible in its implementation (Trochim, 1989, p. 358). It captures essential categories for comparison and facilitates consistent analysis of different logics (Reay & Jones, 2016, p. 443). There are many approaches which can be used to develop theoretical and observational patterns (Trochim, 1989, p. 358). Hence, the researcher can combine any kind of data collection and analysis method

(Trochim, 1989 in Sinkovics, 2018, p. 4), as the focus is on data validity. The distinct development of theoretical and observational patterns leads to a convincing pattern match (Trochim, 1989, p. 358). The general pattern matching approach is illustrated in **Figure 9**.

Figure 9. The General Pattern Matching Approach



Source: Author's representation, adapted from Trochim (1989, p. 356) and Sinkovics (2018)

The **challenge of the general pattern matching approach** is that a context needs to be established to identify and determine typical ideal type. Sometimes, the ideal type can be developed from existing literature, otherwise it must be fully investigated from the context and therefore requires a large commitment of time and effort. Further, focus on comparison with the ideal type by starting from established theory may limit findings to established theory and might restrict new insights (Reay & Jones, 2016, p. 443).

The general pattern matching approach introduced by Trochim (1989), can be separated into three main categories of pattern-matching approaches. All have in common that researchers must engage in their data through a variety of qualitative sources (Reay & Jones, 2016, p. 452). **Full pattern matching** involves the simultaneous use of qualitative and quantitative methods based on a multidimensional scaling. In contrast to traditional hypothesis-testing methods, like for instance t-test and ANOVA, full pattern matching has the advantage of enabling a larger degree of complexity and the opportunity of treating observations from a multivariate perspective (Sinkovics, 2018, pp. 5-6). **Partial pattern matching** techniques focus on either pattern deducing or pattern inducing, enabling a wider breadth and depth into a specific direction (Reay & Jones, 2016, p. 443). Likewise the grounded theory approach (Glaser & Strauss, 1967), the bottom-up Gioia (2004) method of structural coding represents a pattern inducing approach or a so-called partial pattern matching approach, where patterns are identified from the empirical data. Top-down partial pattern matching involves the deduction of literature for the identification of research questions (Sinkovics, 2016 in Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252). The specific characteristics of **flexible pattern matching** will be discussed in the following chapter.

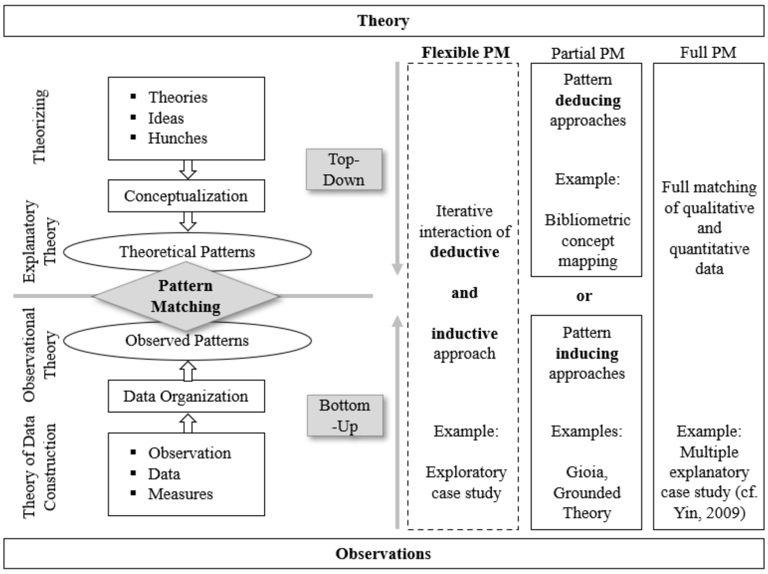
2.2.2 The Flexible Pattern Matching Approach

Flexible pattern matching (FPM), introduced by Sinkovics (2018), involves the interaction of deductive and inductive qualitative research, combining **qualitative rigor** with **high flexibility** (Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252; Sinkovics, 2018, pp. 6–8). During the coding process, where data is transformed into categories or patterns, which is similar in all approaches, the peculiarity of FPM is the iterative interaction between predicted theoretical patterns extracted from literature and observed empirical patterns, creating a balance between extreme standardization and complete anarchy (Sinkovics, 2018 in Bouncken, Qiu, Sinkovics, & Kürsten, 2021, pp. 252, 258). FPM enables new theory building by using matches and mismatches between theoretically expected and observed empirical patterns, increasing reliability and giving a direction for data analysis (Alvesson & Kärreman, 2007 in Bouncken & Barwinski, 2021, p. 91).

The approach consists in linking theories and reality in **qualitative research** (Huarng & Ribeiro-Soriano, 2014 in Bouncken, Qiu, & García, 2021, p. 1) by the deduction of theoretical patterns from prior studies, the formation of newly observed empirical patterns based on these theoretical patterns and the iterative comparison between the two for the purpose of identifying new, explorative patterns (Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 256). This interplay enables readers to follow the researcher's ideas from conceptualization to data interpretation (Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 257).

The FPM approach, compared to the other two types of pattern matching, is demonstrated in **Figure 10**.

Figure 10. The Different Types of Pattern Matching



Source: Author's representation, adapted from Trochim (1989, p. 356) and Wible and Sedgley (1999) in Sinkovics (2018, p. 16)

2.3 Extension of the Flexible Pattern Matching Approach By the Inferential Process of Abduction

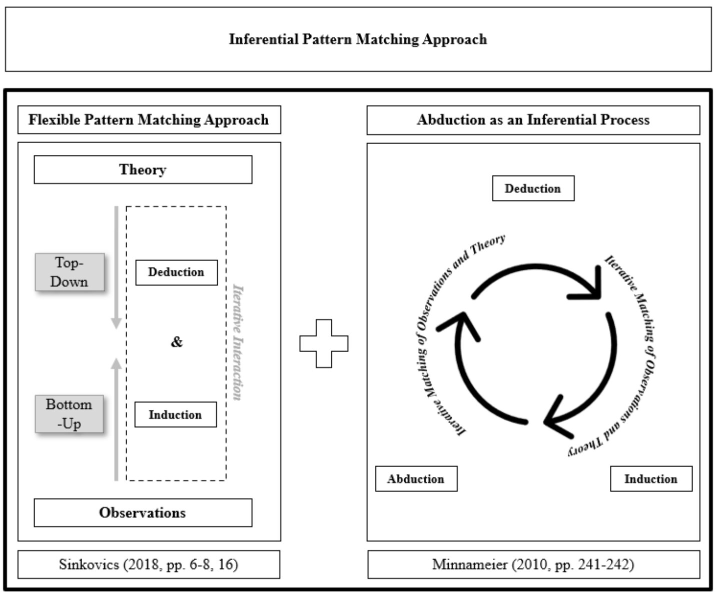
2.3.1 The Inferential Pattern Matching Approach

The FPM approach enables the flexible and simultaneous application of inductive and deductive approaches for the creation and matching of patterns (Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 256; Sinkovics, 2018, pp. 6–8), as demonstrated in the previous chapter. For the creation of a systematic partner selection framework in business ecosystems however, where theoretical data is still very limited, a more holistic research structure is needed.

The FPM with its constant matching and double-fitting of data and theory between the deductive and inductive types of reasoning (Sinkovics, 2018, pp. 6–8) can be compared to the double recursive inferential process described in **Chapter 2.1.5** (Minnameier, 2010, pp. 241-242; Linneberg & Korsgaard, 2019, p. 264; Timmermans & Tavory, 2012, pp. 179–180). While FPM includes the iterative interaction of deductive and inductive patterns only (Sinkovics, 2018 in Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252), **the inferential process additionally contains iterations with abductive data**. As abduction contains inductive and deductive elements but is not a mere combination of induction and deduction (Okoli, 2023, pp. 304–306), the FPM falls short in representing a research method enabling a holistic investigation. For this reason, **this thesis extends FPM by abductive reasoning**. The addition of the abductive reasoning as a third component necessitates not only the flexible matching of patterns between theoretical and observational data (Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252), but also the matching between the three types of reasoning (Minnameier, 2010, pp. 241-242). This is realized by the inferential process. For this reason, holistic research is achieved by **combining the FPM with the inferential process**, thereby forming the **Inferential Pattern Matching Approach (IPMA)**. This combination of the inferential process of abduction and the FPM is the logical consequence of the double recursive inferential process (Minnameier, 2010, pp. 241-242; Linneberg & Korsgaard, 2019, p. 264; Timmermans & Tavory, 2012, pp. 179–180), to highlight that the pattern matching does not occur in a cycle but constantly and flexibly between theory and observations. Based on the initial characteristics of the FPM (Sinkovics, 2018, pp. 6–8).

What is now different to the inferential process is that this new approach created by this study only follows the spiral-shaped static process proposed by Minnameier (2010) in its macrostructure (pp. 241-242). In its microstructure in turn, it flexibly moves between abduction, deduction, and induction without a set order but according to the respective insights generated. The construct of the novel **Inferential Pattern Matching Approach** as an extension of the FPM (Sinkovics, 2018, pp. 6–8) by the inferential process of abduction (Minnameier, 2010, pp. 241-242); is visualized in **Figure 11**.

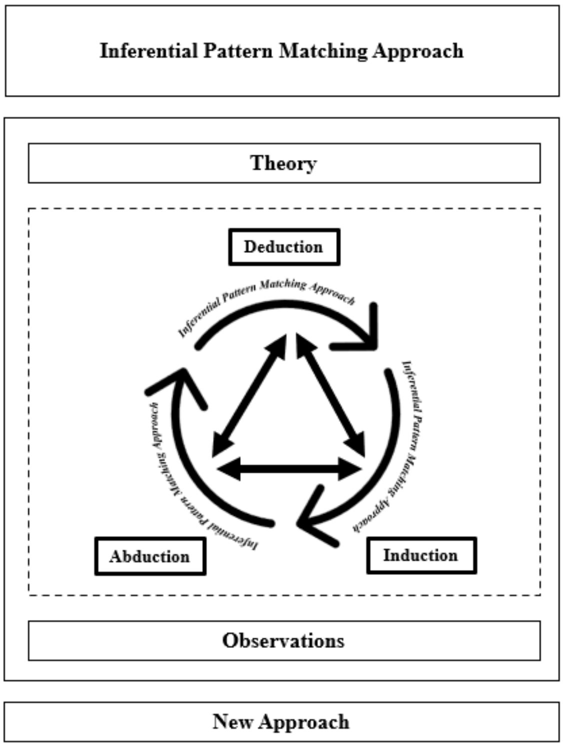
Figure 11. Extension of the FPM by the Inferential Process of Abduction



Source: Author's representation, with elements from Sinkovics (2018, pp. 6-8, 16) and Minnameier (2010, pp. 241-242)

Together, the FPM and the inferential process of abduction form the **Inferential Pattern Matching Approach** as presented in **Figure 12**: the flexible part is demonstrated by the arrows; the inferential part is demonstrated by the ongoing cycle.

Figure 12. The Inferential Pattern Matching Approach



Source: Author's representation, with elements from Sinkovics (2018, pp. 6-8, 16) and Minnameier (2010, pp. 241-242)

This study defines **Inferential Pattern Matching Approach** as follows:

Author's Definition

The **Inferential Pattern Matching Approach** is the flexible and inferential pattern matching of observational and theoretical data among abductive, deductive, and inductive research approaches.

2.3.2 Method Fit and Research Design

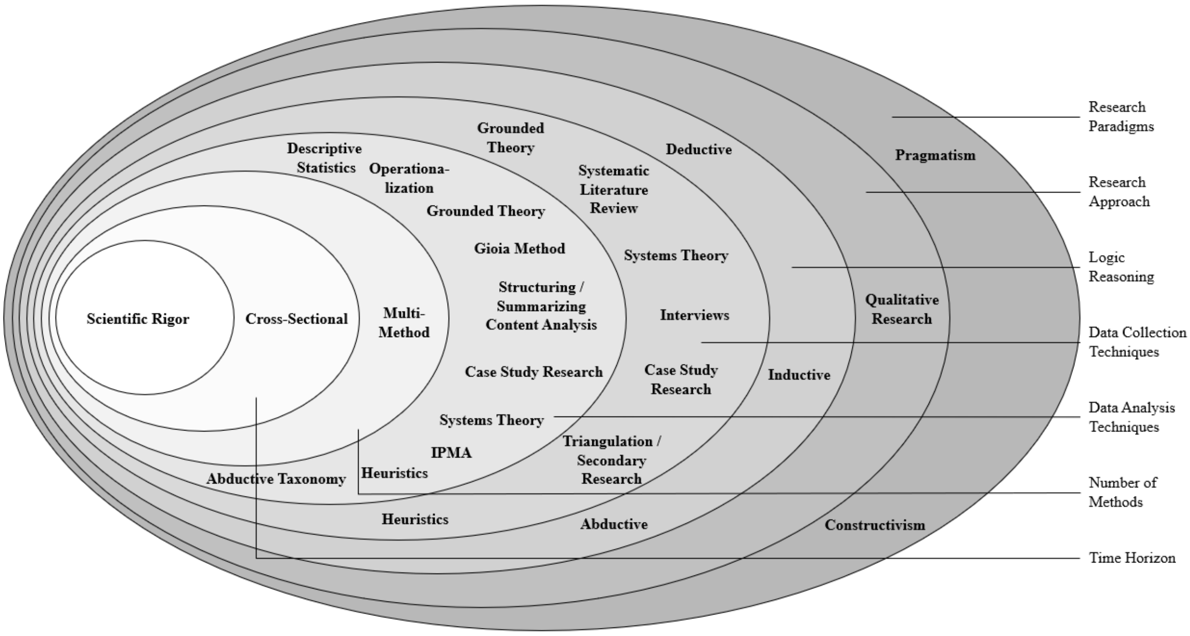
The **method fit** is important for the choice among different research approaches (Gehman et al., 2018, p. 284). Researchers must be conscious of the philosophy they follow through their selection of research approach since this has a substantial impact on both, what they do and how they comprehend the problem they are investigating (Johnson & Clark, 2006 in Saunders et al., 2009, p. 108).

A **multi-method qualitative study** collects data from different sources and adopts a purely qualitative approach for data analysis (Saunders et al., 2009). Often, **pragmatism** is associated with mixed methods approaches to combine qualitative and quantitative research approaches or to combine data collection and analysis (Creswell, 2003, p. 12; Maarouf, 2019, p. 4). Even though some research methods are best used under certain research paradigms, several authors support the flexible use of research methods in relation to research paradigms (Betzner, 2008 and Johnson & Onwuegbuzie, 2004 in Maarouf, 2019, p. 4).

Therefore, the present study adopts pragmatism as a philosophical and methodological framework, using a multi-method qualitative study by combining different qualitative methods. This procedure is best suited for the purpose of achieving high quality results using different kinds of research methods in accordance with the **research question** (Tashakkori & Teddlie, 1998, p. 20).

The research design of this underlying study shall be defined as the totality of the strategy and procedure of the research process. The metaphor of an onion can be used to depict the research design, the so-called **research onion** (Saunders et al., 2008 in Saunders et al., 2009, pp. 106–108). The original research onion research onion (Saunders et al., 2008 in Saunders et al., 2009, pp. 106–108) is innovatively modified, completed, and extended for this present study, as illustrated in **Figure 13**. The idea of this research onion is to gain an overview of what methods are applied among the major commonly used methods and how these should be classified. Moreover, due to the high number of applied methods within this thesis, this research onion supports keeping the overview. It illustrates the unique pathway of research methods used to forward theory development by guaranteeing **scientific rigor** (Grodal et al., 2021, p. 605; Morse et al., 2002, p. 14; Prager et al., 2019, p. 377).

Figure 13. Research Onion



Source: Author's representation, basic framework adapted from Saunders et al. (2008) in Saunders et al. (2009, pp. 106–108)

As suggested by Grodal et al. (2021) scientific rigor is demonstrated by providing specific information about a diverse set of methods deliberately used to interact with the data (p. 593). Scientific rigor is at the heart of the research onion, underlining its importance across the entire study. The research design involves transparency about the procedures used to obtain results and completeness of the research methods and therefore guaranties reliable research (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377). The core of the research onion is determined by the outer layers, such as to demonstrate the different steps of the research process included in this study (Saunders et al., 2009, p. 136). The advantage of this research onion is that it gives an illustrative idea of the methods applied in this study (Saunders et al., 2009, p. 136). The different research steps used in this study are indicated in bold fonts and hence give a structured overview of the overall research design adopted in this study, presenting each individual step of the research process. A further benefit of this research onion is that it depicts a systematic research approach. The **time horizon** is **cross-sectional**, meaning that all data collection occurred within a specific time period and not like it is the case in longitudinal research focused on a long time period (Maxwell & Cole, 2007, pp. 23, 40). Although the data collection for this study stems from different points of time and over a large time period in total, it does not represent a longitudinal research, as this would require the repeated data collection over time from the same observed data, which is not the case in this investigation (Ployhart & Vandenberg, 2010, p. 97). The intention of this thesis is the collection of data from different data sources for an iterative completion of the investigation and thus represents a cross-sectional research.

The research onion further demonstrates that **multiple methods** are used emphasizing the topic processing from different perspectives and enabling a rich data generation and elaboration for best completeness of this study and for the objective of creating a **holistic framework** for partner selection in digital-, innovation-, sustainability-, and circular-oriented business ecosystems.

In line with Fife and Gosner's (2024) suggestion, this study adopts multiple lenses in combining constructivist and pragmatist research (p. 2). A **constructivist approach** is applied to augment a **pragmatic analysis of data** seeking to explore the elements of a holistic framework for partner selection in business ecosystems (Bogna et al., 2020, p. 461). This is referred to as **constructivist pragmatism** (Nonhoff, 2011, p. 91) and is not to be confused with pragmatic constructivism, which involves actor based management in organizations (Seal & Mattimoe, 2016, p. 336). Instead of homogeneity, the essence of constructivist pragmatism is methodological plurality to achieve systematicity, precision and clarity (Nonhoff, 2011, p. 92). This **multi-paradigm approach**, also referred to as metatriangulation, enables the adoption of a more comprehensive view of multifaceted phenomena to achieve a broader approach to theory building (Gioia & Pitre, 1990, pp. 584–585) by fostering greater insights and creativity (Lewis & Grimes, 1999, p. 672).

The research steps and applied research methods illustrated in the research onion are listed with their corresponding chapters in **Table 5**.

Table 5. Applied Research Methods and their Corresponding Chapters

Research Steps	Applied Research Methods	Chapter
Research Paradigm	Constructivist Pragmatism	**2.1.1, 2.3.2**
Research Approach	Qualitative Research	**2.1.2**
Types of Reasoning	Deductive	**2.1.4.1**
	Inductive	**2.1.4.2**
	Abductive	**2.1.4.3**
Pattern Matching	Inferential Pattern Matching Approach	**2.2.2**
Data Collection Techniques	Grounded Theory	**5.3.1**
	Systematic Literature Review	**5.3.2**
	Systems Theory	**5.3.4**
	Interviews	**6.2**
	Case Study Research	**7.2**
	Methodological and Data Triangulation / Secondary Research	**7.2.1**

	Heuristics	**8.1.1**
Data Analysis Techniques	Descriptive Statistics	**5.4 | 6.4 | 7.4**
	Operationalization	**5.4.2.2**
	Grounded Theory	**5.5**
	Gioia Method	**5.5**
	Structuring / Summarizing Content Analysis	**6.3 | 7.3**
	Case Study Research	**7.3**
	Systems Theory	**7.3**
	Inferential Pattern Matching Approach	**7.3**
	Heuristics	**8.1.1**
	Abductive Taxonomy	**8.2**
Number of Methods	Multi-Method Approach	**2.3.2**
Time Horizon	Cross-Sectional	**2.3.2**
Scientific Rigor	Scientific Rigor	**2.1.1**

Source: Author's representation

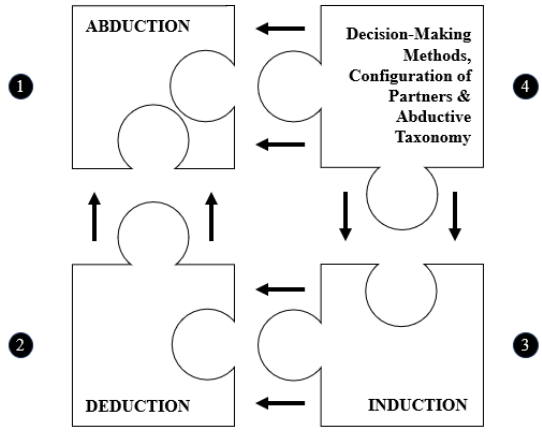
2.3.3 Theorizing with the Inferential Pattern Matching Framework

2.3.3.1 Constructivist-Pragmatist Theory-Building

The aim of this investigation is to achieve holisticness and depth of research and content. This will be accomplished through the interconnection of the respective scientific reasonings - abduction, deduction, and induction - by the matching of patterns and constant comparison between these three types of reasoning, thereby forming this study's innovative **Inferential Pattern Matching Approach**, an extension of the flexible pattern matching approach (Sinkovics, 2018 in Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252; Minnameier, 2010, pp. 241-242; Linneberg & Korsgaard, 2019, p. 264; Timmermans & Tavory, 2012, pp. 179–180).

To support the transparency demonstrating rigorous scientific research (Grodal et al., 2021, pp. 591–594; Morse et al., 2002, p. 14; Prager et al., 2019, p. 377), the research structure of this thesis is visualized by a puzzle. Every piece of the puzzle is put together such as to form the overall research structure, which is demonstrated by the **Quadruple Puzzle of Holistic Research** as illustrated in **Figure 14**. The puzzle begins with ABDUCTION. As demonstrated by the abductive piece of the puzzle, a first data basis is created, which is still fragmented. Gaps will be filled by DEDUCTION and INDUCTION iteratively. This thesis will contribute to complete the puzzle such as to provide a systematic and holistic framework for partner selection in business ecosystems. The single steps will be discussed in more detail in the following chapters.

Figure 14. Quadruple Puzzle of Holistic Research



Source: Author's representation

The present study uses a **constructivist-pragmatist approach** for the empirical investigation of the topic (Nonhoff, 2011, p. 91). Behfar and Okhuysen (2018, p. 328) emphasize the constructive role of the researcher in the reasoning process. The pragmatist idea is that the thinking process and the interpretations of researchers are integral part of the theory as "[p]rior findings cannot by themselves motivate hypotheses, and the reporting of results cannot substitute for causal reasoning" (Sutton & Staw, 1995, p. 374).

The complementarity between creating and validating explanation underlines the importance of pragmatism for theory-building, as it seeks for a deep engagement with empirical phenomena, it rejects simplification, and it is self-reflective and constantly evolving, as it promotes exploration and discovery (Behfar & Okhuysen, 2018, p. 326; Martela, 2015). According to Peirce (1931-1958b), the inferential process of abduction consists in studying facts to derive a theory which explains the interrelationships among these facts (CP 5.145 in Psillos, 2011, p. 117). The evolutionary process of the **Inferential Pattern Matching Approach** thus supports **strong theory building** (Roth, 1988 in Paavola, 2005, p. 137; Sutton & Staw, 1995, p. 378; Bouncken, Qiu, & García, 2021, p. 2).

2.3.3.2 The Inferential Pattern Matching Framework

Instead of combining qualitative with quantitative research, the methodological framework remains purely **qualitative** for several reasons: first, qualitative research is the best method for an explorative investigation of this underresearched topic, as a detailed understanding of the complex issue is needed (Creswell, 2018, pp. 39–40; Morgan, 2007, p. 73). Second, qualitative research enables high flexibility (Mack et al., 2005, p. 3), in data collection as well as in data analysis. Third, it allows for an in-depth study, describing the phenomena and interpreting the interrelationships (Eisenhardt, 1989b, p. 538). Fourth, it provides a good understanding of the dynamics within the relationships (Eisenhardt, 1989b, p. 542). Fifth, it provides a holistic picture of the investigation (Creswell, 2018, p. 249).

Multiple methods are used for the match of theory and data, combining all types of reasoning, the objective being to search for useful points of connection. This does not question that the use of one single method would not be sufficient to advance a reliable investigation (Morgan, 2007, pp. 68–71). Rather, a multi-method qualitative approach ensures that on the one hand, the systematic and holistic partner selection framework is as complete as possible and on the other hand, that match of theory and data is investigated from different perspectives. The combination of data types is highly synergistic (Eisenhardt, 1989b, p. 538), the iterative use of multiple methods hence ensures high content generation. The **Inferential Pattern Matching Approach** involves the application of multiple qualitative methods which are verified incrementally and interactively throughout the whole investigation. This qualitative investigation is hence accompanied by a verification process ensuring **validity** and **reliability** to achieve overall **scientific rigor** (Morse et al., 2002, p. 19).

Conceptual, theoretical and analytical frameworks will serve as a guiding structure for the **Inferential Pattern Matching Approach**, thereby creating the **Inferential Pattern Matching Framework**, a new holistic approach proposed by this thesis:

According to Eisenhardt and Graebner (2007), **theory building** is best accomplished through a structured process, in which theory is drafted first, each construct is empirically tested such as to achieve a match of patterns between theory and data (pp. 29-30). The iterative and recursive nature of theory building thus reflects the relevance of the **Inferential Pattern Matching Approach** to build a strong theory (Sutton & Staw, 1995, p. 378). Sætre and van de Ven (2023) refer to this as **abductive theorizing** (p. 1). A pragmatist approach using abductive theorizing is highly recommended by Nenonen et al. (2017) as a way to contribute to theory and practice alike (p. 1132). Links between the constructs can be informed by empirical evidence (Eisenhardt & Graebner, 2007, pp. 29-30). “[I]nferences are made through an abductive process driven by an experiential context and tested via application back into context” (Hansen, p. 456 in Sharfman & McManus, 2023, p. 385). This emphasizes the important **role of the framework** as the guiding structure for the **Inferential Pattern Matching Approach**. The initial framework is constantly developed through the new insights generated during the process (Dubois & Gadde, 2002, p. 559).

Consistently, this study first proposes a conceptualization of the entire research project through a **conceptual framework** constructed by the researcher and based on an initial research (Maxwell, 2013, p. 41). The conceptual framework serves as the initial structure by which this study is guided. It results from a pre-reading of relevant literature related to the topic and illustrates the skeletal structure of the partner selection framework (Eisenhart, 1991, p. 202; Maxwell, 2013, p. 39).

The **theoretical-conceptual framework** is drafted in the next step, the **ABDUCTION** chapter. Two literature reviews provide the initial data for the development of the theoretical partner selection framework. Doing a comprehensive SLR is the best technique to construct the theoretical framework since it will allow the framework to emerge from the literature (Kivunja, 2018, pp. 48–49). The theoretical framework helps to raise questions through hypotheses (Kivunja, 2018, p. 47). **Constructivist Grounded Theory** advances, refines, challenges, or supersedes existing concepts and thus interconnects the emerging concepts and theoretical codes to a utilizable form within the conceptual-theoretical framework (Charmaz, 2006, pp. 168–169).

The **ABDUCTION** chapter thus represents the basis of research. The data collection is informed by Constructivist Grounded Theory Literature Review Method (Charmaz, 2006, p. 10; Wolfswinkel et al., 2013, p. 52). Gioia Method is applied to conduct data analysis through theoretical sampling with data collected by Constructivist Grounded Theory (Glaser & Strauss, 1967, p. 45; Suddaby, 2006, p. 639). The results generate the hypotheses and provide the first step for building a strong new theory (Burks, 1946, p. 302; Linneberg & Korsgaard, 2019, p. 264; Vila-Henninger et al., 2022, 970). This initial theory is summarized within the combined **theoretical-conceptual framework**.

The **DEDUCTION** chapter shall answer the questions and fill the knowledge gaps with additional data from semi-structured, guideline-supported interviews, such as to provide evidence by verifying the hypotheses (Behfar & Okhuysen, 2018, p. 326; Nathaniel, 2023, p. 2). The objective is to highly interconnect the respective findings for the achievement of best holisticness of the topic. This is accomplished through the **Inferential Pattern Matching Approach**, enabling constant matching of patterns by flexible feedback loops to complete the knowledge iteratively (Sinkovics, 2018 in Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252;

Minnameier, 2010, p. 241). The construction of an **analytical framework** helps making sense of the data (Wible & Sedgley, 1999 in Sinkovics, 2018, p. 4).

After the interconnection of the abductive and deductive parts, the **INDUCTION** chapter further closes the knowledge gaps. Data is collected with a case study, a common method for an inductive investigation englobing multiple sources aimed at discovering specific dimensions of the research topic (Dubois & Gadde, 2002, p. 556). Multiple data collection methods strengthen the grounding of theory by triangulation of evidence (Eisenhardt, 1989b, p. 533; Yin, 2014, p. 13).

On the one hand, this study follows the recursive abductive process and on the other hand, the pattern matching approach enables comparison of the respective patterns generated within each step (Minnameier, 2010, pp. 241-242; Sinkovics, 2018, pp. 6–8). Finally, together with the theoretical-conceptual and analytical frameworks composed by the **Inferential Pattern Matching Approach**, this leads to the **finalized theoretical-conceptual framework** and thus to a new theory (Eisenhardt & Graebner, 2007, p. 30). This study therefore provides the framework for the interconnection of the pieces to the puzzle and builds new theory based on the theoretical-conceptual and analytical framework for partner selection in business ecosystems.

By the nature of this inferential research approach, the **research question** will change during the investigation (Eisenhardt, 1989b, p. 536) as the **research focus emerges** with every new data collection (Bettenhausen & Murnighan, 1985, p. 352 in Eisenhardt, 1989b, p. 536). This three-phase process is thus not linear, as the discovery of new evidence **redirects the research iteratively** (Tecuci et al., 2018, p. 10).

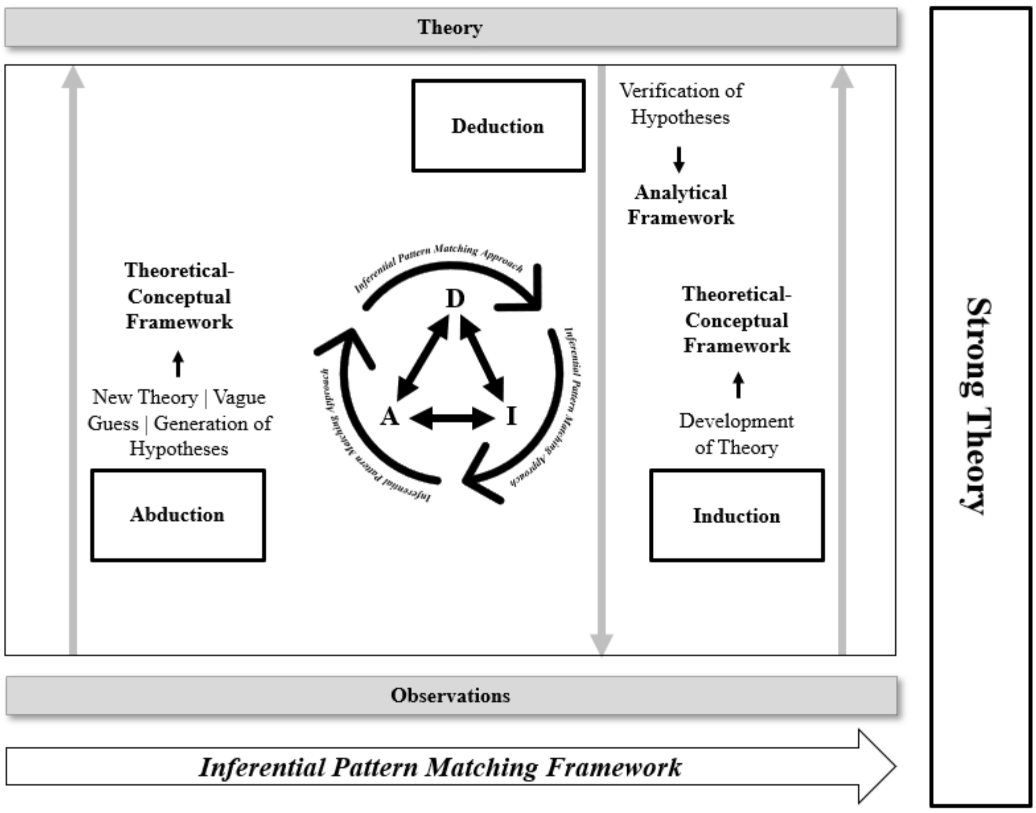
This also applies to the hypotheses, which develop further during the course of the investigation, and which are therefore termed **working hypotheses**. They are subject to change and are a “provisional, working means of advancing investigation” (Dewey, 1938, p. 142 in Casula et al., 2021, p. 1709). The working hypotheses can be regarded as an untested theory (Seddon, 2022, p. 284); they are provisional and will be developed or dropped throughout the investigation (Casula et al., 2021, p. 1709; Grodal et al., 2021, p. 605). Together with the systematic partner selection framework for business ecosystems, they constitute the guiding theory; the first step to building a strong theory (Sutton & Staw, 1995, p. 378; Fife & Gossner, 2024, p. 3; Vila-Henninger et al., 2022, p. 970). Consequently, the term hypothesis is then applied from the point when the working hypotheses no longer change.

The iterative matching of patterns between the three types of reasoning is demonstrated by the pieces of the **Quadruple Puzzle of Holistic Research**: instead of having isolated pieces of knowledge, the interconnectedness accomplished by the **Inferential Pattern Matching Approach** is demonstrated by the assembling of the pieces to a puzzle. This thesis proposes the innovative **Inferential Pattern Matching Framework** and provides the following definition:

> **Author's Definition**
>
> The **Inferential Pattern Matching Framework** is a holistic framework involving the flexible and inferential pattern matching of observational and theoretical data among abductive, deductive, and inductive research approaches and is guided by theoretical, conceptual and/or analytical frameworks to result in a strong theory.

The **Inferential Pattern Matching Framework** is depicted in **Figure 15**.

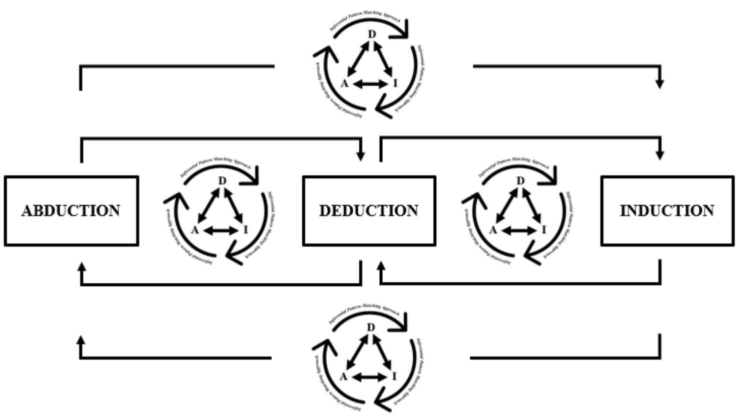
Figure 15. The Inferential Pattern Matching Framework



Source: Author's representation, with elements from Sinkovics (2018) and Minnameier (2010, p. 241)

The aim of this investigation is to build a strong theory: therefore, this work builds on the newly created **Inferential Pattern Matching Framework**, including evidential pattern matchings confirmed among at least two of the main chapters, **ABDUCTION, DEDUCTION, and/or INDUCTION** by the **Inferential Pattern Matching Approach**. Although the **Inferential Pattern Matching Approach** already takes place within the chapter ABDUCTION, the intention of this study is a strong evidence based on different data, as only the cycling among different patterns evolving from **ABDUCTION, DEDUCTION, and/or INDUCTION** enables the in-depth investigation of the topic. This can be done with a move forward in applying the **Inferential Pattern Matching Approach**, from ABDUCTION to DEDUCTION, from DEDUCTION to INDUCTION, or from ABDUCTION to INDUCTION. Similarly, evidencing can be done by a respective move backward among at least two of these chapters in applying the **Inferential Pattern Matching Approach**. **Figure 16** illustrates this proceeding. The arrows represent the different options for evidencing according to the **Inferential Pattern Matching Framework**.

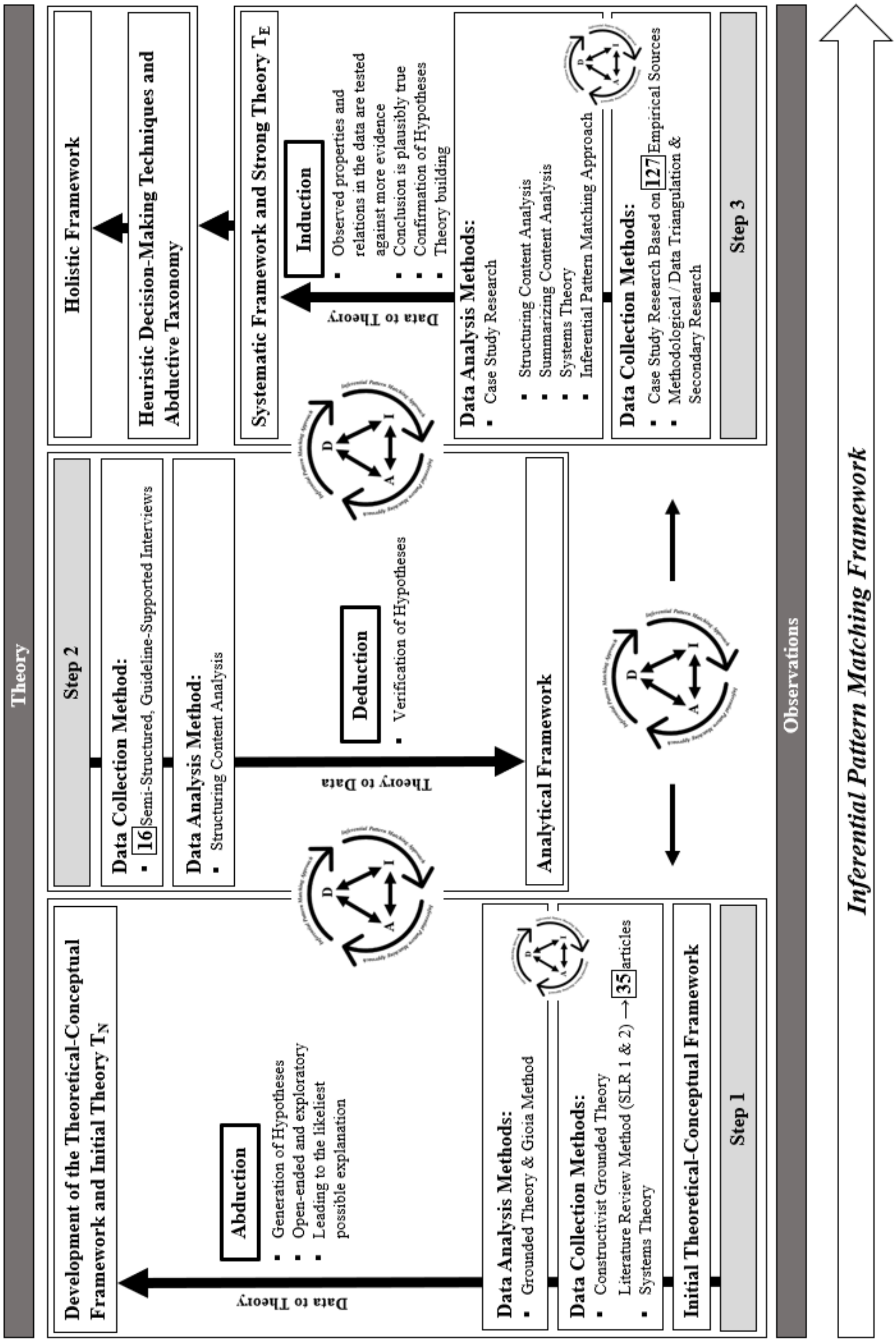
Figure 16. Implementation of the Inferential Pattern Matching Framework



Source: Author's representation

The overall **Inferential Pattern Matching Framework** including the research methods applied within this investigation is illustrated in **Figure 17**. Each single step will be discussed in detail in the respective chapters 5-7. Before starting with the **Inferential Pattern Matching Framework**, antecedents and characteristics of business ecosystems and partner selection in business collaborations in general are presented providing the foundation for the topic which will be investigated by the application of the **Inferential Pattern Matching Framework**.

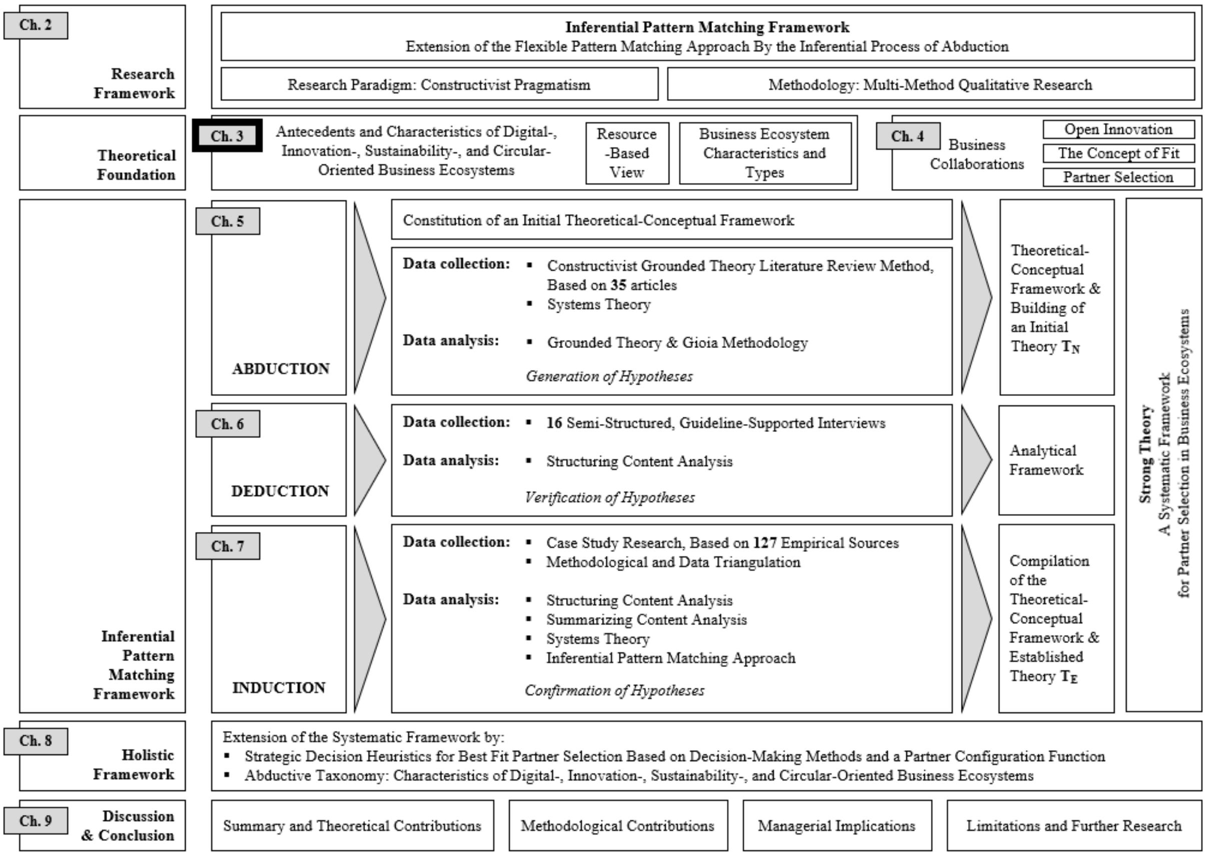
Figure 17. The Inferential Pattern Matching Framework



Source: Author's representation

Figure 18 illustrates the thesis structure leading to chapter 3.

Figure 18. Thesis Structure



Source: Author’s representation

"[A]n ecosystem [is] a group of actors that are co-specialized (so they can work together) and produce a collective (usually novel) product or service."

Michael G. Jacobides

(Jacobides, 2022, p. 103)

3 Antecedents and Characteristics of Digital-, Innovation-, Sustainability-, and Circular-Oriented Business Ecosystems

3.1 The Resource-Based View

3.1.1 Principals of the Resource-Based View

The initial roots of the **resource-based view (RBV)** can be traced back to Edith Penrose's (1959) book "The theory of the growth of the firm" (Rugman & Verbeke, 2002, p. 769). The RBV was preceded by **Porters (1980) five forces framework** based on the **structure-conduct-performance paradigm**, indicating that a company's competitive advantage is gained by the selection of strategies exploiting the structural conditions of the industry (Pisano, 2015, p. 6). Despite this framework's success, it falls short in explaining performance differences of companies within the same industry involving companies following a similar strategy. This gap is filled by the RBV (Lippman & Rumelt, 1982, pp. 419-420, 432-436 ; Pisano, 2015, pp. 6–7). A company's competitive position thus refers not only to its business environment, but majorly to its distinctive resources and competences (Learned et al., 1969 in Teece et al., 1997, p. 513).

The **resource** of a company can be defined as tangible or intangible assets that are connected semi permanently with the company and can include for instance knowledge of specific technology, skilled personnel, machinery, brand names, efficient procedures or capital (Wernerfelt, 1984, p. 172). A company can hence be regarded as a broad set of resources (Penrose, 1959; Rugman & Verbeke, 2002, p. 771; Wernerfelt, 1984, p. 171). Optimal company growth is achieved through balancing the exploitation of existing resources and the development of new resources (Penrose, 1959; Wernerfelt, 1984, p. 178). Resources enable the company to implement strategies which improve its efficiency and effectiveness (Barney, 1991, p. 101) such as to create sustained competitive advantage (Barney, 1991, p. 99). Resources can promote higher company performance if they are characterized as valuable, rare, nonsubstitutable and inimitable (Barney, 1991, p. 99; Gueler & Schneider, 2021, p. 161; Wernerfelt, 1984, pp. 172–173), enabling the company to earn above-average returns (Cavusgil et al., 2007, p. 160). The value of a resource is company-specific and therefore highly subjective and influenced by a company's ex ante market position, resource base allowing for complementarities, its position in interorganizational collaborations, and its managers' knowledge about how to use the resource (Gueler & Schneider, 2021, p. 161; Schmidt & Keil, 2013, p. 207).

As the value of a company is the sum of its constituent parts and organizational knowledge is fungible to a certain extent, companies are not bound to an entire specialization (Teece, 1982, 41, 45). Rather they possess excess resources which can be used for diversification (Rugman & Verbeke, 2002, p. 771; Teece, 1982, p. 47).

3.1.2 Resource Dependence Theory

The resource dependence theory (RDT) with the following unerlying arguments has first been mentioned by Pfeffer and Salancik (1978) and is assigned to organizational theory and strategic management:

1. Companies are the fundamental unit for understanding interorganizational relationships.
2. These companies are not autonomous but constrained by the interdependence with other companies.
3. The interdependence with other companies leads to uncertainty about the performance of activities, which in turn will lead to uncertainty about its own survival and continued success.
4. Companies manage the external interdependencies, which will never be completely successful such as to lead to new patterns of dependence.
5. Dependency patterns lead to inter- and intraorganizational power, which will have an impact on the company's behavior.

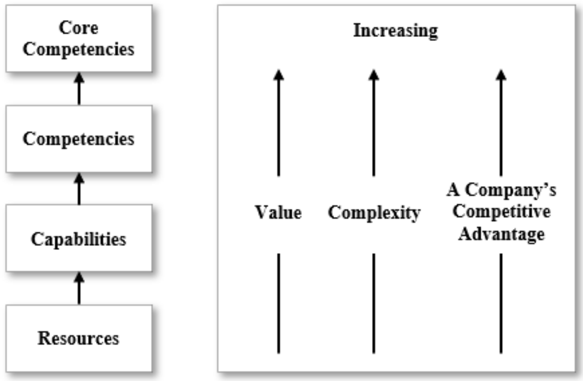
RDT refers to the company as an open system, which is dependent on external contingencies (Pfeffer & Salancik, 1978 in Hillman et al., 2009, p. 1404) and thus recognizes the influence of contextual conditions and constraints (Gao et al., 2023, p. 3). The RDT regards companies as places "[…] in which groups and individuals with varying interests and preferences come together and engage in exchanges […]" (Pfeffer & Salancik, 1978, p. 26) and emphasizes the need to understand the company's business ecosystem to being able to understand the company's own behavior (Pfeffer & Salancik, 1978, p. 1). RDT is closely related to the concept of **path dependency** (Teece et al., 1997, pp. 522–523), as once interaction patterns are established, they are likely to persist as this reduces the participants' uncertainty (Pfeffer & Salancik, 1978, pp. 26–27).

In contrast to the RBV, the RDT is oriented towards a need for an environment providing external resources to the company, while RBV focuses on resources possessed by the company. In this sense, **RBV could enrich RDT** by deriving a company's need for external resources from its internal resource basis (Pfeffer & Salancik, 2003 and Hillman et al., 2009 in Jiang et al., 2023, p. 28). Companies are externally constrained and controlled due to their dependence on external resources so that interorganizational **differences in power** can result from such exchanges (Pfeffer, 1987, pp. 29–30). RDT especially becomes relevant when **resources are scarce** so that multiple companies compete for a same scarce external resource (Hessels & Terjesen, 2010, p. 207).

3.1.3 Capabilities and Core Competencies

As the terms **core competencies, competencies, capabilities, and resources** are often used interchangeably (Javidan, 1998, pp. 61–62), their clear distinction is necessary for their successful exploitation (Priem & Butler, 2001, p. 22). The terms can be explained according to a competencies hierarchy, as proposed by Javidan (1998) and illustrated in **Figure 19**, in which the value, complexity, and a company's competitive advantage increase with the hierarchy levels. Resources are at the bottom level of hierarchy and are useless unless companies are able to exploit their resources. This is only possible if they have the respective capabilities to do so, which are at the second step of the hierarchy model. The third step represents the competencies which enable the coordination and cross-functional integration of capabilities. The highest level in the hierarchy is represented by the core competencies which result from the integration of the lower hierarchy levels such as to build synergies among resources, capabilities, and competences among the organization. The broader organizational scope of the increase in hierarchy level implies the degree of complexity (pp. 62-63).

Figure 19. The Hierarchy of Resources, Capabilities, Competencies, and Core Competencies



Source: Author's representation, major elements adapted from Javidan (1998, p. 62)

Capabilities are not a simple assembling of team resources, but complex coordination patters among people and resources (Grant, 1991, p. 122). A company's resources, capabilities, and competencies are its key sources of competitive advantage (Javidan, 1998, p. 61), provided that a company consists of the capabilities to fully exploit these distinctive competencies (Hitt & Ireland, 1986, pp. 401–404). In contrast to resources, capabilities focus on the development, carrying and exchange of information through human capital and refer to company-specific tangible or intangible processes developed over time, involving complex interactions based on a company's resources (Amit & Schoemaker, 1993, p. 35). Capabilities are constantly enhanced by multiple sources and usually enable innovation, but can also inhibit innovation due to core rigidities, which are simultaneously part of the complex structure of capabilities within a company (Leonard-Barton, 1992, pp. 116–121).

The capacity to leverage **corporate resources** according to the **corporate strategy** is enabled through **core competencies** (Prahalad, 1993, p. 42; Prahalad & Hamel, 1990, p. 91). The concept of core competencies is therefore closely related to the **RBV** and can be defined as the "[…] management's ability to consolidate corporatewide technologies and production skills into competencies that empower individual businesses to adapt quickly to changing opportunities" (Prahalad & Hamel, 1990, p. 81). While physical assets diminish as they are used, core competencies contrarily grow when they are applied and shared, and drive business development (Prahalad & Hamel, 1990, p. 82).

A core competence is characterized by three attributes: First, a core competence enables a **sustained competitive advantage** and potentially provides access to various markets. Second, it enables the company to significantly contribute to customer benefits and third, this core competence is difficult to imitate for other companies as it consists of a complex orchestration of disparate technologies and skills in production (Barney, 1991, pp. 102–103; Prahalad & Hamel, 1990, pp. 83–84). The benefit of a core competence for a company depends on the size of the stock of competence hold by the company and its tangibility, which is largely dependent on the people embodying the core competencies (Prahalad & Hamel, 1990, p. 87).

A company's resources, capabilities, and core competencies are the company's identity, purpose, and foundation for its source of direction and long-term strategy (Grant, 1991, p. 116).

3.1.4 The Dynamic Capabilities View

Although the RBV provides insights about strategies to exploit company-inherent resources to provide sustained competitive advantage (Barney, 1991, p. 99; Cavusgil et al., 2007, p. 160), it falls short in addressing strategies "[…] in high- velocity markets, where the strategic challenge is maintaining competitive advantage when the duration of that advantage is inherently unpredictable, where time is an essential aspect of strategy, and the dynamic capabilities that drive competitive advantage are themselves unstable processes that are challenging to sustain" (Eisenhardt & Martin, 2000, p. 1106).

The **dynamic capabilities view (DCV)** therefore focuses more on maintaining a company's competitive advantage within rapidly changing environments (Teece et al., 1997, p. 510) and involves the dynamic adaptation of a company's resources, capabilities and competencies to highly variable market conditions (Teece, 2007, p. 1335; Teece et al., 1997, p. 516). It thus enriches the traditional view of efficient and robust processes of a company by the dynamic, time-sensitive component towards its environment (Cyert & March, 1963; Eisenhardt & Martin, 2000, pp. 1116–1117).

Dynamic capabilities can therefore be defined as a company's ability to integrate, build, reconfigure, orchestrate, gain and release resources, capabilities, and competences in addressing rapid market change to achieve competitive advantage (Adner & Helfat, 2003, pp. 1011-1013, 1023; Eisenhardt & Martin, 2000, p. 1107; Teece et al., 1997, p. 516). The DCV englobes **RBV** and **RDT**, as it considers not only the resources with the company boundaries, but also those external to a company. Companies seek to maintain and enhance their competitive position by the acquisition of complementary resources (Kalubanga & Gudergan, 2022, p. 159; Pfeffer & Salancik, 1978, p. 26; Teece, 2007, p. 1335).

A company's competitive advantage is built by its managerial and organizational processes with the inherent roles of integration, learning, and reconfiguration, its position based on its assets and the paths based on path dependencies and technological opportunities. **Path dependencies** describe the shape of a company's current position by its past travelling (Prahalad & Hamel, 1990, pp. 81–82; Teece et al., 1997, pp. 518–524).

3.1.5 Resource Orchestration Theory

Resource orchestration theory (ROT) is an extension of the **RBV** and refers to the manager's ability to **structure, bundle, and leverage** a company's internal and external resources such as to achieve orchestration by efficient portfolio configuration (Sirmon et al., 2007, p. 277; Sirmon et al., 2011, p. 1390).

Resource orchestration thus **combines RBV, capabilities, core competencies, and DCV** to efficiently exploit market opportunities to gain sustained competitive advantage (Barney, 1991, p. 99; Prahalad & Hamel, 1990, pp. 81–82; Sirmon et al., 2007, pp. 283–287; Teece et al., 1997, p. 510) and to promote innovation (Carnes et al., 2017, p. 472). The role of managers is critical in resource orchestration, as their decision making and dynamic capabilities are central for their effectiveness (Helfat et al., 2007, p. 19). It is therefore key to understand how companies dynamically organize their resources to create business value (Zhang et al., 2021, pp. 2–3). Baert et al. (2016) emphasize the role of resource orchestration for the balancing of resource and capability configurations across company borders (p. 364).

3.2 Business Ecosystem Characteristics and Types

3.2.1 Business Ecosystems

The interest in business ecosystems (BE) by management and science has grown exponentially in the last years (Kapoor, 2018, pp. 1–2). Based on its roots in biology the term ecosystems has been established in business science by Moore (1993) arguing that in today's fast pace of evolving businesses, companies can no longer innovate in isolation, but in a coevolving and competitive innovation environment in which industrial transformation is fueled by competition among business ecosystems instead of single companies (p. 75-76).

Authors have not yet agreed upon a uniform definition of business ecosystems and other different types of business ecosystems. A reason for this lies in their deferring goals and structures. Characteristics of business ecosystems are highly individual so that the ambiguity of the concepts leads consequently to a lack of clear definitions. Further, the interrelatedness of business-, digital-, innovation-, and often also sustainability- and circular-oriented business ecosystems complicates the sharp demarcation of the terms (Gupta, R. et al., 2019, p. 100). What they all share is the dynamic nature of ecosystems, in which they evolve from "[…] a random collection of elements to a more structured community" (Moore, 1993, p. 76). Business Ecosystems thus have a long-term objective and follow an evolutionary process (Zahra & Nambisan, 2012, p. 219).

A business ecosystem can be regarded as the basic form of an ecosystem in the business environment, a standard underlying all other types of business ecosystems and refers to a community of actors beyond a single industry, which collaboratively creates value (Jacobides et al., 2018, p. 2257). Value creation refers to financial or non-financial benefits resulting from the business ecosystem interactions (Senyo et al., 2019, p. 53). This usually goes along with simultaneous complementarity and interdependence among actors. Complementarity refers to the beneficial interplay of actors, in which each actor contributes to the value of the whole business ecosystem (Ennen & Richter, 2010, p. 207). Interdependence results from their interconnection trough a system-level architecture (Kapoor, 2018, p. 3). As interaction takes place beyond traditional industry boundaries and connects customers, suppliers, partners, and competitors, the company moves in the area of tension between collaboration and cooperation (Iansiti & Levien, 2004, p. 5).

From an **RBV perspective**, business ecosystems enable the access to complementary resources such as to ensure sustained competitive advantage. Emphasis is placed on companies being sufficiently different to provide highly complementary resources (Gueler & Schneider, 2021, p. 161; Lin et al., 2009, p. 921). Companies can be described by their uniqueness in the composition of their internal and external resources so that even though complementary resources are shared within business ecosystems, the utilization of the resources is company-specific leading to **co-specialization** (Jacobides et al., 2018, pp. 2261–2262; Teece, 1986, pp. 288–290). The harmonization of unique resources can be referred to as a company's **core competencies** which can be enhanced by the sharing within business ecosystems and therefore generate a **competitive advantage** (Barney, 1991, pp. 102–103; Prahalad & Hamel, 1990, p. 82). It is worth mentioning that the best business ecosystem cannot compensate for a lack in competence leadership, meaning that a company can **successfully engage in business ecosystems only when having a core competence** (Prahalad & Hamel, 1990, p. 84).

The clear definition and distinction of business ecosystem types is important to actors, such as to have a common understanding of its characteristics and targets, and for researchers to being able to explore the phenomenon (Suddaby, 2010, p. 347 in Aarikka-Stenroos et al., 2021, p. 261; Bogers et al., 2019, p. 2). For this reason, **Table 6** illustrates definitional approaches from various authors to provide best explanation of the notion of business ecosystems.

Table 6. Definitions of Business Ecosystems

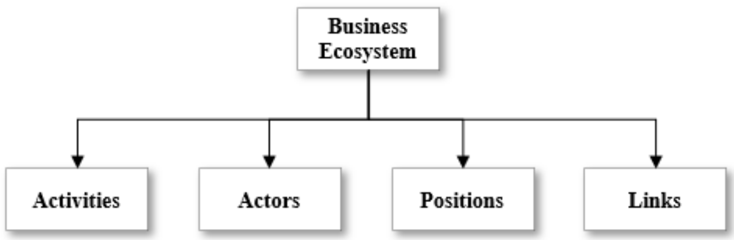
Definition	Source
"An ecosystem is a set of actors with varying degrees of multilateral, nongeneric complementarities that are not fully hierarchically controlled."	Jacobides et al., 2018, p. 2264
"[…] the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize."	Adner, 2017, p. 40
"[…] encompasses a set of actors that contribute to the focal offer's user value proposition."	Kapoor, 2018, p. 3
"[…] an interdependent network of self-interested actors jointly creating value."	Bogers et al., 2019, p. 2
"A business ecosystem contains a number of firms that work together (and also compete) to create and sustain new markets and new products."	Teece & Linden, 2017, p. 4
"[…] is not simply a means for connection or collaboration. Rather, it is a collection of independent businesses, orchestrated by a business at the center, that come together to address a specific need in the market. Most important, the solution that is developed by the business ecosystem creates value for every participant. And to make things a bit more complicated business ecosystems can also incorporate the other two forms of collective action: partnerships and alliances."	Young et al., 2021, pp. 4–5

Source: Author's representation

Business ecosystem collaborations share similarities with alliances, but overlap only partially with latter ones, as business ecosystems are characterized by more open memberships (Gulati, Puranam, & Tushman, 2012, p. 577), in which the focus is not to bind the partner, but a specific function (Jacobides et al., 2018, p. 2275). However, a business ecosystem can be regarded as a loose alliance in which actors with complementary functions cocreate value (Jacobides et al., 2018, p. 2275). While M&A and alliances are characterized by closeness and bilateral partnerships, business ecosystems favor **loose partnerships** within very **complex cooperations** (Li, 2009, p. 380). Usually, a business ecosystem is composed of a core product and complementary products or services that add value by creating customer solutions (Friend & Malshe, 2016, p. 174; Jacobides et al., 2018, p. 2257). A business ecosystem therefore supports repositioning a company's strategy as an alternative to M&A or other types of cooperations (Li, 2009, pp. 379–381). Dependency results from the interconnection of different complementary elements provided by the actors of the ecosystem (Roundy & Bayer, 2019, p. 551). This multilateral dependence is coordinated by the definition of common rules contractually agreed with each partner. Their interaction is **not based on hierarchy, but on modularity** based on the **prior defined** rules (Jacobides et al., 2018, p. 2255). Moore's (1993) definition of a business ecosystem has been taken up as a basis for ecosystem research and the extension towards other ecosystem types (Adner, 2017, pp. 40–41).

A guideline for a business ecosystem structure is given by Adner (2017), providing four major elements, including the definition of activities undertaken to reply to the value proposition, the assignment of activities to different actors, the position of actors within the business ecosystem, and the alignment structure ensuring the link of activity flows (pp. 41-43), as demonstrated by **Figure 20**.

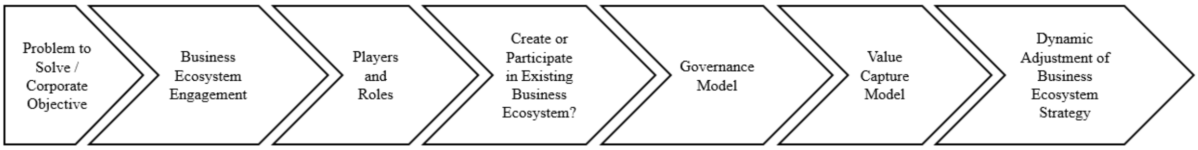
Figure 20. Business Ecosystem Structure



Source: Author's representation, based on Adner (2017, pp. 43-44)

Based on Adner (2017) a more fine-grained business ecosystem structure is provided by Pidun et al. (2020a) who present a six-step process for business ecosystem design in addressing the following topics: the problem to solve, the actors and their roles, the initial governance model, the value capture, the launch-phase with the achievement of critical mass, and the long-term viability of the business ecosystem (pp. 2-22). Together with their process of business ecosystem strategy formation (Pidun et al., 2022, p. 2), this leads to the following process of business ecosystem formation (**Figure 21**):

Figure 21. Process of Business Ecosystem Formation



Source: Author's representation, with elements from Pidun et al. (2020a, p. 2) and Pidun et al. (2022, p. 1-2)

3.2.2 Actors and Their Roles within a Business Ecosystem

As highlighted in the previous chapter, the actors play a major role within business ecosystems and their alignment determines the functioning and success of a business ecosystem (Adner, 2017, p. 47). The role of a company within a business ecosystem is strongly related to the value of its resources or capabilities (Jacobides et al., 2018, p. 2270).

A business ecosystem typically relies on a company holding the technological leadership and providing the infrastructure for other business ecosystem members, which in turn, provide inputs and complementary goods. The leadership company is the central actor of a business ecosystem, also referred to as the ecosystem leader, keystone, hub, designer, or **orchestrator** (Dedehayir et al., 2018, p. 22; Iansiti & Levien, 2004, pp. 17–19; Jacobides et al., 2018, p. 2257; Tsujimoto et al., 2018, p. 56).

Generally, roles are assigned according to the activities so that the company which sets the goals, shapes the business ecosystem design, and proves the business ecosystem infrastructure holds the **orchestrator role** (Adner, 2017, p. 48; Gulati, Puranam, & Tushman, 2012, p. 573). Even though there is no formal hierarchy within a business ecosystem, the orchestrator has an informal authority due to its status and reputation (Dedehayir et al., 2018, p. 22; Gulati, Puranam, & Tushman, 2012, p. 573). The orchestrator provides the structure to enable value creation and capture (Dhanaraj & Parkhe, 2006, p. 660; Kogut, 2000, p. 413), which particularly involves the crucial task to **identify, assess, and capture the value** of specialized knowledge, skills, and resources from the different network partners (Dhanaraj & Parkhe, 2006, p. 660). The orchestrator guides the **resource orchestration** by the linking of key actors to each element of the orchestration process (Andersén & Ljungkvist, 2021, p. 155). The orchestrator further must have the ability to manage innovation appropriability to avoid unauthorized imitation (Pisano, 1990, p. 159 in Dhanaraj & Parkhe, 2006, p. 660) and to capture the value generated by the innovation (Teece, 1986, p. 287 in Dhanaraj & Parkhe, 2006, p. 660). The orchestrator role is of particular importance in the early stage of business ecosystem formation, when partners lack a structure to interconnect (Dedehayir et al., 2018, p. 22). While most literature takes the robustness of a business ecosystem for granted once it is established, Foss et al. (2023) emphasize the need to focus on the establishment as well as the continued control of the partner configuration by the orchestrator to ensure ongoing vitality and robustness of the business ecosystem. This involves **continuous adaptation** framed by the **dynamic capabilities** of the orchestrator (pp. 2-3). The orchestrator is responsible for identifying the critical dependencies to build a successful partner configuration (Havinga et al., 2023, p. 4) and consider potential **resource dependencies** inherent in needed external resources (Jiang et al., 2023, p. 7).

Apart from the orchestrator role, the business ecosystem is composed of **several different actors**, including suppliers, customers and complementors (Kapoor & Lee, 2013, p. 276). The actors of a business ecosystem can be defined as participants in the value proposition, regardless of whether or not having a direct link to the orchestrator (Adner, 2017, p. 43). While the orchestrator provides the core component and infrastructure of the business ecosystem, third party companies provide the complementary elements and are therefore known as the **complementors** (Adner, 2017, p. 52; Tavalaei & Cennamo, 2021, p. 1). The role of the complementor is a type of actor providing complementary products or assets without being a supplier (Teece, 2018b in Carst & Hu, 2020, p. 7). Complementors provide innovations which add substantial value to the business ecosystem (Teece, 2018b, p. 1369). Usually, complementors do not have contractual partnerships with other actors, as due to their innovative character, they are highly independent (Carst & Hu, 2020, p. 7). Leveraging shared resources and infrastructures can be highly advantageous for complementors to expand their offerings (Tavalaei & Cennamo, 2021, p. 1).

Even though companies can assume different roles, company size, bargaining power, and the extent to which the company is involved in joint value creation might influence the assignment of roles (Adner, 2017, p. 48). It is important that value capture is balanced among business ecosystem members (Teece & Linden, 2017, p. 4). In contrast to traditional linear value creation with suppliers, the complex business ecosystem structure with multiple actors challenges the role of the supplier among the simultaneous cooperation and competition with the other actors (Kamalaldin et al., 2021, p. 1). The number and versatility of roles is very much dependent on the business ecosystem type (Korsunova et al., 2021 in Thakur & Wilson, 2023, p. 2). The terms actor and partner are used interchangeably among and within literature referring to business ecosystem research (Adner, 2017, p. 42; Poblete et al., 2022, p. 301).

3.2.3 Digital Business Ecosystems

Digital Business Ecosystems (DBE) can be considered as an extension of business ecosystems based on digital technologies as a central component (Senyo et al., 2019, p. 53). Value co-creation is enabled through the integration of value chain and platform logics providing an aggregated service solution to the customer (Nucciarelli et al., 2017 in Coskun-Setirek et al., 2024, p. 60). In contrast to **digital ecosystems**, which are characterized by self-organized, scalable architectures providing software services in complex systems, DBEs share business ecosystem characteristics being supported by a digital architecture (Tsai et al., 2022, pp. 3–4). DBEs are hence entirely based on business ecosystems and have partial elements of digital ecosystems (Gupta, R. et al., 2019, p. 101).

Digital opportunities enable the integration of heterogeneous actors from dispersed geographical regions (Nachira, Dini, & Nicolai, 2007 in Coskun-Setirek et al., 2024, p. 60). The removing of geographic boundaries and the provision of tools for cross-system collaboration is a major advantage of DBEs (Boley & Chang, 2007, p. 401). The digital component enables DBEs being self-organized, scalable, and sustainable (Briscoe, 2010, p. 43). A DBE can be regarded as a software infrastructure to support the interaction of a large number of actors (Nachira, Dini, & Nicolai, 2007 and Nachira, Nicolai et al., 2007 in Briscoe, 2010, p. 43). It therefore provides an internet-based environment enabling actors to interact efficiently (Nachira, Nicolai et al., 2007 in Briscoe, 2010, p. 43). Based on the dynamic needs of the environment, a leadership structure is formed (Boley & Chang, 2007, p. 399). Optimized spillover is possible due to digital technology (Parker et al., 2016, p. 263). **Table 7** summarizes major definitions of DBEs.

Table 7. Definitions of Digital Business Ecosystems

Definition	Source
"[…] a socio-technical environment of individuals, organisations and digital technologies with collaborative and competitive relationships to co-create value through shared digital platforms."	Senyo et al., 2019, p. 53

"[…] a combination of Digital, Social, and Business Ecosystems; therefore, any distributed adaptive open socio-technical system for business, with properties of self-organisation, scalability and sustainability, inspired by biological ecosystems.	Briscoe, 2010, p. 44
"[…] an open community, and there is no permanent need for centralised or distributed control or for single-role behaviour."	Boley & Chang, 2007, p. 399
"[…] is a paradigm that enables developing and monitoring novel business models of collaborating organisations and individuals using ICT as the foundation."	Tsai et al., 2023, p. 573

Source: Author's representation

An analysis of the definitions reveals that the primary attributes of DBEs are platform, symbiosis, co-evolution, and self-organization enabling complex interdependence among technology platforms, processes, individuals, and organizations across industry boundaries (Senyo et al., 2018, p. 126, 2019, p. 53).

Despite the fact that DBEs are progressively becoming more prevalent across nearly all industries, their rates of development, degrees of integration, and maturity vary, which result from the unique features and markets of each industry (Goetz et al., 2022, p. 530). In addition to the importance of the governance structure of DBEs, the correct DBE architecture is a critical issue impacting the success of future evolution of the DBE so that the alignment of both is critical to DBE success (Shahbazian et al., 2018 and Capilla et al., 2007 in Coskun-Setirek et al., 2024, p. 58). Due to its high connectivity based on a platform, efficiency, and innovation, the key features of business models, can be exploited to a higher extent than with non-digital business ecosystems (Zott & Amit, 2008 in Rong, Hu et al., 2015, p. 53). The platform as an interaction interface is thus critical to create value (Hsieh et al., 2017, p. 3; Rong, Hu et al., 2015, p. 53).

Despite the inherent platform, DBEs have to be distinguished from **platforms**, **digital platform ecosystems, digital ecosystems,** or **platform ecosystems** in the sense that the latter ones provide a platform infrastructure and complementary assets to enable users the access to the platform marketplace at which complementors offer their products (Tavalaei & Cennamo, 2021, p. 3; Teece, 1986, p. 288). The value co-creation in digital platform ecosystems results from digital affordances and infrastructures (Autio & Thomas, 2020, p. 120). The core purpose of a platform ecosystem is the interconnection of players to simplify the exchange of resources and services (Goetz et al., p. 1396) and typically involves a combination of software and hardware providing the infrastructure to provide a common standard for interaction (Teece, 2018b, p. 1375). Platforms are the enablers of DBEs, which in turn further include multiple business functions (Teece, 2018b, p. 1375).

3.2.4 Innovation Ecosystems

Innovation ecosystems (IE) are characterized by several key elements, with diversity and heterogeneity of its stakeholders as its primary characteristics. These stakeholders are constituted by companies, academic institutions, governmental organizations, and private citizens who work together in a variety of network types to promote innovation. Most important aspects of innovation ecosystems include the access to financial resources, a workforce being educated, competent, and capable of thriving in a technologically advanced economy, enabling system-level production, as well as a culture that appreciates and promotes experimentation, taking risks, and learning from mistakes. Complementary innovations are at the core of innovation ecosystems (Adner, 2006, p. 1). Government rules and supportive policies foster an atmosphere that encourages innovation (Al-Sulaiti et al., 2023, p. 4). The difference to business ecosystems lies in its innovation oriented goals related to a higher uncertainty of outcomes and hence leading to the difficulty to guide such an innovation ecosystem (Aarikka-Stenroos & Ritala, 2017, p. 25; Dattée et al., 2018, p. 466). **Table 8** offers a definitional basis for innovation ecosystems.

Table 8. Definitions of Innovation Ecosystems

"[…] the collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution. Enabled by information technologies that have drastically reduced the costs of coordination, innovation ecosystems have become a core element in the growth strategies of firms in a wide range of industries."	Adner, 2006, p. 2
"[…] is set for the co-creation, or the jointly creation of value. It is composed of interconnected and interdependent networked actors, which includes the focal firm, customers, suppliers, complementary innovators and other agents as regulators. This definition implies that members face cooperation and competition in the innovation ecosystem; and an innovation ecosystem has a lifecycle, which follows a co-evolution process."	Gomes et al., 2018, p. 45
"[…] a network of interconnected organizations, organized around a focal firm or a platform, and incorporating both production and use side participants, and focusing on the development of new value through innovation."	Autio & Thomas, 2014, p. 3
"[…] the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors."	Granstrand & Holgersson, 2020, p. 1

"[…] stresses the importance of a pluralism of a diversity of agents, actors and organisations: universities, small and medium-sized enterprises and major corporations, arranged along the matrix of fluid and heterogeneous innovation networks and knowledge clusters. This all may result in a 'democracy of knowledge', driven by a pluralism of knowledge and innovation and by a pluralism of paradigms for knowledge modes."	Carayannis & Campbell, 2009, p. 207
"[…] a business ecosystem, which aims at creating and capturing value from innovation activities (related to either technological or business/entrepreneurial innovation)."	Ritala et al., 2013, p. 248
"[…] refer to dynamic and interconnected networks of individuals, entities, and resources that foster the development and diffusion of innovative ideas, methods, products, technologies, and solutions."	Al-Sulaiti et al., 2023, p. 3

Source: Author's representation

It must be acknowledged that innovation ecosystems can be interpreted in many different ways so that several other business ecosystem types exist, which partly overlap with the characteristics of innovation ecosystems (Poblete et al., 2022, p. 302) and that there is no consensus regarding its definition, theoretical roots, scope, and boundaries (Ritala & Almpanopoulou, 2017, p. 39). For instance, the knowledge ecosystem can be considered as part of an innovation ecosystem (Valkokari, 2015, p. 20). Compared to business ecosystems, innovation ecosystems can be regarded as more open and loosely-coupled systems allowing the actors to utilize the captured knowledge and skills in own particular ways (Ketonen-Oksi & Valkokari, 2019, p. 27).

Innovation ecosystems involve the joint value creation of legally independent actors, taking into account their value propositions, inherent risks, dependency among them. and an innovation ecosystem value proposition being end user focused (Konietzko et al., 2020, p. 3; Talmar et al., 2020, pp. 2–4).

The major opportunity of innovation ecosystems is a substantial value creation, which cannot be created by one company alone (Adner, 2006, p. 2). However, this also entails the risk of becoming dependent on other companies (Adner, 2006, p. 3). Cooperation and competition, the so-called coopetition, typically coexists in innovation ecosystems, so that further to the above-mentioned stakeholders, competitors are part of the innovation ecosystem, which involves the challenge of managing this ambiguity of partners (Gomes et al., 2018, p. 43). The appropriate balancing of cooperation and competition is thus a major challenge (Gu et al., 2021, p. 9). Competition within an innovation ecosystem requires being prepared for delays, drawbacks, and compromises, which are to a certain extent outside the control of the keystone. This can be accomplished through an innovation strategy mitigating the risk or forgoing the opportunity of a collaboration (Adner, 2006, p. 9).

A successful innovation ecosystem hence consists of a sound strategy that specifically takes into consideration the delays and difficulties being present in collaborative networks (Adner, 2006, p. 3).

3.2.5 Sustainability Innovation Ecosystems

The search for a definition for sustainability-oriented ecosystems is difficult, as science and industry do not have a uniform definition, as illustrated in **Table 9**.

Table 9. Definitions of Sustainability Innovation Ecosystems

"**Sustainability Business Ecosystems**. This is a very specific type of collective action that is often highly focused on addressing a particular market need—and is more than just a kind of loose affiliation, which the word "ecosystem" often evokes. […] Business ecosystems are the right choice to address a sustainability challenge that requires combining complementary solutions from different businesses in a highly coordinated fashion."	Young et al., 2021, pp. 4–5
"[..] the conceptual framework of the fashion innovation ecosystem can be trimmed with a focus on sustainability […] to analyse the sustainability of the innovation ecosystem within which the circular economy is dependent on the activities of actors […]. The fashion innovation ecosystem could be further developed into a **fashion sustainability innovation ecosystem**."	Zeng et al., 2024, pp. 69–70
"**Green innovation ecosystems** are viable ways to collaborate to nurture a heterogeneous green value proposition for participants […]. Previous studies on green innovation ecosystems include the game between enterprises and upstream and downstream enterprises […], the government-university-industry cooperative alliance […], and the interaction mechanism between external environmental regulation and corporate internal green innovation processes […]."	Gao et al., 2023, pp. 1–2
"[Innovation ecosystem] has been increasingly gaining significant and widespread academic attention in multiple fields, including innovation […], business […], economic […], and sustainability […]. Taking the research on sustainability as an example, [innovation ecosystem] has been utilized to explore diverse sustainable issues, including green product production […], sustainable enterprise development […], circular industrial economies […], and sustainable regional transformations […]. This indicates that [**innovation ecosystem**] as an effective approach has played a significant role in **advancing sustainability** in recent years."	Gu et al., 2021, p. 1
"Considering the importance of innovation ecosystems in supporting and increasing the functionality of innovations, **green innovation ecosystems** (IEs) arise as an important topic of interest, since this green innovation demands a common joint effort from suppliers, universities, policymakers, users/customers, and complementors to succeed and make a change […]. Green innovation entails the integration of sustainable elements into firms' new or improved products, services, processes, or practices or the development of new ones that either reduce their environmental impact of the product, neutralize it, or even cause a positive impact […]."	Marcon et al., 2021, p. 586

Source: Author's representation

In several cases, there is even no dedicated definition at all, so that science merely refers to innovation ecosystems with a reference to sustainability (Gu et al., 2021, p. 1). An industry-article from the consulting company Boston Consulting Group provides the definition of a sustainability business ecosystem (Young et al., 2021, pp. 4–5). The major goal of a **sustainability innovation ecosystem (SE)** is the access to relevant sustainable resources (Gao et al., 2023, p. 2). Sustainability innovation ecosystems (SE) are particularly dependent on external scarce resources so that **RDT** plays a major role in this context of green innovation (Gao et al., 2023, p. 3). The core objective of a sustainability innovation ecosystem is that its innovations contribute to sustainability issues (Dzhengiz, 2018, p. 5).

This study proposes that sustainable goals can be subordinated to innovation ecosystems, as sustainability is a type of innovation (Jütting, 2020, p. 3), so that similar to Zeng et al. (2024) the innovation ecosystem dedicated to sustainability goals shall be defined as sustainability innovation ecosystem (pp. 69-70). The word innovation is put into the middle to underline the close relationship to innovation and to not to be confused with a biological ecosystem.

3.2.6 Circular Ecosystems

The link between business ecosystem research and circular economy has first been established by Hsieh et al. (2017, p. 2) and Aminoff et al. (2017, p. 530). Studies regarding the emergent **circular ecosystems (CE)** are consequently still very limited but expected to increasingly being studied in the near future (Barquete et al., 2022, p. 4). Especially in circular economy or sustainability related business ecosystems, the boundaries of the terms are fuzzy and often overlap with innovation ecosystem characteristics (Thakur & Wilson, 2023, p. 1). The importance of innovation within circular ecosystems is highlighted by several further authors (Konietzko et al., 2020, p. 1; Veleva & Bodkin, 2018, pp. 31–32). Nevertheless. The term circular ecosystem does not contain the term innovation, as it is an already established term.

The purpose of the circular economy is to maximize the value of resources by its reuse and to simultaneously reduce greenhouse gas emissions, waste, and pollution (Konietzko et al., 2020, p. 1). Objectives of circular ecosystems involve the waste collection for recycling, the transportation, sorting and dismantling of already used materials, the reduction of material costs, and the increase of resource efficiency (Hsieh et al., 2017; Tukker, 2015; Tate et al., 2019 in Trevisan et al., 2022, p. 287).

Despite its similarity and the sustainability potential of the circular economy, the terms can have opposite effects in the sense that circular economy might for instance contain unsustainable materials such as plastic, which is reused with possibly higher energy consumption leading to higher CO_2 emissions so that circular economy goals not necessarily create benefits in sustainability (Velenturf & Purnell, 2021, pp. 1438–1439). The compulsion to offer circular products due to customer expectations entails that sales goals take precedence over sustainability goals. This statement is supported by Koval et al. (2023) arguing that sustainability-oriented innovation is a systematic effort to promote competitiveness by developing eco-friendly practices (p. 2; Khurana et al., 2021, p. 13).

A circular ecosystem is a complex multi-actor ecosystem needed to support environmental sustainability through circularity (Aarikka-Stenroos et al., 2021, p. 260), but cannot be equaled with sustainability-oriented ecosystems; rather circularity is one way to support sustainability-oriented innovation (Koval et al., 2023, p. 13). **Table 10** illustrates different definitions of circular ecosystems.

Table 10. Definitions of Circular Ecosystems

"[…] a system of interdependent and heterogeneous actors that go beyond industrial boundaries and direct the collective efforts towards a circular value proposition, providing opportunities for economic and environmental sustainability."	Trevisan et al., 2022, p. 292
"[…] an eco-centric system of multiple platforms, wherein disparate and mutually dependent actors, collaborate and cooperate to achieve circular shared value proposition, exchange innovative ideas and technologies via the innovation chain and create environment-friendly artifacts that support the sustainability of circular economy."	Thakur & Wilson, 2023, p. 4
"A circular economy (CE) ecosystem is a multi-actor entity in which interdependent actors play complementary roles. Actors include for-profit companies, public services, governmental bodies such as ministries, municipalities and cities, universities, non-profit organizations, and citizen–consumers. A CE ecosystem emerges or is created around a common, system-level goal related to resource circularity, and may involve the creation of CE knowledge, CE businesses, and economic value. Agency varies from focal actor-driven ecosystems to being widely distributed, and the ecosystem structure varies from tightly coordinated CE business models to loosely coupled affiliation structures oriented around CE goals."	Aarikka-Stenroos et al., 2021, p. 271
"[…] co-evolving, dynamic and potentially self-organising configurations […], in which actors integrate resources and co-create circular value flows in interaction with each other.	Aminoff et al., 2017, p. 530

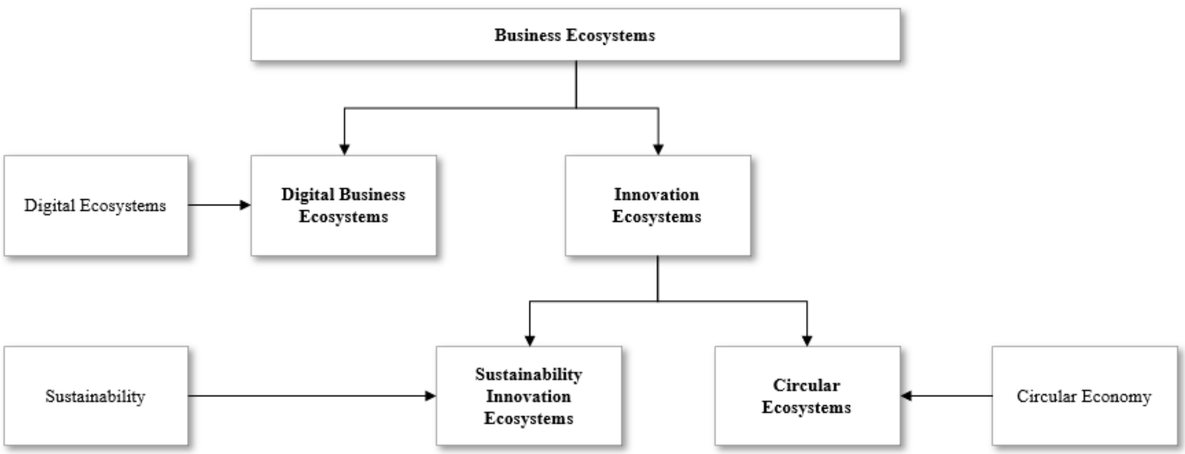
Source: Author's representation

Drivers of circular ecosystems encompass the drivers related to initial forces that fostered the circular ecosystem's development, legislations, and standards such as laws and regulations that are enforced, pressure from environmental issues, dealing with the changing of environment, and the need to find sustainable solutions. Further it includes the cooperation among actors which relates to how members of a business ecosystem communicate with and support one another in order to potentially produce the desired solution together, as well as properties of carton packages and ecological tiles pertaining to the attributes of the completed goods that are traded across the business ecosystem (Barquete et al., 2022, pp. 10–12).

Main challenges of circular ecosystems include a lack of material, high costs, market fragility, poor alignment of actors, and difficulties in manufacturing (Barquete et al., 2022, p. 13).

The five types of business ecosystems presented in the previous chapters are presented in the following **Figure 22**, in providing a schematic illustration of their roots and interrelationships demonstrated by arrows. This study focuses on the most important types of business ecosystems, despite the existence of various intermediate or sub forms of business ecosystem types, such as for instance platform-based innovation ecosystems (Wei et al., 2020, p. 1). This enables the focus on the most established business ecosystem types and to combine their characteristics for other business ecosystem types.

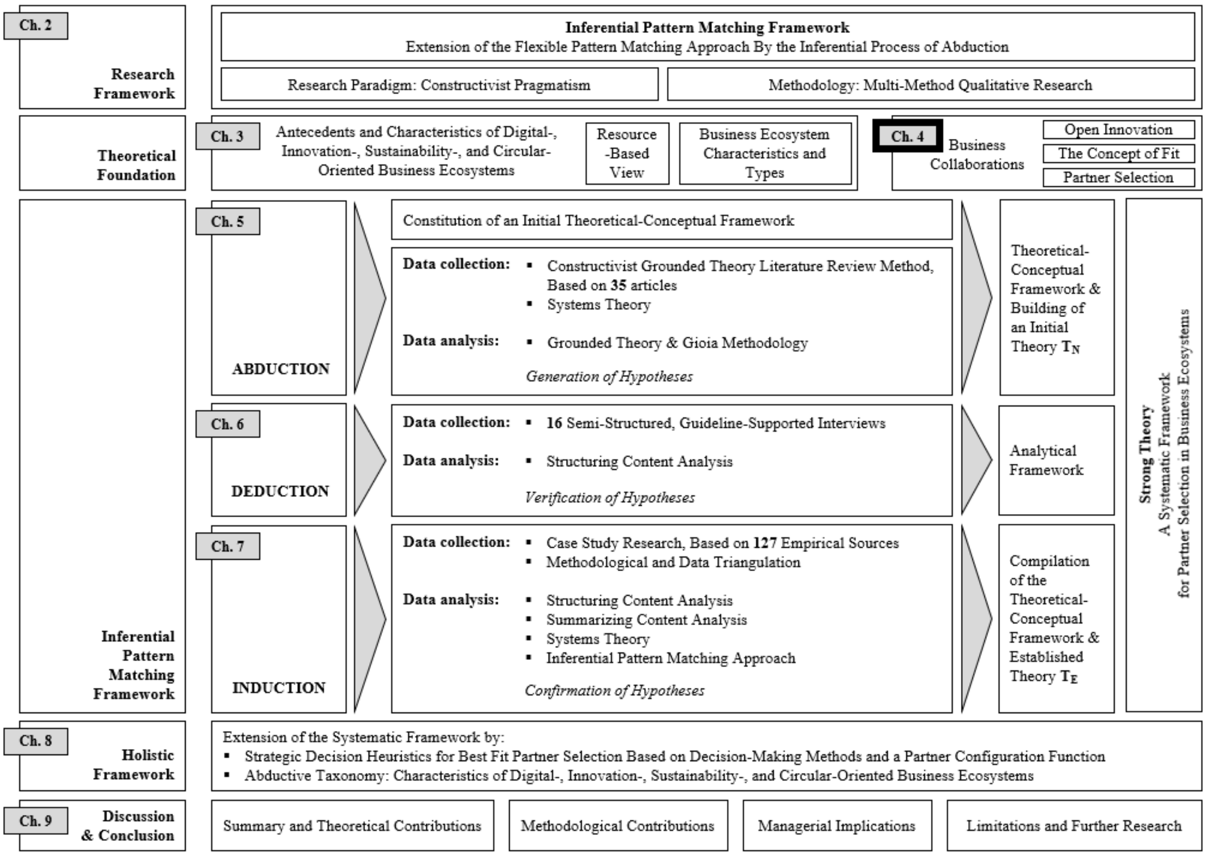
Figure 22. Business Ecosystem Types and Their Interrelationships



Source: Author's representation

In the following, the term business ecosystems shall be used as a generic term to address all ecosystem types. **Figure 23** illustrates the thesis structure leading to chapter 4.

Figure 23. Thesis Structure



Source: Author’s representation

"Open Innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology."

Henry William Chesbrough

(Chesbrough, 2006, p. 2)

4 Business Collaborations

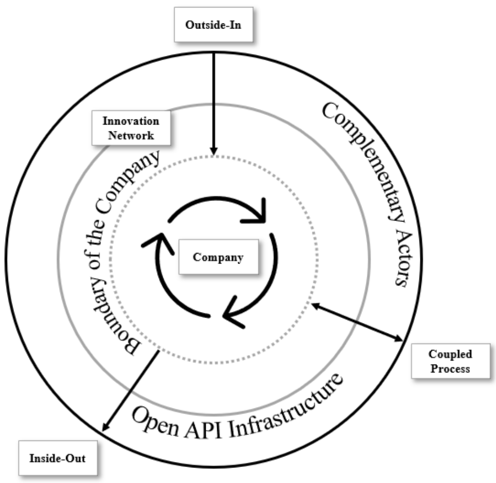
4.1 Open Innovation in Business Collaborations

For decades, companies engage in **business collaborations** for the purpose of risk sharing, access to new technologies or markets, speed-to-market, or the acquisition of complementary skills (Powell et al., 1996, p. 116). Within business collaborations, Chesbrough (2003) introduced the term **open innovation** as a new paradigm for the organization of innovation, assuming that companies no longer innovate within their own boundaries but use ideas outside their boundaries to advance their technology (Bogers et al., 2018, p. 6; Chesbrough, 2003, p. 37). The term open innovation itself is defined differently among authors (Chesbrough, 2012, p. 20), but refers to "[…] the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation […]" (Chesbrough, 2006, p. 2) or "[…] a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model" (Chesbrough & Bogers, 2014, p. 17).

Internal and external ideas are combined through open innovation methods to create platforms, infrastructures and systems encompassing **outside-in and inside-out open innovation** (Chesbrough, 2012, p. 21; Chesbrough & Bogers, 2014, p. 3). The outside-in element includes external technology sources being able to join the internal innovation process at different stages. In addition to using the company's internal marketing and sales channels, initiatives can also reach the market through outlicensing or a spin-off venture company, representing the model's inside-out part of the model, in which internal technology or skills are made accessible to external partners (Chesbrough, 2012, p. 23; Chesbrough & Bogers, 2014, p. 3; Enkel et al., 2009, pp. 312–313). The simultaneous development and commercialization of innovation evolves by the **coupled process** in combining outside-in and inside-out process (Enkel et al., 2009, p. 313).

Accordingly, Bigliardi et al. (2021) stress the need for organizations to have permeable boundaries allowing for innovation development (p.1131). This can be accomplished by a strategic alliance or a network partnership which includes the exchange of knowledge or skills, the sharing of information, or the co-development of products and technologies (Chesbrough, 2006, p. 6; Gulati, 1998, p. 293). Describing business ecosystems by a mere alliance structure would however fall short, as business ecosystems are represented by much more **complex and modular network -like structures** without being hierarchically managed (Jacobides et al., 2018, p. 2255). Independent of the type of business collaboration, the open innovation process is enabled by Open Application Programming Interfaces (API) enabling the efficient communication and exchange of information with external actors (Aitamurto & Lewis, 2013, p. 316; Bodle, 2011, p. 320). The processes of open innovation within business collaborations is demonstrated in **Figure 24**.

Figure 24. Open Innovation Process for Innovation within Business Collaborations



Source: Author's representation, adapted from Chesbrough (2003, p. 37) and Aitamurto and Lewis (2013, p. 326)

4.2 The Concept of Fit

The **concept of fit** is used in different management disciplines, but is central to strategic management research and has been defined in different ways (Venkatraman, 1989, p. 442; Venkatraman & Camillus, 1984, pp. 513–514). In the strategic management context fit can be defined as "[…] a pattern of covariation or internal consistency among a set of underlying theoretically related variables […]" (Venkatraman, 1989, p. 435). The following statements shed light on its basic characteristics. With regard to interorganizational relationships, literature uses the term "**partner fit**" to express high capability complementarity and high compatibility of the companies (Thorgren et al., 2012, p. 454). Similarly, the term "**strategic fit**" is used to describe the alignment of the partner's projects with the stated strategy (Iamratanakul & Milosevic, 2007, p. 2090). Strategy is defined as "a set of decision-making rules for guiding the process of development of an organization" (Ansoff, 1988 in Iamratanakul & Milosevic, 2007, p. 2090). The underlying rules are: present and future performance measurement of the company, development of the company's relationship with its external environment, the establishment of the relations and processes within the company, and the conducting of the day-to-day business of the company (Ansoff, 1988 in Iamratanakul & Milosevic, 2007, p. 2090). The strategy is compiled of different components, notably different **resources** and the **core competencies** of each company (Andrews, 1997, p. 55). Strategy can hence be seen as the **pattern matching of different elements**, within and outside the organizational boundaries (Venkatraman & Camillus, 1984, p. 514). In this context, strategy can take two forms, the content or the process of strategy; while the first implies the match of strategy to the environment, the latter one regards strategy as patterns of interactions, thus the alignment process of company and environment (Venkatraman & Camillus, 1984, p. 514). Together with the domains of fit, which can be differentiated into external, internal, and integrated domains, they represent six different perspectives compiling the conceptual scheme of the different perspectives of **strategic fit** (Venkatraman & Camillus, 1984, pp. 515–516). Initially developed for the corporate strategy, this conceptual scheme of the different perspectives of strategic fit can be transferred to business ecosystems as well and therefore serves as an analytical guideline to conceptualize strategic fit (Venkatraman, 1989, p. 423).

4.3 Partner Selection in Business Ecosystems

In open innovation external knowledge is as important as internally generated knowledge (Chesbrough, 2006, p. 11) and significantly contributes to innovation, cost reduction and sustainability goals (Belderbos et al., 2015; Cainelli et al., 2012; Dangelico, 2016 in Acebo et al., 2021, p. 2672). It enables shared resources and shared risks among partners in accordance with dynamic market needs and underlines the significance of selecting the appropriate partners (Yoon & Song, 2014, pp. 1069–1070).

Although a failure in business collaborations can have multiple reasons, prior literature agrees that most of business partnerships fail due to unsuitable partner selection, that a careful selection of partners can significantly mediate this risk (Ding et al., 2013, p. 153) and highly contributes to collaboration success (Bang et al., 2021, p. 2; Qi et al., 2022, p. 5519), especially within different business ecosystem types (Wei et al., 2020, p. 1). The selection of the right partners increases the potential for competitiveness of the company and among the entire business ecosystem (Bang et al., 2021, p. 2) by the acquisition of complementary resources as based on the **DCV**, **RBV**, and **RDT** (Kalubanga & Gudergan, 2022, p. 159; Pfeffer & Salancik, 1978, p. 26; Teece, 2007, p. 1335). Despite its importance, there is little effort among literature to uncover how partners are selected within complex business collaborations, such as business ecosystems (Jacobides et al., 2018, p. 2257; Wei et al., 2020, p. 2).

A partner selection process is used to describe the manner and quantity of partners that can join a common project and ensures the achievement of partner fit, which is essential to the success of the collaboration (Konietzko et al., 2020, p. 6). The partner selection should enable a high level of fit of the partner's resources or capabilities with the company's resources and capabilities (Gulati, Wohlgezogen, & Zhelyazkov, 2012, pp. 10, 41). Often, partners are selected based on prior relationships or the required technical capabilities. Cultural fit and similar values are important conditions to avoid disagreements (Konietzko et al., 2020, p. 6). A careful partner selection significantly increases innovation efficiency (Esmaelnezhad et al., 2023, p. 4; Li et al., 2019, p. 140969). The partner selection as defined by this study, involves the strategies for the identification and selection of partners in business ecosystems (Beelen et al., 2022, p. 3; van Vulpen et al., 2022, p. 2). While M&A literature applies the term **screening** for the presentation of the whole selection process (Calipha & Brock, 2019, p. 20; Lucks & Meckl, 2015, pp. 121–122), this study employs the term **partner selection** to avoid misunderstandings, as literature uses the terms partially synonymously (Cummings & Holmberg, 2012, p. 137) and as this is the main term used in business ecosystem literature (Wei et al., 2020, p. 1).

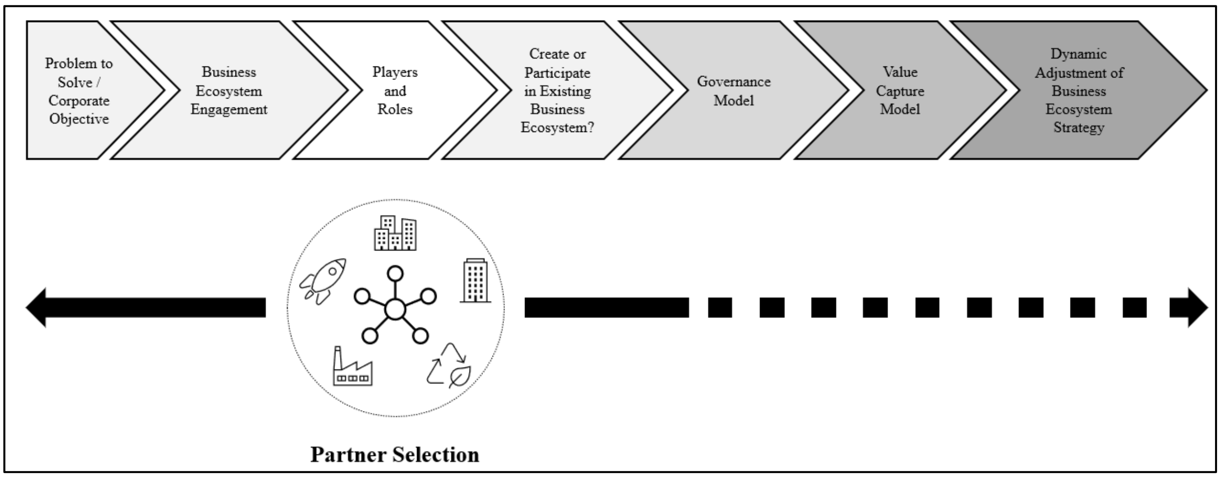
Appropriate methods for partner selection thus have to be employed, which are time-consuming and costly (Esmaelnezhad et al., 2023, p. 4; Fu et al., 2019, p. 69). Most partner selection processes are based on the definition of **selection criteria** (Fu et al., 2019, p. 68). **Multi-Criteria Decision-Making (MCDM) methods** are employed by authors to address the decision making within the partner selection process in business collaborations (Esmaelnezhad et al., 2023, p. 4) especially when based on uncertain information (Haseli et al., 2023, p. 2; Mishra & Rani, 2023, pp. 6898–6899). Partner selection criteria depend on the type of collaboration and might incorporate technological capabilities for innovation oriented collaborations (Geum et al., 2013, p. 217; Wei et al., 2020, pp. 2–3).

Therefore, a careful identification and assessment of fit criteria between the partners can help to gain substantial information prior to the collaboration (Chen et al., 2008). The criteria for partner selection however depend on each individual type of collaboration (Fahimullah et al., 2019).

Qi et al. (2022) highlight the need for a **systematic partner selection framework for business collaborations** (pp. 5524, 5544). A systematic partner selection framework holistically investigates the partner fit by considering the dependencies and interrelationships among the selection criteria (Jamshidi et al., 2019, p. 5190). Partner selection in business ecosystems thus has been studied from different theoretical perspectives, including **RDT** (Havinga et al., 2023, p. 3; Hillman et al., 2009, p. 1407) and **strategic alliances literature** (Todeva & Knoke, 2005 in Havinga et al., 2023, p. 3).

The partner selection process, though located at the initial stage of the overall process of business ecosystem formation (Johnston & Huggins, 2018, p. 19), covers elements of all parts of the business ecosystem construction process as the partner selection needs to match with the overall business ecosystem structure. This is why also the orchestration of partners needs to be considered when defining the partner selection process (Aagaard & Rezac, 2022 in Shen et al., 2024, p. 10). The partner selection process is illustrated in **Figure 25** and highlights the element of players and roles of a business ecosystem, but further covers multiple steps forth and back within the process of business ecosystem formation.

Figure 25. Partner Selection within the Different Steps of the Process of Business Ecosystem Formation

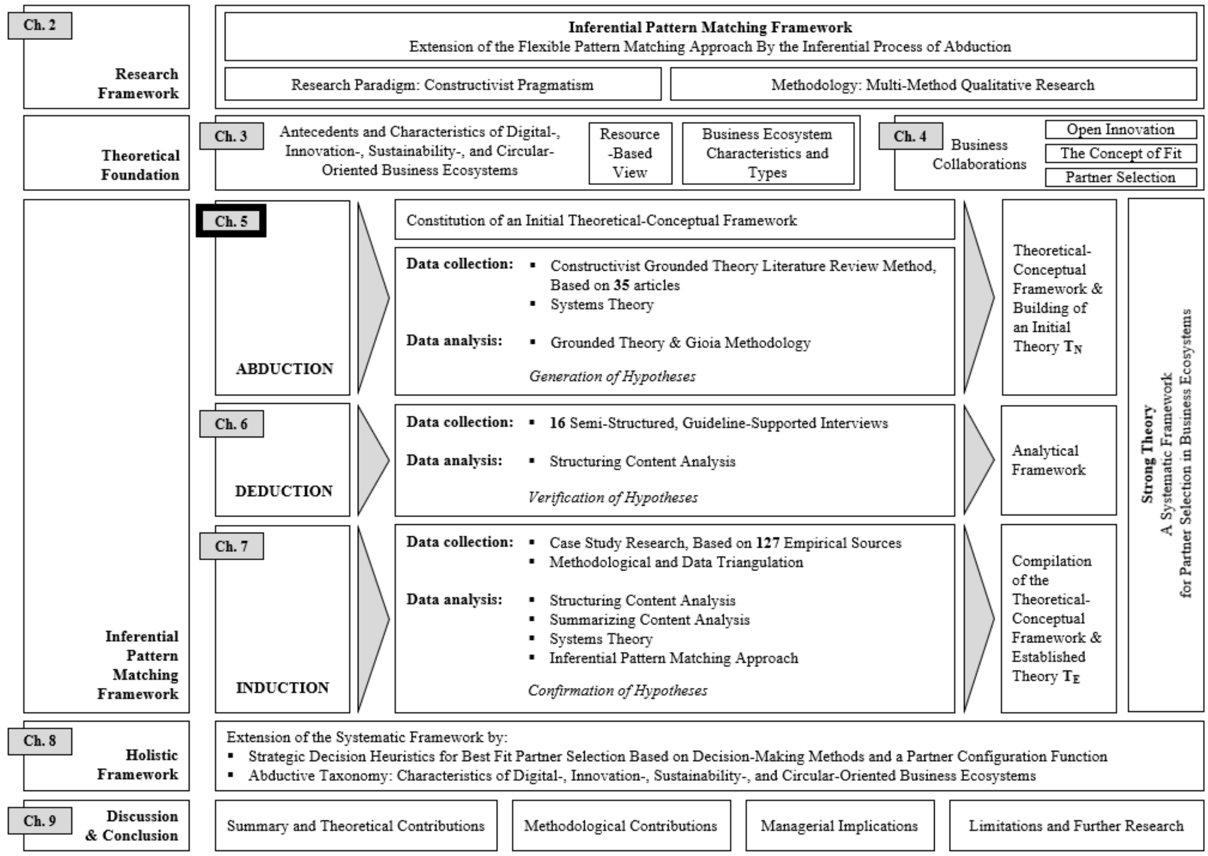


Source: Author’s representation, with elements from Pidun et al. (2020a, p. 2) and Pidun et al. (2022, pp. 1–2)

The steps impacting the partner selection process are indicated by white and bright grey colors. Those having a larger impact on the partner selection process are indicated in lighter colors, with the highest impact indicated in white.

Figure 26 illustrates the thesis structure leading to chapter 5.

Figure 26. Thesis Structure



Source: Author's representation

"Abduction is the process of forming explanatory hypotheses. It is the only logical operation which introduces any new idea."

Charles Sanders Peirce

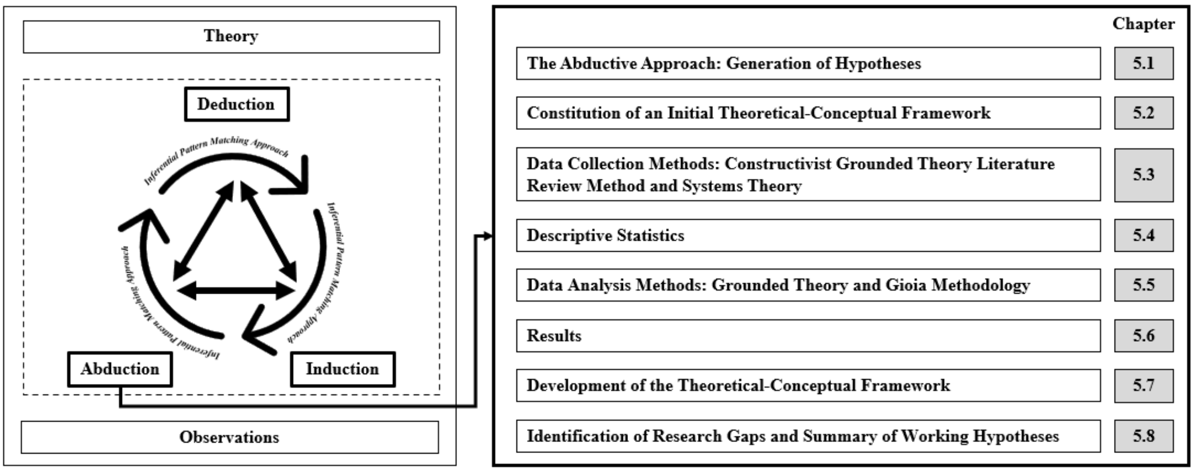
(Peirce CP 5.172 in Frankfurt, 1958, p. 593)

5 ABDUCTION

5.1 The Abductive Approach: Generation of Hypotheses

In the following three chapters the three types of reasoning, ABDUCTION, DEDUCTION, and INDUCTION will be applied in depth and set in relation to each other through the **Inferential Pattern Matching Approach**, thereby creating the **Inferential Pattern Matching Framework**. In this chapter the questions, respective the initial hypotheses shall be developed (Burks, 1946, p. 302) for the systematic partner selection framework in digital-, innovation-, sustainability-, and circular-oriented business ecosystems. The structure of this chapter is as follows (**Figure 27**):

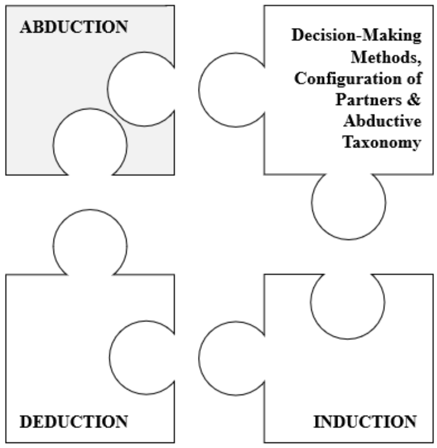
Figure 27. The Structure of Chapter ABDUCTION



Source: Author's representation

From an empirical and methodological point of view, this chapter is based on **ABDUCTION**, the first piece of the **Quadruple Puzzle of Holistic Research**, as illustrated in **Figure 28**.

Figure 28. The Abductive Piece of the Puzzle



Source: Author's representation

According to Eisenhardt and Graebner (2007), a solid foundation in relevant literature is the first step in conducting sound empirical research, which also reveals research gaps and suggests research questions to be answered (p. 26). Therefore, this investigation starts with a pre-reading and a thorough SLR based on the **Constructivist Grounded Theory Literature Review Method (CGTLRM)**, which, together with the preconceived ideas and analytical capabilities of the researcher, develop the **theoretical-conceptual framework**, which serves as a roadmap and will guide the investigation throughout this study (Charmaz, 2006, p. 10; Dubois & Gadde, 2002, p. 559; Timmermans & Tavory, 2012, p. 179; Wolfswinkel et al., 2013, p. 52).

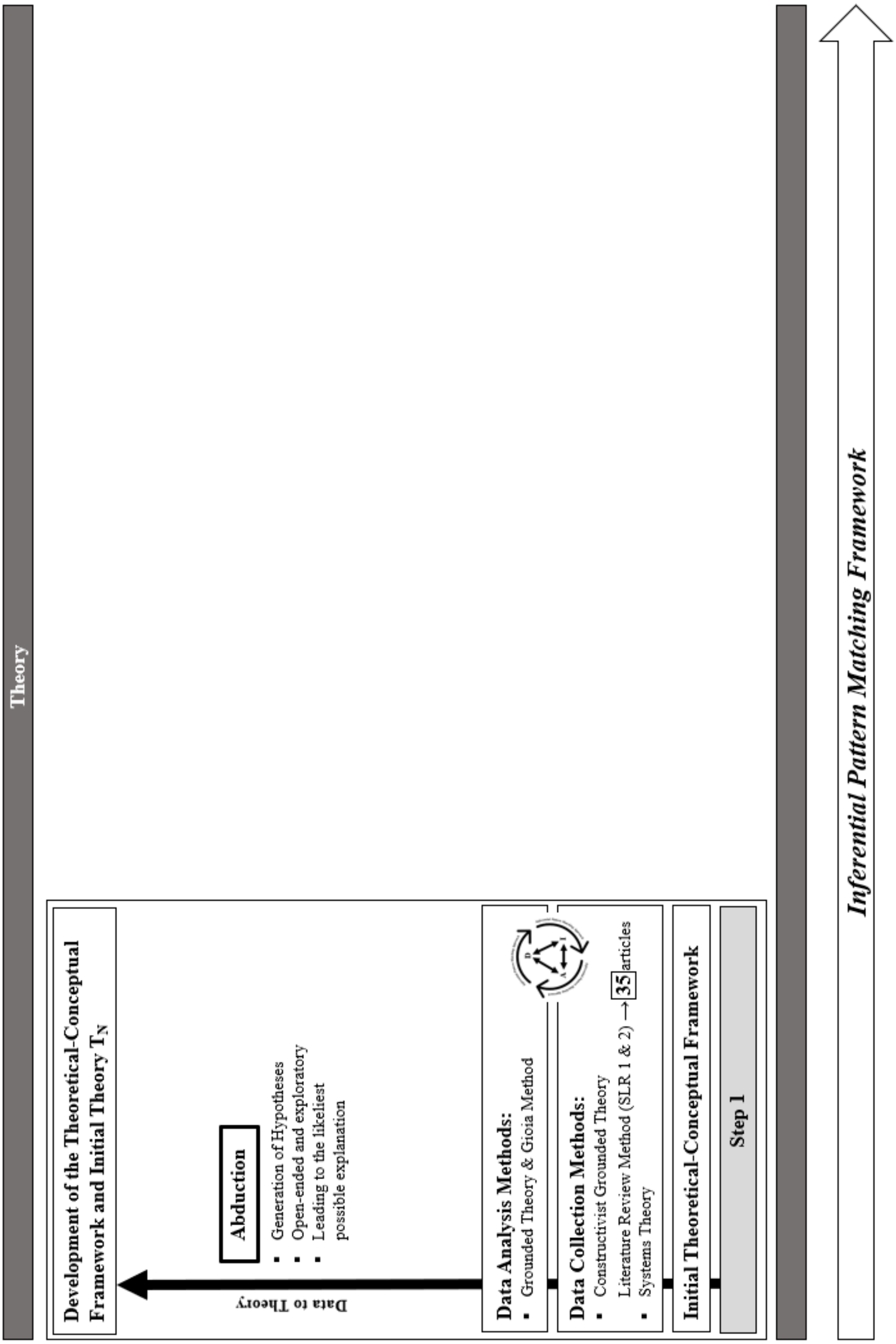
The abductive approach will uncover phenomena which cannot be explained by existing theories (Dubois & Gadde, 2002, p. 559). A CGTLRM is applied to explore and enlarge the breadth and depth (Charmaz, 2006, p. 10; Wolfswinkel et al., 2013, p. 46) of the underinvestigated topic of partner selection in business ecosystems. This abductive approach supports the **building of new theory** by providing best predictions (Mitchell, 2018, p. 105). These predictions are translated into most **probable hypotheses**, which are the foundation of the inquiry (Harrowitz, 1988, pp. 183–184 in Weick, 2006, p. 1731) and then tested by deduction and induction (Behfar & Okhuysen, 2018, p. 326; Logan & Tandoc, 2018, p. 91; Shank, 1998, p. 846). This thesis aims at discovering the novel and introducing new knowledge to build new theory; abduction is hence the best suited approach for the empirical foundation (Paavola, 2005, p. 132; Reichertz, 2019, p. 268). In contrast to induction, abduction accepts starting with existing theories to improve the strength of theory and enables data-driven theorizing (Järvensivu & Törnroos, 2010, p. 102). Further, abduction as an inferential process represents the first step in the abductive process, in which hypotheses and ideas are generated with abduction, then be tested with deduction, and theory built with induction (Flach & Kakas, 2000, p. 6; Paavola, 2005, p. 133). Within this abductive process patterns of abduction, deduction, and induction will be compared iteratively with each other based on the **Inferential Pattern Matching Approach**. This ABDUCTION chapter further serves as the first step to create the **Inferential Pattern Matching Framework** with the **theoretical-conceptual and analytical frameworks**, which will guide the investigation.

ABDUCTION as the first step of the **Inferential Pattern Matching Framework** is illustrated in **Figure 29** and will be explained in detail in the following. It aims at answering the first research question:

Research Question 1

How do companies systematically select partners in digital business ecosystems?

Figure 29. Step 1: The Abductive Approach

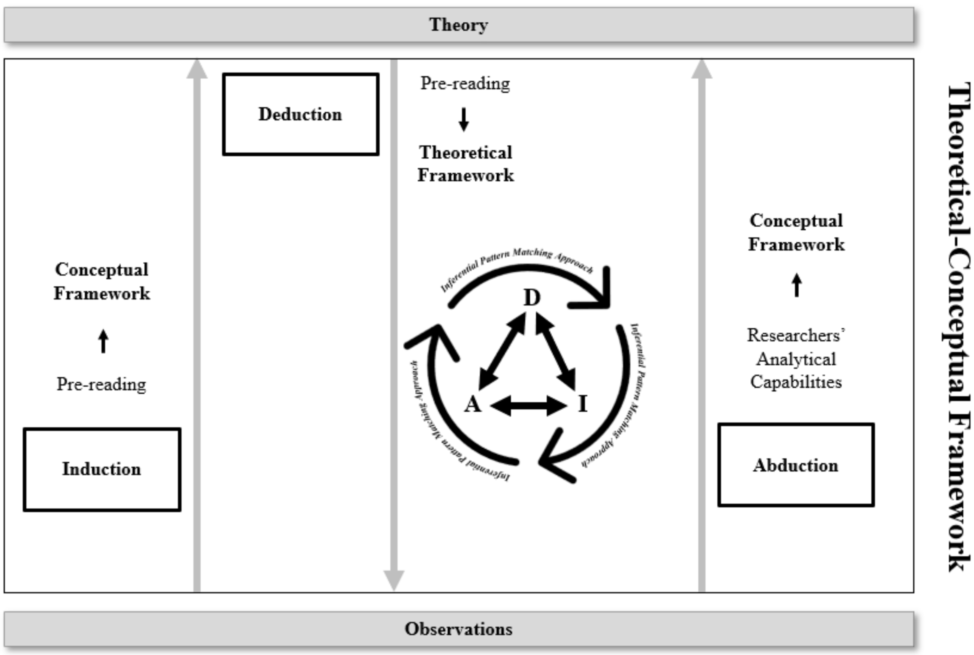


Source: Author's representation

5.2 Constitution of an Initial Theoretical-Conceptual Framework

A pre-reading of prior, relevant literature is the crucial first step for a research project to assess the research area and motivation of the study and to justify the research question and hypotheses. This is typically referred to as a **theoretical framework** (Snyder, 2019, p. 334). In addition to the pre-reading of existent literature, which also reveals observational data, the researcher's analytical capabilities guide the formulation of the research topic. Therefore, the researcher constructs the research idea, which does not exist ready-made. This is also referred to as the **conceptual framework** (Maxwell, 2013, p. 41; Miles & Huberman, 1994, p. 18). These proceedings refer to the first abductive approach, as the theoretical framework is deduced from theory and the conceptual framework refers to observations identified inductively and iteratively matched by the researcher. The first application of the **Inferential Pattern Matching Approach** thus reveals the initial **theoretical-conceptual framework** which will guide the overall investigation and is illustrated in **Figure 30**.

Figure 30. Constitution of the Initial Theoretical-Conceptual Framework by applying the Inferential Pattern Matching Approach



Source: Author's representation

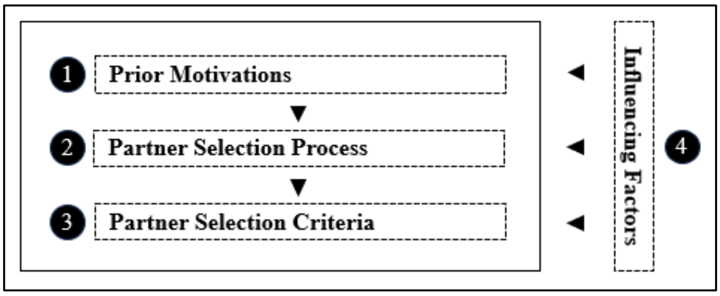
This preliminary framework evolves throughout this study in accordance with new insights gathered from the empirical fieldwork, analysis, and interpretation (Dubois & Gadde, 2002, p. 555). Results from the pre-reading reveal that different partner selection approaches have been applied, but articles referring to partner selection in DBEs are scarce. Even though the partner selection issue has been largely discussed by prior literature in the context of different natures of business collaborations, only a fragmented part of this topic has been addressed (Jalali, 2017, p. 59), as each collaboration with several organizational types involved is unique and complex (Holmberg & Cummings, 2009, p. 168). The application of universal checklist approaches is therefore risky, as important factors and dynamic aspects of the partnership might be overlooked and can lead to wrong conclusions (Chen et al., 2008, p. 451; Holmberg & Cummings, 2009, p. 182). Several authors thus present categories for general selection criteria, including strategy-, cost-, resource-, task-, learning-, partner-, and risk-related factors, for which detailed selection criteria can then be assigned according to the collaboration type (Chen et al., 2008, pp. 451–452; Cummings & Holmberg, 2012, p. 136). Authors are unanimous that the partner selection process itself is composed of different steps, including for instance the identification, the verification, the engagement, and the integration of partners in DBEs (Beelen et al., 2022, pp. 4–5; Rong, Wu et al., 2015, p. 2).

In the larger context of the partner selection process, Holmberg and Cummings (2009) emphasize the need for a backward link to overall corporate objectives and a forward step to specific alliance or business ecosystem-oriented objectives and their respective alignment, as the assessment of the motivation of the partnership determines the partner selection criteria (p. 168).

This implies that not only the partner selection is of major relevance for the enhancement of the collaboration success, but also the partner management as a whole (Beelen et al., 2022, p. 2; Draulans et al., 2003, p. 151). Prior literature did not investigate partner selection criteria in isolation, but within different contexts, as for instance within the larger context of business ecosystem creation (Jacobides, 2022, p. 99) or by identifying critical stages to identify and select partners (Wei et al., 2020, p. 1), or factors that influence the partner selection (Beelen et al., 2022, pp. 9, 16; van Vulpen et al., 2022, pp. 5, 8). Combining the overview of existent literature and the researchers' analytical capabilities leads to a clustering of the topics into four major categories: the prior motivations to the partner selection process (1), the selection process itself (2), the selection criteria on which the partner selection is based, and which determine the final choice of an appropriate partner (3) and the factors influencing the partner selection process at any stage (4). These categories are iterative, the influencing factors being in a vertical position, as they are influencing all previous stages.

Based on already available concepts and links from prior literature, new concepts and links provide the **research proposition** for this study, demonstrating the relationship between the categories. The research proposition forms the **initial theoretical-conceptual framework** (Cornelissen, 2017 in Ulaga et al., 2021, p. 399) and is thus an important step of sense-making in **theory building** (Ulaga et al., 2021, p. 396). This initial theoretical-conceptual framework for partner selection in DBEs is illustrated in the following **Figure 31**:

Figure 31. Categories Forming the Initial Theoretical-Conceptual Framework for Partner Selection in DBEs



Source: Author's representation

DBEs are composed of several different types of relationships and various types of partners with divergent inherent goals and strategies, which makes it necessary to have a partner selection approach including these complex relationships within a systematic framework and considering the dynamic developments over time as well (Holmberg & Cummings, 2009, p. 168). The empirical foundation of ABDUCTION, the first step of the **Inferential Pattern Matching Approach**, will be developed throughout the next chapters.

5.3 Data Collection Methods: Constructivist Grounded Theory Literature Review Method and Systems Theory

5.3.1 Grounded Theory: Its Foundations and Further Developments

Grounded Theory (GT) is a qualitative research method developed in the 1960s by the social scientists Glaser and Strauss (1967). GT has its roots in Glaser and Strauss's development of Grounded Theory (1967, pp. 2–5). They criticized logically deduced theory as being limited to confirm a theory in the sense that it gives a picture of evidence when there is none and the theory takes on a level of detail that it does not deserve. They held that an adequate theory cannot be separated from the process that constitutes it, so that in their view the better theory is the one that is **derived inductively** (Glaser & Strauss, 1967, p. 5). According to its founders, GT represents an innovative qualitative research methodology that incorporates the simultaneous data collection and data analysis to develop theory from observational data. The aim was to find a theory that would fit the data and work in the real world (Glaser & Strauss, 1967, p. 6; Walker & Myrick, 2006, p. 548). Therefore, the main characteristic of GT, compared to other types of qualitative inquiry, is **theory construction** (Charmaz, 2021, p. 157). GT is a systematic, yet flexible guideline for collecting and analyzing qualitative data iteratively "[…] to construct theories 'grounded' in the data themselves" (Charmaz, 2006, p. 2). This implies that researchers build a new theory based on empirical data rather than focusing on testing hypotheses from an existing theoretical framework (Dunne, 2011, p. 111). The logico-deductive way of theory building from a priori assumptions that prevailed at the time was challenged, as Glaser and Strauss (1967) found that neither of the existent processes met the goal of building theory from data and proposed a systematic qualitative analysis enabling the generation of theory (Charmaz, 2006, p. 5; Walker & Myrick, 2006, p. 548). Therefore, GT is particularly suitable for inductive research (Corley, 2015, p. 601). Although being a clearly qualitative research method, its strength is that it combines the depth and richness of qualitative research with the logic, rigor, and systematic analysis of quantitative research (Charmaz, 2000 and Glaser & Strauss, 1967 in Walker & Myrick, 2006, p. 548). Like in quantitative research, the **researcher's objectivity** and unbiased data collection is of utmost importance (Charmaz, 2000 in Rieger, 2019, p. 6).

The foundation of GT is conceptualization, which is based in empirical data and validated by the process of **constant comparison**, meaning that similar indicators are clustered during this constant comparison (Glaser & Strauss, 1967, p. 102; Nathaniel, 2023, p. 2). GT begins with the process of data collection, where data is simultaneously collected, coded, and analyzed. This involves selectively **collecting data** to support the developing theory and means that researchers selectively look for information that can help refine and advance the emerging theory. Sampling does not follow a pre-determined plan but is adjusted as the research progresses. The beginning of the data collection can be preceded by a partial framework with some principal features of structure for initial guidance (Glaser & Strauss, 1967, pp. 45–47).

GT is a method that combines two processes of **data analysis**. In the first process, the analyst codes all the data and then systematically analyses these codes to verify or prove a particular statement. In the second process, the analyst does not code the data, but merely examines the data for the properties of the categories (Glaser & Strauss, 1967 in Walker & Myrick, 2006,

p. 548). Notes are used to keep track of the analysis and theoretical ideas are developed (Walker & Myrick, 2006, pp. 548–549). Hence, they propose a hybrid approach to data analysis: "[…] one that combines, through an analytical process of constant comparison, the explicit coding procedure of the first approach and the style of theory development of the second" (Glaser & Strauss, 1967, p. 102). This interconnectedness of data collection and data analysis processes makes it necessary to present both simultaneously, that is why in this chapter, the complete GT, including data collection and data analysis, is illustrated.

While **constant comparison** (Glaser & Strauss, 1967, p. 102) refers to the simultaneous data collection and analysis, **theoretical sampling** refers to the interwovenness of collecting data, analyzing data, and the building of theory (Eisenhardt & Graebner, 2007, p. 30; Glaser & Strauss, 1967, p. 45; Suddaby, 2006, p. 634). This process can be described as "[…] an analytic spiral stemming from data and progressing to the explanation, combining two large vectors: one ascending, aimed at developing the theory, and the other descending, seeking to ground concepts in the data" (Hennink et al., 2011 in Bendassolli, 2013, p. 10). **Theoretical saturation** is reached when new data provide no further insights into the investigation so that data collection can be stopped (Charmaz, 2006, p. 189; Glaser & Strauss, 1967, p. 61).

Through its methodological elements, such as constant comparative analysis and theoretical sampling, the GT can be clearly distinguished from other research methods (Dunne, 2011, p. 111). The typical actions carried out when using classical GT are summarized in **Table 11**.

Table 11. Main Actions Involved in Classical Grounded Theory

Steps in Classical Grounded Theory:
Simultaneous involvement in data collection and data analysis
Constructing analytic codes and categories from data, not from preconceived logically deduced hypotheses
Using the constant comparative method, which involves making comparisons during each stage of the analysis
Advancing theory development during each step of data collection and data analysis
Memo-writing to elaborate categories, specify their properties, define relationships between categories and identify gaps
Sampling aimed toward theory construction, not for population representativeness
Conducting the literature review *after* developing an independent analysis

Source: Author's representation, adapted from Glaser and Strauss (1967) in Charmaz (2006, pp. 5–6)

The focus should be on either creating a **substantive theory**, which can be transferred to contexts of action with similar characteristics to the context under study, or **formal theory**, which is based upon validated and generalizable conclusions across multiple studies representing the research population as a whole or validated by empirical theories using a deductive logic. Most grounded theories are substantive theories (Gasson, 2009, p. 48; Kenny & Fourie, 2015, p. 1272; Rieger, 2019, p. 3).

The method of GT has been advanced over time and split into the **Straussian and the Glaserian models of GT** (Charmaz, 2006, p. 8; Stern, 1994). Their differences lie mainly in the data analysis part of GT. Both versions of GT use the processes of coding, constant comparison, theoretical sampling (Glaser & Strauss, 1967, p. 45), and memos for the generation of theory. The main difference is in how the processes are carried out within the data analysis process (Walker & Myrick, 2006, p. 550).

Glaserian GT follows an approach which is more similar to the classical GT than the Straussian approach (Rieger, 2019, p. 2). Glaser (1992) divides the coding process into two procedures, substantive coding, which is the development of categories and their properties, and theoretical coding, which is the conceptual level, joining codes into a hypothesis and theory. Glaser's (1978) coding process is rather simple and adapted from the classical GT, described as "[…] the essential relationship between data and theory […and the coding process that] gets the analyst off the empirical level by fracturing the data, then conceptually grouping it into codes that then become the theory which explains what is happening in the data" (Glaser, 1978, p. 55).

Straussian GT divides the coding process into three phases, open, axial and selective, each phase having a different purpose and each phase applying constant comparison analysis. Straussian GT seems to be the more complex procedure (Strauss & Corbin, 1990; Walker & Myrick, 2006, p. 550). Further, the timing of the processes and priorities appears to be different: "Glaser's method is to fracture and select in substantive coding, then relate and integrate in theoretical coding. The Straussian method is to fracture in open coding, relate and integrate in axial coding and then select and integrate in selective coding" (Walker & Myrick, 2006, p. 556).

Unlike classical Glaserian GT, Straussian GT is convinced that "objectivity in qualitative research is a myth" (Corbin & Strauss, 2008, p. 32 in Rieger, 2019, p. 6) and therefore contradicts the initial idea of Classical GT and Glaserian GT to systematically collect and analyze data without preconceived notions (Glaser, 1992 in Charmaz, 2006, p. 8). Rather, the subjective perspective of the researcher can be helpful during data collection and analysis (Corbin & Strauss, 2008 & 2015 in Rieger, 2019, p. 6). The early intervention of the researcher, the clear description of the complex research procedures and the emphasis on using analytical tools are the major strengths of Straussian GT (Charmaz, 2000 and Glaser, 1992 in Rieger, 2019, p. 7).

A third approach, the **Constructivist GT**, was developed by **Kathy Charmaz** (Charmaz, 1990, p. 1165; Charmaz, 2006, p. 130). Being convinced that coding, writing memos, and developing theoretical sampling are still of importance, she developed GT to a more modern approach (Charmaz, 2006, p. 136). Even more than Strauss, Charmaz (2006) takes the view that researchers are part of the study they conduct and therefore construct GT through their involvements and interactions in the study (p. 10). In contrast to classical GT, constructivist GT emphasizes **subjectivity** by the incorporation of the researcher's previous knowledge: data is coconstructed by the researcher; thus **knowledge is cocreated** with the researcher being involved in the research and not separate from research, enabling to uncover hidden meanings and enabling insightful interpretations (Charmaz, 2006, pp. 9–10; Rieger, 2019, p. 8). Constructivist GT is based on the view that neither theories nor data are discovered, but **constructed**, as researchers are part of the study (Charmaz, 2006, p. 10). Further, Charmaz (2006) emphasizes the need for flexible guidelines, instead of prescriptions on how to proceed with the research process, which promotes the potential for making emergent interpretation of data (p. 9).

To conclude, when applying GT one has to consider that there are many variants of GT, which are diametrically different from each other, so that it is essential to explain which specific GT will be applied to locate the research within the particular type of GT (Kenny & Fourie, 2015, p. 1285; Reichertz, 2019, p. 260).

The uniting principles of all GT traditions are: theoretical sampling until the point of saturation, comparative analysis, memos, and the concentration on either substantive or formal theory (Kenny & Fourie, 2015, p. 1272). The diverging characteristics are illustrated in **Table 12**.

Table 12. Comparison of the Main Variants of Grounded Theory

	Classic / Glaserian GT	Straussian GT	Constructivist GT
Underlying Philosophy	Soft Positivism	Post-Positivism & Symbolic Interactionism	Constructivism & Symbolic Interactionism
Coding Framework (CF)	Original CF designed to discover a GT.	Rigorous CF designed to create a GT.	Open-ended CF designed to construct GT.
Use of SLR	Abstain from SLR until the very end.	Use SLR appropriately at every stage.	Use SLR at every stage and interweave your discussion with it throughout the entire study.

Source: Author's representation, adapted from Kenny and Fourie (2015, p. 1286)

5.3.2 Systematic Literature Review

Based on the original proposal of Kitchenham (2004) a **systematic literature review (SLR)** identifies, evaluates, and interprets every research article that is pertinent to a specific study question, topic, or interesting phenomenon for the purpose of summarizing the existing evidence of benefits and limitations, identifying research gaps or providing a framework for the appropriate positioning of new research activities (p. 1-2). "[A]n effective review creates a firm foundation for advancing knowledge. It facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed" (Webster & Watson, 2002, p. 13). It aims to assist in the creation of evidence-based guidelines for practitioners that are grounded in research. **Research evidence** in the context of an SLR refers to the summary of the best quality scientific articles on the investigated topic (Kitchenham et al., 2009, p. 8). An SLR further allows for the development of new theories and paves the way for future research (Webster & Watson, 2002, p. 19).

A review starts with a well-defined research problem. As the SLR progresses, this research problem can be refined into answerable research questions (Wolfswinkel et al., 2013, p. 47). The SLR consists of **different, consecutive stages**, which guide the systematic review process. The number of stages is depending on the respective topic and method employed (Wolfswinkel et al., 2013, pp. 46–47). Usually it involves the following stages:

First, an initial informal search is undertaken to provide the information needed to guide the SLR (Kitchenham & Brereton, 2013, pp. 2051–2052).

Second, the scope is defined, including the search terms, the fields of research as well as the inclusion and exclusion criteria.

Third, the search stage involves the execution of the review and involves eventual moves back to refine the scope of research and the clear preparation of data.

Fourth, in the selection stage, articles are analyzed according to their fit to the prior defined research question and potential duplicates are removed so that the sample is refined until the achievement of items with a perfect match (Kitchenham & Brereton, 2013, pp. 2050–2053; Wolfswinkel et al., 2013, pp. 47–49). In this context, Wolfswinkel et al. (2013) highlights the importance for a thorough documentation of the single steps of the review process to ensure traceability, reproducibility, and to demonstrate scientific rigor (p. 49).

Fifth, the analysis stage involves the data preparation and analysis using coding techniques.

Sixth, the last stage involves the structured presentation of the results (Wolfswinkel et al., 2013, pp. 47–53). Besides the construction of the review, the most challenging part is the structuring and presentation of the review (Webster & Watson, 2002, p. 14).

The **value of a review** is increased by the **quality of justification of each decision** made during the review process (Wolfswinkel et al., 2013, p. 45) and the **quality of the underlying literature**. Therefore, only peer-reviewed literature should be included (Wolfswinkel et al., 2013, p. 46). The quality of the SLR is determined by its completeness, which means the engagement into the process until saturation and its focus on concepts, such as to identify the key categories of concepts, which will subsequently be structured. This enables a theory-based and concept-centric SLR (Webster & Watson, 2002, p. 15; Wolfswinkel et al., 2013, p. 47).

The present study adopts an SLR to provide a first basis and firm foundation for developing a theory (Webster & Watson, 2002, p. 13) for systematic partner selection.

5.3.3 Inductive Top-Down Approach: Constructivist Grounded Theory Literature Review Method

Theory building can take different forms, the main form is the comparison of concepts, theory, or hypotheses within extant literature (Eisenhardt, 1989b, p. 544). Wolfswinkel et al. (2013, p. 52) propose to perform an SLR based on GT for theory building, which they call Grounded Theory Literature Review. This combination of GT with SLR has been a **controversial issue** in prior literature, since the general characteristics of classical GT and an SLR are diametrically different, as demonstrated in the following (Ramalho Vera et al., 2015, p. 1):

First, the premise of classical GT is to ensure an **open mind free from unwarranted influences**. The GT analyst should **suspend any prior knowledge from literature**, as theory emerges from the data and not from prior theory (Glaser & Holton, 2004, p. 12).

Second, regarding the reasoning perspective, classical GT is an **inductive, bottom-up** approach, discovering theory from data and therefore favors data collection and data analysis (Glaser & Strauss, 1967, p. 1). An SLR, in turn, is usually the initial step for a **deductive, top-down** approach, highlighting existing theory, which is tested by data afterwards (Casula et al., 2021, p. 1705).

Third, there is a discrepancy when it comes to the researcher's role. Classical GT advocates **objectivity of the researcher** such as to ignore literature prior to the data observing and data analysis process (Charmaz, 2006, p. 38). This would allow theory to emerge from data without being imposed from existing literature (Ramalho Vera et al., 2015, p. 3). Within an SLR, **bias can be reduced but not eliminated**, as data analysis logically entails the knowledge of the researcher (Wolfswinkel et al., 2013, p. 53). Given these arguments, applying an SLR before data collection and analysis is generally not provided for classical GT (Ramalho Vera et al., 2015, p. 1).

While the main authors of GT and modified GT, Charmaz, Strauss, Corbin, and Glaser, are unanimous in declaring that theory developed from GT must be grounded in data and not in existing literature, Charmaz (2014) argues that a **researcher cannot be regarded as independent from the data collection and data analysis process** as both are "created from shared experiences and relationships with participants and other sources of data" (p. 239 in Ramalho Vera et al., 2015, p. 5). The researcher's presence is hence neither neutral nor undesirable and should not be excluded, as an SLR prior to data collection and data analysis can guide the choice of the area to be researched (Ramalho Vera et al., 2015, p. 6). In contrast to other qualitative methods and the classical GT, the exclusion of the **preconceived ideas of the researcher** is not targeted by **constructivist GT**, contrarily, the contribution of preconceived ideas of the researcher are intended and crucial part of the study (Charmaz, 2021, p. 158). The theoretical understanding does not emerge from objective data, but from the interaction of the researcher with the data. The researcher thus cocreates knowledge within the theoretical sampling process (Charmaz, 2000 in Rieger, 2019, p. 8; Glaser & Strauss, 1967, p. 45).

Charmaz (2006) has a clear stance on SLRs: researchers should advance them throughout the investigation instead of allocating them to a short section or chapter. SLRs should be interwoven with the discussion across the entire study (p. 167). Conducting a thorough, sharply focused SLR improves both, the argument's quality and credibility. It could be an opportunity to introduce the ideas covered in later chapters or sections (Charmaz, 2006, p. 166). The GT will then be used to frame the SLR (Charmaz, 2006, p. 168). Therefore, GT, which is basically a bottom-up approach due to its inductive nature, is combined with the SLR as a top-down approach (Shepherd & Sutcliffe, 2011, pp. 364–366). This **inductive top-down approach** through combined GT and SLR is particularly useful as it **avoids three common disadvantages of an inductive bottom-up approach**:

First, the bottom-up approach requires the grasp of data without preconceived knowledge of the researcher, but **obtaining data in its purest form is nearly impossible** (Eisenhardt, 1989b; Shepherd & Sutcliffe, 2011, p. 364).

Second, theorists who employ a bottom-up approach run the risk of being accused of imposing their own theories if they do not begin **close to the phenomenon** in order to identify and explain key links and constructions (Shepherd & Sutcliffe, 2011, p. 364).

Third, bottom-up theorists frequently end their analysis with a rich description of the phenomena and a simple list of advantages or disadvantages instead of developing generalizable theory (Eisenhardt, 1989b, p. 546; Shepherd & Sutcliffe, 2011, p. 364). **A good theory, however, describes and explains causes of effects of phenomena** (van Evera, 1997, pp. 7–8).

By its nature, an SLR is a top-down approach, as previous theory is scanned to derive logical conclusions, which are then presented by hypotheses. This derivation of hypotheses typically refers to a deductive reasoning (Kovács & Spens, 2005, p. 137). Though, when combined with constructivist GT, the empirical data is regarded in its wider context, being contained in the literature, whereby **phenomena** are considered **building the bridges between theory and data**. This distinction between phenomena and data is the particular characteristic of the **inductive top-down** approach (Bendassolli, 2014, p. 165; Haig, 1995, p. 4; Shepherd & Sutcliffe, 2011, p. 366).

Consistent with van Orman Quine (1975), concepts are not investigated in isolation but in relation to other concepts forming the network of interrelationships. Researchers should focus more on the phenomena that are embedded in a particular network than just on the data. That is why the investigation of hypotheses is important, however should not be treated in isolation as this would lead to a simple list of descriptions. Rather, the overall **network of**

interrelationships should be investigated to build a strong theory (Bendassolli, 2013, p. 4; Sutton & Staw, 1995, p. 378).

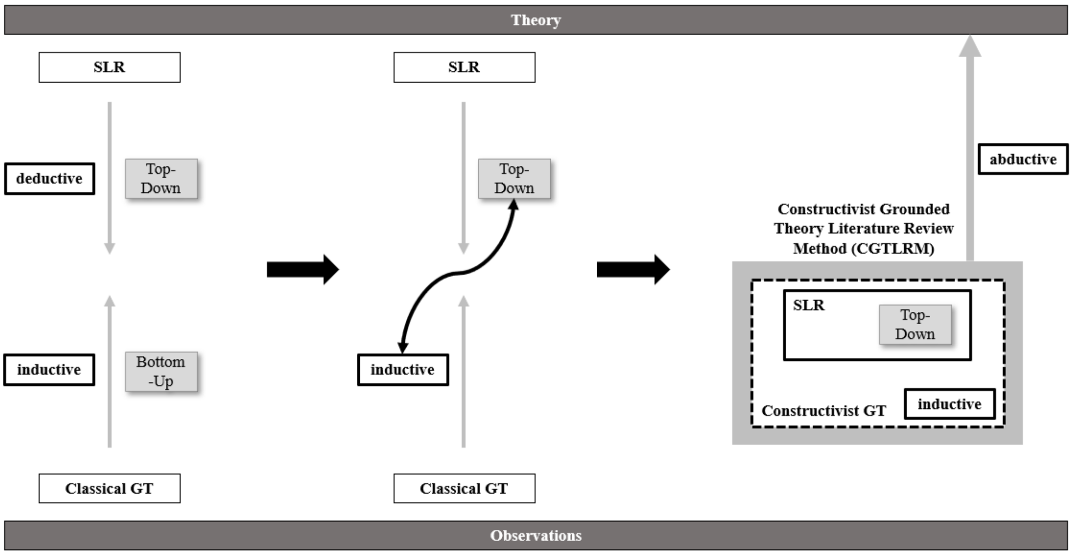
GT Literature Review Method has already been used for SLRs in the context of DBE research for the goal of achieving holistic coverage of literature, appropriate interpretation of meanings and interrelationships between the studies, and in-depth analysis. Therefore it appears to be a suitable method (Senyo et al., 2019, p. 53). Though, this study goes one step further and adopts a **constructivist-pragmatist** (Nonhoff, 2011, p. 91) lens to build the **Constructivist Grounded Theory Literature Review Method (CGTLRM)** in this investigation (Charmaz, 2006, p. 10; Wolfswinkel et al., 2013, p. 46). The aim of combining a literature review with GT is to enlarge the breadth and depth of this underresearched topic (Wolfswinkel et al., 2013, p. 46).

Using extant theories, a literature search and developing a research question are the starting points for constructivist GT and will guide the research (Charmaz, 2014 in Rieger, 2019, p. 8). Consequently, the **SLR** serves as a thorough **theoretical basis**, a **source of data and a guide throughout the entire study**, representing an **abductive approach** for the objective of **building a new theory**.

Charmaz' (2006, p. 103) **Constructivist GT** represents an **abductive method** enabling cocreation of knowledge by the interaction of the researcher with the study throughout the theoretical sampling process (Rieger, 2019, p. 8; Glaser & Strauss, 1967, p. 45). As Constructivist GT builds the frame and the SLR is the source of data, the approach is **inductive top-down** and not deductive bottom-up. The overall direction is built by Constructivist GT and is thus abductive (Timmermans & Tavory, 2012, p. 167).

The extent and complexity of the theoretical foundation a researcher brings to the investigation greatly influences the abductive analysis (Timmermans & Tavory, 2012, p. 173). Theoretical explanations for the researcher's initial observations are contemplated in the attempt to verify the tentative ideas and to obtain the most plausible explanation for the proposal of a hypothesis (Burks, 1946, p. 302; Charmaz, 2014 in Rieger, 2019, p. 8). To sum up, "[…] abductive inference entails considering all possible theoretical explanations for the data, forming hypotheses for each possible explanation, checking them empirically by examining data, and pursuing the most plausible explanation" (Charmaz, 2006, pp. 103–104). **Figure 32** illustrates this abductive CGTLRM.

Figure 32. Abductive Constructivist Grounded Theory Literature Review Method (CGTLRM)



Source: Author’s representation

The **early implementation of the SLR** within a study has long been a cause for debates (Charmaz, 2006, p. 165). While traditional grounded theorists (Glaser, 1978; Glaser & Strauss, 1967) advocate its delaying until completion of analysis to avoid the incorporation of preconceived ideas, Charmaz (2006) highlights that the early use of an SLR within GT as an advantage to frame the research (pp. 165-168). As the idea of undertaking a study without prior knowledge is not realistic, the implementation of an SLR prior to any further data collection and analysis is hence highly recommended (Dunne, 2011, pp. 116–117).

GT, respectively CGTLRM and **ABDUCTION perfectly fit** since both processes aim at moving back and forth between data and theory repetitively (Timmermans & Tavory, 2012, p. 168). ABDUCTION, exactly like CGTLRM, emphasizes the need of preconceived theoretical ideas during the investigation, such as to have the broadest and deepest theoretical foundation when doing research and continuing to expand the theoretical knowledge throughout the process of research (Charmaz, 2006, p. 10; Timmermans & Tavory, 2012, p. 180). Like GT, the main concern of ABDUCTION is the generation of new concepts and theories (Dubois & Gadde, 2002, p. 559). Methodologically, the surprise or puzzle that might lead to a novel theory then surfaces against a backdrop of developed theoretical competence through meticulous data analysis (Timmermans & Tavory, 2012, p. 180). While seeking to make sense of emergent empirical results, the researcher in GT begins with an inductive reasoning and then transitions into abductive reasoning (Charmaz, 2008, p. 157).

Thus, the way theoretical literature has traditionally approached GT with reluctance must drastically change in light of this abductive perspective (Timmermans & Tavory, 2012, p. 173). The incomplete observations at the beginning shall be enriched step by step by **abductive CGTLRM**. The goal being the development of a systematic framework for partner selection in business ecosystems.

5.3.4 Systems Theory

Initially emerged from biology (Bertalanffy, 1950), systems theory within management has first been mentioned by Boulding (1956) (Teece, 2018a, p. 360). Systems theory aims at grasping information beyond the initial boundaries to identify similar concepts from other disciplines, which can be applied to the underlying investigation (Boulding, 1956, p. 199). It adopts an exploratory perspective towards empirical material in searching relevant tendencies among other disciplines to provide meaningful interpretation to the study (Besio & Pronzini, 2011, p. 22). It provides an understanding of multidisciplinary systems (Adams et al., 2014, p. 120) and describes general relationships within the empirical world in transferring similarities among disciplines (Johnson et al., 1964, p. 369). Systems theory is "[…a] unified system of propositions made with the aim of achieving some form of understanding that provides an explanatory power and predictive ability" (Adams et al., 2014, p. 115).

In the context of partner selection in DBEs, the application of systems theory is particularly useful, as relevant data from the strategic alliance literature can be transferred to the DBE literature, which has major gaps regarding the partner selection process. Systems theory reduces complexity in simplifying research by a focus on key relationships and insights from other systems to get an understanding of the relevance of each external actor (Gummesson et al., 2019, p. 4).

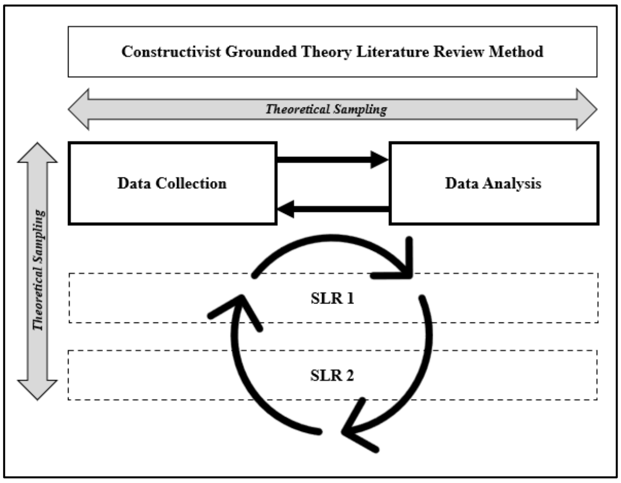
5.3.5 Scope of Review

The CGTLRM is based on two thorough SLRs. At the beginning of each SLR, it is important to outline the **scope of review**. The scope of review is a roadmap for the implementation of the SLR and helps the reader to understand the steps taken by the researcher (Wolfswinkel et al., 2013, p. 47). Unlike Wolfswinkel et al. (2013), this study employs the GT perspective not only for data analysis, but also for **data collection** and therefore follows the constructivist GT approach (Charmaz, 2006).

In this study, a second SLR (SLR 2) was conducted as the first SLR (SLR 1) failed to provide sufficient content to develop a holistic picture of the partner selection process in DBEs. This lack of findings shows that partner selection in DBEs is an emerging topic yet to be explored and for which there needs to be more fundamental knowledge to be investigated. Therefore, the alliance literature was used to fill that gap in applying **systems theory** (Boulding, 1956, p. 199). Hence, from a systems theory perspective, the alliance and DBE or business ecosystem literature logically fit together as both examine the same construct of collaboration and apply similar definitions as their main difference is that while alliances rely on dyadic ties, DBEs or business ecosystems are composed of a set of actors (Kapoor, 2018, p. 10). As DBEs or business ecosystems are composed of a network of alliances and interlinkages between the partners (Adner, 2017, pp. 53–55), the findings from the strategic alliance literature (SLR2) are applied to DBEs. Noticing that most of the authors of SLR 1 base their work on the strategic alliance literature (Beelen et al., 2022, pp. 26–27), other authors equally recommend using the literature on strategic alliances to apply this approach to business ecosystems (Shaikh & Levina, 2019, p. 1). Thus, SLR 2 was conducted, focusing on the strategic alliance literature and the partner selection process in this traditional form of business collaboration. As a result, an **integrative systematic literature review** is conducted. This method allows researchers to explore emerging topics, drawing on related research fields that have already been sufficiently explored to develop frameworks and theories for novel research areas (Torraco, 2005, pp. 356–358).

The combination of SLRs with GT aims to establish a holistic framework derived from both SLRs (Charmaz, 2006, p. 10; Wolfswinkel et al., 2013, p. 46). Thus, new insights are obtained by combining the two data sources (Langley et al., 2013, p. 6). Data collection and data analysis were done simultaneously, as proposed by GT, using the **theoretical sampling** method (Glaser & Strauss, 1967, p. 45), "which involves making iterative comparisons during each stage of analysis [and] advancing theory development during each step of data collection and analysis" (Charmaz, 2006, p. 5; Glaser & Strauss, 1967, p. 45). Even though data collection and **data analysis** are treated independently in this chapter, they are interrelated in the underlying study, representing a dynamic process for the purpose of generating in-depth research, while following a rigorous pathway according to GT (Glaser & Strauss, 1967, p. 45). This simultaneous, dynamic process of data collection and data analysis of SLR 1 and SLR 2 based on GT is illustrated in **Figure 33**.

Figure 33. Theoretical Sampling of SLR 1 and SLR 2 based on Constructivist Grounded Theory Literature Review Method



Source: Author's representation, based on elements from Glaser and Strauss (1967, p. 45)

The individual steps of the two SLRs are as follows: Xiao and Watson (2019) have presented a comprehensive methodology for conducting an SLR, which was followed by this study. This method entails several key steps, starting with the formulation of a well-defined research question and the establishment of a meticulous schedule to guide the systematic review process. In line with this approach, the research question was already articulated during the planning phase, which aims at investigating partner selection within DBEs while developing a robust framework for this purpose (pp. 102-108). A detailed plan outlining the execution of the SLR was devised accordingly. For both systematic reviews conducted in this study, the **Web of Science database** was utilized. This database is widely recognized and extensively employed for conducting systematic literature reviews (Xiao & Watson, 2019, p. 93). A comprehensive outline of the different steps as well as the inclusion and exclusion criteria undertaken in the SLRs are presented in **Figure 34**, providing a clear overview of the methodology employed throughout the research process.

Figure 34. Process Description of SLR 1 and SLR 2 Investigated by Prior Literature

First Step	**Database:** Web of Science **Search domains:** Title OR Abstract OR Author keywords OR Keywords Plus **SLR 1** **Keywords:** partner AND ecosystem **Publication years:** literature including June 2022	**SLR 2** **Keywords:** partner selection AND alliance **Publication years:** literature including August 2022	**Results** **SLR 1: n = 1835** **SLR 2: n = 976**
Second Step	**FILTER** **Category:** Management, Business, Economics, Computer Science Information Systems, Computer Science Software Engineering, Computer Science Interdisciplinary Applications	**Research Areas:** Business Economics Computer Science **Document Type:** Article **Language:** English	**Results** **SLR 1: n = 242** **SLR 2: n = 470**
Third Step	• Mark all keywords in the categories: Title, Abstract, Author keywords, Keywords Plus	• Delete all publications which do not have any of the keywords in the title or the abstract	**Results** **SLR 1: n = 242** **SLR 2: n = 338**
Fourth Step	• Remove duplicate sources:	**SLR 1:** Fortino et al. 2021 **SLR 2:** -	**Results** **SLR 1: n = 241** **SLR 2: n = 338**
Fifth Step	• Independent reading of all titles / abstracts by two researchers • Evaluation of titles / abstract on a scale 1 to 4 (“no fit” to “ideal fit”)	• Publications with ideal fit = ranking 4 • Discussion of results and final rating	**Results** **SLR 1: n = 34** **SLR 2: n = 47**
Sixth Step	• For SLR 2: Remove duplicate sources already included in SLR 1:	• Beelen et al. 2022 • Shaik et al. 2019	**Results** **SLR 1: n = 34** **SLR 2: n = 45**
Seventh Step	• Detailed reading of all n°4 Papers (= with ideal fit)		**Results** **SLR 1: n = 10** **SLR 2: n = 25**

Source: Author’s representation

5.3.5.1 Steps and Final Sample of the First Systematic Literature Review (SLR 1)

Data were collected in two different phases. For SLR 1, all literature including **June 2022** has been considered. The primary objective of SLR 1 was to gain insights into partner selection within DBEs. Consequently, the inclusion criteria for SLR 1 encompassed studies on partner management in ecosystems, without limiting the scope exclusively to DBEs or the partner selection process. These broad inclusion criteria aimed at generating a substantial number of results. The **initial phase** of the research entailed executing a search strategy by employing the broad search string “partner AND ecosystem” within the Title, Abstract, Author Keywords, or Keywords Plus fields in order to not exclude valuable studies at an early stage. As the careful selection of keywords is of utmost importance to achieve targeted results, SLR 1 was preceded by an in-depth review of the relevant literature: the term partner has been identified as more targeted than actor, as it is most frequently used in relation to the selection process (Malherbe & Tellier, 2022, 1). To refine the results, a filtering process was implemented, narrowing down the outcomes to specific categories including those referring to digitalization: Management, Business, Economics, Computer Science Information Systems, Computer Science Software Engineering, or Computer Science Interdisciplinary Applications.

In the **subsequent step**, the domain of either Business Economics or Computer Science was specified, article as the document type was selected and English as the preferred language was designated. To maximize the inclusion of IT-relevant categories and areas pertaining to DBEs, the search encompassed the aforementioned criteria.

In the **third step**, the keywords “partner” and “ecosystem” were highlighted within the title, abstract, or keyword sections to facilitate the researchers’ identification of pertinent studies in the subsequent phase. As DBE literature was expected to be limited, this guaranteed a maximum of results.

This preliminary search yielded a total of 241 articles, from which duplicates were eliminated in the **fourth step**.

In a **fifth step**, the abstracts were read and evaluated based on a scale ranging from 1 to 4, where a score of 1 indicated poor alignment with the research question and 4 denoted an ideal fit. Only those articles deemed an ideal fit were selected and subjected to re-evaluation in the **sixth step**. This crucial stage yielded the first SLR (SLR 1) comprising a dataset of 34 studies.

The **seventh step** encompassed a comprehensive reading of the selected articles in their entirety. Subsequently, the articles were reassessed using the aforementioned 1 to 4 scale and ultimately arrived at a final sample of 10 papers.

5.3.5.2 Steps and Final Sample of the Second Systematic Literature Review (SLR 2)

Due to the insufficient number of articles obtained from SLR 1, a subsequent SLR was conducted with a focused approach based on the alliance literature. SLR 2 was carried out including **literature until August 2022**. As partner selection within the context of alliances has received considerable scholarly attention, the specific keyword of “partner selection” was emphasized. The search query comprised the terms “partner selection” AND “alliance”, to be present within the Title, Abstract, Author Keywords, or Keywords Plus fields. Consequently, a total of 470 articles were identified for SLR 2. In the subsequent step, the keywords “partner selection” and “alliance” were sought within the title and/or abstract of the articles. As a result, 132 articles were excluded as they did not feature these keywords in either the title or abstract. The subsequent steps of the SLR 2 process mirrored those of SLR 1. Abstracts were reviewed and evaluated using a scale ranging from 1 to 4, which yielded 47 articles deemed relevant.

Emphasis was placed on completeness regarding a partner selection process and neutrality of strategic alliances so that too specific alliance types and joint ventures were excluded to remain as focused as possible. Following this, the full-text articles were carefully read and reevaluated again, ensuring that sources included in SLR 1 were excluded from SLR 2. Ultimately, this led to a final set of 25 articles with a perfect fit for SLR 2. To analyze the results and develop a comprehensive framework, the **35 articles** from both, SLR 1 and SLR 2, were systematically examined focusing on the four key categories: (1) prior motivations, (2) the selection process, (3) selection criteria and (4) influencing factors.

5.4 Descriptive Statistics

5.4.1 Distribution of Journals and Publication Years

The distribution of journals and publication years for SLR 1 and SLR 2 are presented in **Tables 13 and 14**, respectively. **Table 13** exhibits a waveform distribution of articles focusing on partner selection in business ecosystems. The earliest publication in this area can be traced back to 2015, authored by Rong, Wu et al. (2015) in the Journal of International Management. This seminal study explores the growth of business ecosystems and establishes a framework for partner management, including the incubation, identification, and integration of complementary partners. Consequently, the groundwork for subsequent research was laid on ecosystems and the selection and management of suitable partners (Rong, Wu et al., 2015, p. 293). Taking a more practical approach, Hyysalo et al. (2019) examined the topic by investigating the creation of a platform for matching potential partners (p.74). The two most recently published articles by Beelen et al. (2022) and van Vulpen et al. (2022) were the first ones to determine their work specifically to partner management and partner selection in software ecosystems. The authors define their work as sister articles, pointing out the lack of research in this field of mapping the entire partner selection process (p. 1 and p. 1-2).

Table 13. Distribution of Journals and Publication Years and Journal Ranking of SLR 1

Author	**Year**	**Journal**	**No. of Years**	**Percentage of Years**	**Journal Ranking SJR**	**Journal Impact Factor (2022)**
Rong et al.	2015	Journal of International Management	1	10 %	Q1	6.1
Hyysalo et al.	2019	IT Professional			Q2	2.6
Tsou et al.	2019	Management Decision	4	40 %	Q1	4.6
Shaikh & Levina	2019	Research Policy			Q1	7.2
Svensson et al.	2019	Technology Innovation Management Review			Q3	1.8

Olsson & Bosch	2020	Journal of Software-Evolution and Process	1	10 %	Q2	2
Visscher et al.	2021	Creativity and Innovation Management	1	10 %	Q1	3.5
Jacobides	2022	California Management Review	3	30 %	Q1	10
Beelen et al.	2022	Science of Computer Programming			Q3	1.3
van Vulpen et al.	2022	Science of Computer Programming			Q3	1.3
			10	100%		

Source: Author's representation

Table 14 presents the publications in the field of strategic alliances, shedding light on the literature pertaining to partner selection in this domain. The first publication in this area can be attributed to Medcof (1997) in Long Range Planning.

Table 14. Distribution of Journals and Publication Years and Journal Ranking of SLR 2

Author	**Year**	**Journal**	**No. of Years**	**Percentage of Years**	**Journal Ranking SJR**	**Journal Impact Factor (2022)**
Medcof	1997	Long Range Planning	1	4 %	Q1	8.5
Hitt et al.	2000	Academy of Management Journal	1	4 %	Q1	10.5
Ding & Liang	2005	Information Science	1	4 %	Q1	8.1
Dong & Glaister	2006	International Business Review	1	4 %	Q1	8.7
Bierly & Gallagher	2007	Long Range Planning	1	4 %	Q1	8.5
Chen et al.	2008	Management Decision	2	8 %	Q1	4.6
Shah & Swaminathan	2008	Strategic Management Journal			Q1	8.3
Holmberg & Cummings	2009	Long Range Planning	1	4 %	Q1	8.5
Chen et al.	2010	Computers & Industrial Engineering	2	8 %	Q1	7.9
Solesvik & Encheva	2010	Industrial Management & Data Systems			Q1	5.5
Liou et al.	2011	Applied Soft Computing	1	4 %	Q1	8.7
Chand & Katou	2012	Journal of World Business	3	12 %	Q1	8.9
Cummings & Holmberg	2012	Long Range Planning			Q1	8.5
Diestre & Rajagopalan	2012	Strategic Management Journal			Q1	8.3
Castro et al.	2014	European Management Journal	1	4 %	Q1	7.5
Akhavan et al.	2015	Technological and Economic Development of Economy	3	12 %	Q2	5.9
Alves & Meneses	2015	Journal of Research in Marketing and Entrepreneurship			Q2	1.9
Franco & Haase	2015	Long Range Planning			Q1	8.5
Haskell et al.	2016	Journal of International Entrepreneurship	2	8 %		3.3
Mindruta et al.	2016	Strategic Management Journal			Q1	8.3
Jalali	2017	Journal of Entrepreneurship Management and Innovation	1	4 %	Q2	1.8
Krammer	2018	Journal of World Business	1	4 %	Q1	8.9
Fahimulla et al.	2019	IEEE Access	1	4 %	Q1	3.9
Vaez-Alaei et al.	2022	Enterprise Information Systems	2	8 %	Q1	4.4
Xie et al.	2022	British Journal of Management			Q1	5.6
			25	100%		

Source: Author's representation

Upon analyzing these distributions, several noteworthy observations can be made. First, the striking disparity in the number of filtered articles is evident, with SLR 1 yielding 10 articles and SLR 2 identifying a total of 25 essential articles, thus a total of 35 articles. This indicates that the investigation of partner selection in DBEs remains relatively understudied. In contrast, the neighboring area of alliances has extensively explored this topic for over 25 years. However, partner selection has not been widely embraced as a research area in alliance literature, with only a few articles published during several years. The peak phase appears to have occurred between 2010 and 2016, as evidenced by the majority of publications during 2013 and 2015, followed by a subsequent decline.

Long Range Planning emerges as the most cited journal, featuring five articles, followed by Strategic Management Journal with three articles, indicative of the prominence of management studies in this context. In comparison, literature from SLR 1 reveals that Science of Computer Programming, with two articles, predominates as the journal with a more technological focus. The remaining journals feature only one article each. Notably, a substantial number of articles were published in 2019 and 2022, while no publications were found between 2016 and 2018. This fluctuating pattern of article distribution reflects the complexity of the topic and underscores the necessity of establishing a foundation for further research. Nevertheless, ongoing publications on this topic in reputable journals highlight the continued relevance of partner selection as a research area.

In total, SLR 2 not only involves a higher number of articles, but also better journal rankings compared to SLR 1. To achieve rigorous scientific research (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377), SLR 2 is used as the primary source so that potential gaps in content will be filled with SLR 1.

5.4.2 Identification of Research Gaps in Existing Literature

5.4.2.1 Redirection of Research Topic

The two SLRs reveal insights on partner selection processes, but very limited insights to the initially focused research topic of partner selection in DBEs. Literature investigating partner selection in business ecosystems is limited, with a total of ten articles and even more limited for DBE. There are only the two sister articles, referring to partner selection in software ecosystems (Beelen et al., 2022, p. 1; van Vulpen et al., 2022, p. 2). Achieving generalizability is thus impossible. Even the inclusion of the strategic alliances literature reveals no insights on partner selection in digitally oriented business structures. A further research of DBE literature related to business ecosystem construction and development reveals only marginal further insights (Valdez-de-Leon, 2019, p. 50). As the objectives of platforms or digital platform ecosystems are different from DBE, referring to platform-related literature for the investigation of partner selection approaches would similarly lead to limited results. Digital platforms are enablers and coordinators of DBEs and provide the technical infrastructure for DBEs, but cannot be equaled with DBEs (Hein et al., 2020 , pp. 87, 89; Kapoor, 2018, pp. 8-10; Adner, 2017, p. 50).

The discovery of these new evidences necessitates a **redirection of research** (Tecuci et al., 2018, p. 10) to the broader research area of **partner selection in business ecosystems** and further in-depth empirical investigation. As the literature on strategic alliances provides insightful information on how to select partners apart from digital goals, this approach appears to be appropriate to uncover how companies systematically select partners in business ecosystems. Due to the open inclusion and exclusion criteria used in the SLRs a new data generation is not necessary so that data analysis is further continued based on the available SLRs. The redirection of research (Tecuci et al., 2018, p. 10) is based on the abductive **CGTLRM** according to which the researcher coconstructs the research direction based on literature review and GT (Charmaz, 2006, p. 10; Wolfswinkel et al., 2013, p. 46). The aim is to provide a sound basis of systematic partner selection in business ecosystems, which will be completed by further data generated in the following investigations in the DEDUCTION and INDUCTION parts of this study. This leads to the second research question.

Research Question 2

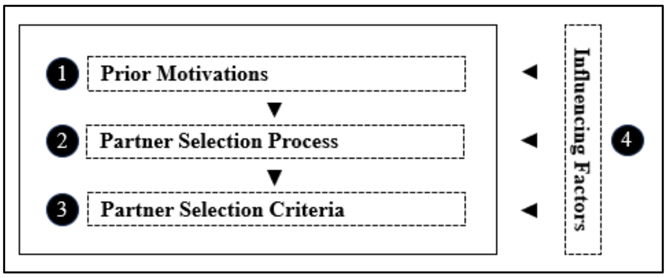
How do companies systematically select partners in business ecosystems and how should a systematic partner selection framework be designed?

5.4.2.2 The Structure of the Partner Selection Process

The SLRs further reveal that the partner selection process is much more complex than simply having universal checklists for partner selection (Chen et al., 2008, p. 451; Holmberg & Cummings, 2009, p. 168) since the objectives of a business ecosystem depend on the objectives and strategies of the actors participating in a business ecosystem. More than half of the authors of SLR 2 are unanimous regarding the importance of considering these objectives and strategies prior to the partner selection (Chen et al., 2008, p. 451; Liou et al., 2011, p. 3520; Shah & Swaminathan, 2008, p. 476), as these determine the critical partner selection criteria. Further, universal lists would fail to consider and weight the relative importance of each selection criterion (Holmberg & Cummings, 2009, p. 182). For this reason, several authors tried to assign the selection criteria to criteria groups, allowing for a generalization of selection criteria, as individual selection criteria depend on the objectives of the business ecosystem and the objectives of each single actor. These criteria groups are mainly divided into task-related and partner-related selection criteria (Alves & Meneses, 2015, pp. 25–26; Dong & Glaister, 2006, p. 577; Holmberg & Cummings, 2009, pp. 168–181; Solesvik & Encheva, 2010, p. 707, 2010, pp. 845–846). Some authors advanced these criteria groups by risk- and learning-related criteria (Alves & Meneses, 2015, p. 26, 2015; Cummings & Holmberg, 2012, p. 136). Most of the prior literature did not investigate partner selection criteria in isolation, but within different contexts.

Inspired by Jacobides (2022) who highlights the need for a framework for action to build a business ecosystem (p. 111), the emphasis is placed on the building of a theoretical-conceptual framework for partner selection in business ecosystems. Accordingly, the authors of the literature reviews mentioned several topics around the selection process, which can be clustered into the four major categories already identified during the pre-reading of existent literature and which are again illustrated in **Figure 35**.

Figure 35. Categories Forming the Theoretical-Conceptual Framework for Partner Selection in Business Ecosystems



Source: Author’s representation

5.4.2.3 Operationalization of the Partner Selection Process Investigated by Prior Literature

Measuring of data is considered being objective and is usually assigned to quantitative research, meaning that data is available numerically and can be evaluated quantitatively. When carrying out qualitative research, data is not available in numbers and can thus hardly be measured (Roskam, 1989, p. 245). In this case, concepts need to be investigated, which is defined as concept-as-intended (de Groot, 1969 in Roskam, 1989, p. 241). An empirical variable is produced by the measurement instrument and is called the concept-as-determined, which represents the operational definition of the concept-as-intended. The procedure of **operationalization** assesses the value or the presence of a conceptual variable. The measurement model therefore represents a theory of data (Roskam, 1989, pp. 241–242). Put in other words, this study constructs a way of making observational data measurable such as "[…] to quantify a phenomenon or concept which itself is not directly measurable" (Emmerich et al., 2016, p. 306). The major challenge of this undertaking is to find a way of measurement that ensures **scientific rigor** (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377). The objective of operationalization hence is to find a suitable measurement approach (Landers & Bauer, 2015 in Emmerich et al., 2016, p. 307).

The categories forming the theoretical-conceptual framework for partner selection in business ecosystems from **Figure 35** determine the structuring and operationalization of the partner selection process investigated by prior literature. These categories are carefully investigated among both SLRs for the intention of illuminating the state of research for each respective category. The following **Figure 36** gives an overview of the different categories investigated within the topic of partner selection in business ecosystems (SLR 1) and strategic alliances (SLR 2).

Due to a lack of numerical data, the state of research is operationalized and then measured by pie charts. Pie charts in combination with operationalization are a common tool to enable comparison of proportions (Bruyaka et al., 2024, pp. 11–15). The empty pie charts, quarter, half, three-quarter, and full pie charts indicate the depth of the category investigation by the respective authors from SLR1 and SLR2. Whereas the empty pie charts indicate that the category has not been mentioned at all and a full pie chart demonstrates that a category was dealt with in depth by the authors. A quarter pie chart represents the number 0.25, a half pie chart refers to the number 0.5 and so forth. The measurement was classified according to the comparison of the different articles from SLR 1 and SLR 2. A total of 156 pie charts for both SLRs were operationalized, representing 39 pie charts for each of the four categories. The amount of each pie chart was summed up such as to obtain a total number for each category. The total number represents an indicator of how intensively the category was investigated by the respective authors from both SLRs.

Figure 36. Categories of Partner Selection in Business Ecosystems Investigated by Prior Literature

SLR 1

Author	Year	1 Prior Motivations	2 Selection Process	3 Selection Criteria	4 Influencing Factors
Rong et al.	2015	○	◔	○	○
Hyysalo et al.	2019	◔	○	◑	◔
Tsou et al.	2019	○	○	●	○
Shaikh & Levina	2019	◑	○	◕	○
Svensson et al.	2019	◔	○	◑	◔
Olsson & Bosch	2020	◕	○	◑	◑
Visscher et al.	2021	●	◔	○	◔
Jacobides	2022	●	●	○	○
Beelen et al.	2022	◔	●	●	○
van Vulpen et al.	2022	◔	◔	●	◑
Total		**4.25**	**2.75**	**5.25**	**1.75**

○	no relevance
◔	minor relevance
◑	medium relevance
◕	major relevance
●	full relevance

SLR 2

Author	Year	1 Prior Motivations	2 Selection Process	3 Selection Criteria	4 Influencing Factors
Medcof	1997	◕	○	◕	◔
Hitt et al.	2000	◔	○	●	●
Ding & Liang	2005	○	◕	●	◔
Dong & Glaister	2006	◕	○	●	◕
Bierly & Gallagher	2007	◕	○	◕	●
Chen et al.	2008	◕	●	●	○
Shah & Swaminathan	2008	◔	○	◕	●
Homberg & Cummings	2009	●	●	◕	◑
Chen et al.	2010	◕	○	●	○
Solesvik & Encheva	2010	◔	○	●	○
Liou et al.	2011	●	◔	●	◕
Chand & Katou	2012	◑	○	◕	◔
Cummings & Holmberg	2012	◑	●	●	◑
Diestre & Rajagopalan	2012	◔	○	◑	◔
Castro et al.	2014	◔	○	●	◑
Akhavan et al.	2015	●	◑	○	○
Alves & Meneses	2015	◔	●	●	●
Franco & Haase	2015	●	○	●	○
Haskell et al.	2016	●	○	●	○
Mindruta et al.	2016	○	○	◕	◑
Jalali	2017	●	○	◑	◕
Krammer	2018	◔	○	●	◑
Fahimulla et al.	2019	◕	○	◑	○
Vaez-Alaei et al.	2022	○	●	●	○
Xie et al.	2022	○	○	○	●
Total		**13.25**	**6.5**	**20**	**10.75**

Source: Author's representation

5.4.2.4 Identification of the Research Gaps: The Partner Selection Process Investigated by Prior Literature

The two tables show very clearly that the major focus of the prior literature is on the partner selection criteria (3), followed by the motivations made prior to the partner selection itself (1). The selection process itself (2) and the influencing factors (4) were of minor relevance. Despite the claim of several authors to provide a systematic approach for partner selection (Alves & Meneses, 2015, p. 26; Castro et al., 2014, p. 431) and attempts to investigate not only the selection criteria, but also their context, no prior literature investigated and presented a systematic partner selection framework including all of the four categories, neither for business ecosystems in general nor for strategic alliances. With regard to the selection criteria, most of the authors further neglect the possible interdependencies among the criteria and sub-criteria (Chen et al., 2008, p. 451). This demonstrates that there is a large research gap, which leads to the first hypothesis:

Working Hypothesis 1

Companies do not have a systematic approach for the selection of partners in business ecosystems.

The objective of the present study is therefore in the next step the development of a systematic framework which considers the interrelationships between the criteria and the categories.

5.5 Data Analysis Methods: Grounded Theory and Gioia Methodology

5.5.1 Principles of the Gioia Methodology

Developed by Gioia and Chittipeddi (1991), the Gioia Methodology (GM) is an inductive, qualitative approach for the **structuring** and the **analysis of data** that can satisfy the **rigorous standards of reliable research** (Gioia et al., 2013, pp. 16–17). GM is a tool to implement GT based research analysis. It generates GT through the disclosing of dynamic relationships among the emerging concepts and the illustration of the data-to-theory connections (Gehman et al., 2018, p. 286).

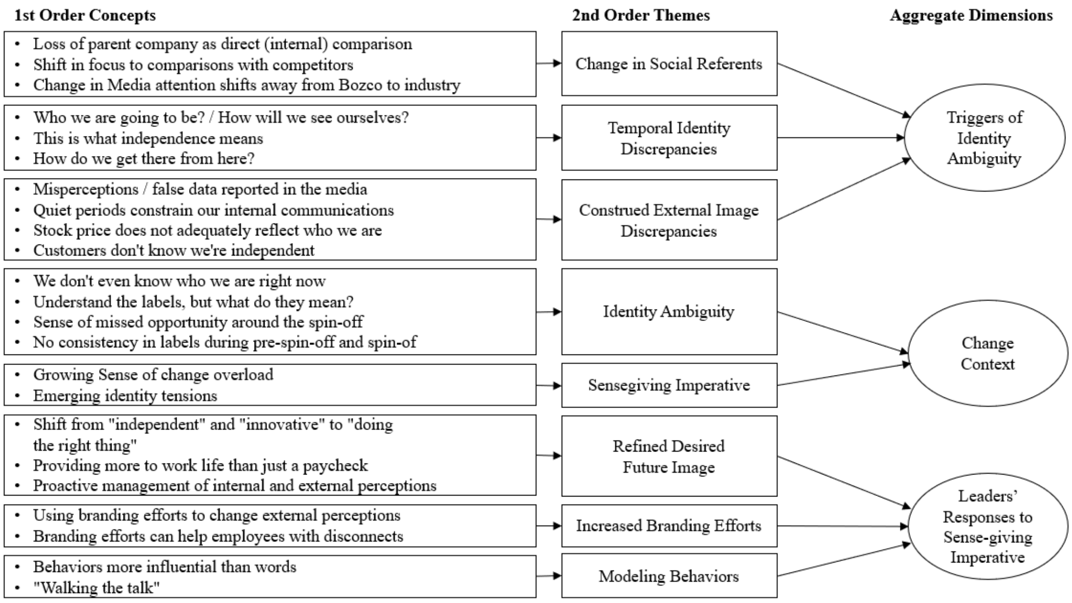
The GM as a qualitative approach complies with the high requirements for quantitative research due to its disciplined approach to obtaining evidence and data coding (Magnani & Gioia, 2023, p. 2). This bottom-up approach is **exploratory**, as **categories are not predefined but developed** by this methodology represented by an **inductive coding** for the purpose of theory building (Eisenhardt et al., 2016, p. 1113; Gehman et al., 2018, p. 288; Gioia & Pitre, 1990, p. 588).

New concepts are inductively developed by the building of categories, providing a holistic theoretical framework for the investigation (Gioia & Pitre, 1990, p. 588; Reay & Jones, 2016, p. 449). GM is **dynamic** in the sense that deviations from the proposed process are possible and desired, as these deviations will lead to credible interpretations (Gioia, 2019 in Magnani & Gioia, 2023, p. 3). It is **systematic** as it provides key stages which are rigorously processed (Magnani & Gioia, 2023, p. 2). GM is thus a static picture of a phenomenon that is inherently dynamic (Gehman et al., 2018, p. 286).

Data analysis begins with the building of so-called **first-order concepts**, which is a similar process to the coding process within the GT, where data patterns are clustered into meaningful categories, the so-called **second-order themes** (Corley & Gioia, 2004, pp. 183–184; Gioia et al., 2013, pp. 20–21; Reay & Jones, 2016, p. 450). In the next step, the second-order themes are analyzed, trying to find further patterns in order to create more abstract categories, resulting in

aggregate dimensions. Within this step, new data is generated by the targeted search for second-order themes (Gioia et al., 2013, p. 20). This theory-guided sampling is also known from classic GT, resulting in a **data structure which can be hierarchically presented** (Magnani & Gioia, 2023, p. 2). An example of the Gioia data structure is outlined in **Figure 37**.

Figure 37. The Data Structure of the Gioia Methodology



Source: Corley and Gioia (2004, p. 184)

5.5.2 Creating Categories of Concepts with Grounded Theory and Gioia Methodology using ABDUCTION

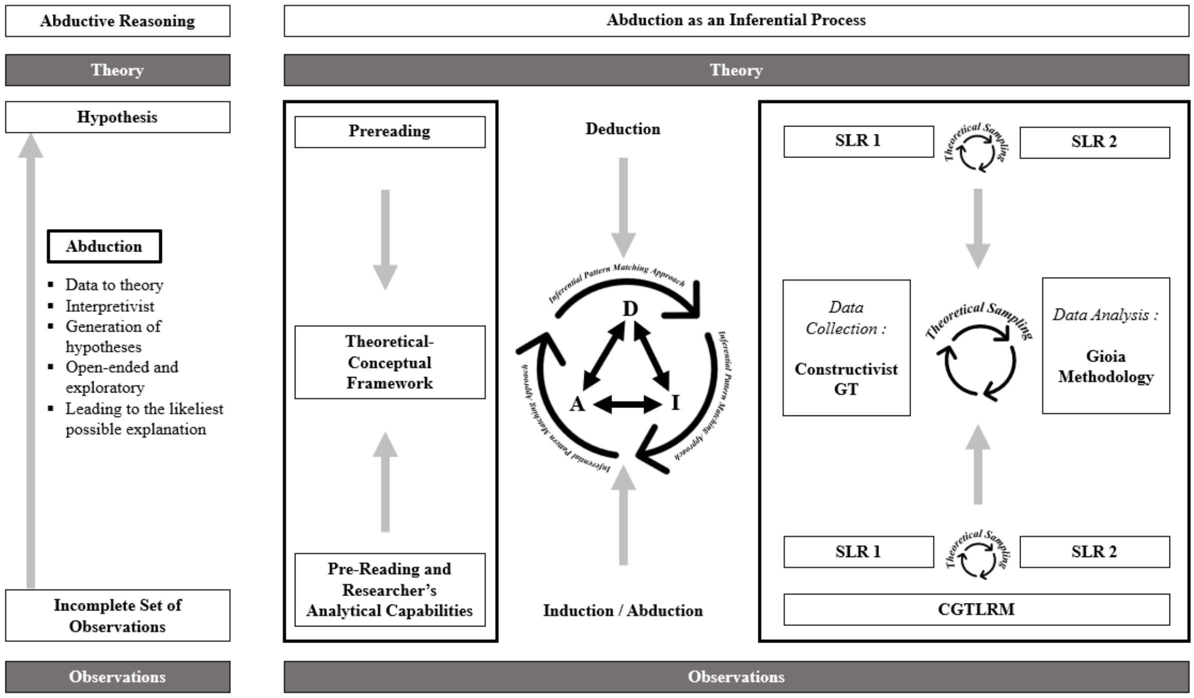
According to Wolfswinkel et al. (2013), a GT approach for analyzing textual data is particularly useful as data can be analyzed in very different ways and at the same time "[…] it assures solidly legitimized, in-depth analyses of empirical facts and related insights. This includes [,] the emergence of new themes, issues and opportunities; interrelationships and dependencies in or beyond a particular area; as well as inconsistencies" (Wolfswinkel et al., 2013, p. 45).

As proposed by Charmaz (2006, p. 9), GT is used as a method to complement other methods for qualitative data analysis. In this vein, the application of GM based on Constructivist GT appears particularly useful to connect rigorous data collection through theoretical sampling with dynamic GM based data analysis. As researchers emphasize the need for more rigorous research methods and topics cannot be viewed in isolation as they are interrelated with one another, GM based on Constructivist GT is an appropriate research method for the data analysis part (Magnani & Gioia, 2023, pp. 2–4). This inductive research method allows to explore emerging innovative patterns (Gehman et al., 2018, pp. 288–291).

Even if the overall research method is called abduction, the beginning of the process is inductive as theory is generated from observed data, so that the process itself is called inductive research method (Bryant, 2019, p. 649). The GM process can be regarded as a transition from induction to abduction building a creative process in which the researcher inferentially combines theory and observations to explore new phenomena (Magnani & Gioia, 2023, p. 3). The iterative move back and forth between observations and theory is a property that can be found equally in abduction and in Constructivist GT (Timmermans & Tavory, 2012, p. 168): "[g]rounded theory begins with inductive analyses of data but moves beyond induction to create an imaginative interpretation of studied life. We adopt abductive logic when we engage in imaginative thinking about intriguing findings and then return to the field to check our conjectures" (Charmaz, 2009, pp. 137–138 in Timmermans & Tavory, 2012, p. 168).

The methodological process of abductive reasoning and abduction as an inferential process is demonstrated in **Figure 38**. On the left hand side, the abductive reasoning is demonstrated, deriving plausible theory from the data (Mantere & Ketokivi, 2013, p. 72). On the right hand side, abduction as an inferential process is depicted (Minnameier, 2010, p. 241; Sinkovics, 2018, pp. 6–8). Abduction as an inferential process involves the iterative pattern matching between multiple elements: the patterns derived from the pre-reading and the researcher's analytical capabilities forming the theoretical-conceptual framework are iteratively matched to the patterns from the SLR part. This is consistent with Charmaz (2006), as knowledge is coconstructed including the researcher's previous knowledge (pp. 9-10; Rieger, 2019, p. 8). The SLR part involves CGTLRM for the identification of patterns from observations and the pattern matching of theory deduced from the SLRs in applying the theoretical sampling process (Glaser & Strauss, 1967, p. 45) based on Constructivist GT and GM, thus the cycling between constructivist GT data collection and GM based data analysis (Charmaz, 2006, p. 189). Additionally, data is constantly compared between SLR 1 and 2 so that data collection and analysis of SLR 2 matches with the analysis of the data priorly identified by SLR 1. The application of GT, respective GM as part of GT, within abduction is coherent, as both are based on theoretical sampling (Glaser & Strauss, 1967, p. 45; Suddaby, 2006, p. 639). Further, it requires the cycling between deduction and induction so that an abductive GT approach is therefore significantly more suitable than GT developed based on induction (Strauss & Corbin, 1998, p. 137 in Suddaby, 2006, p. 639).

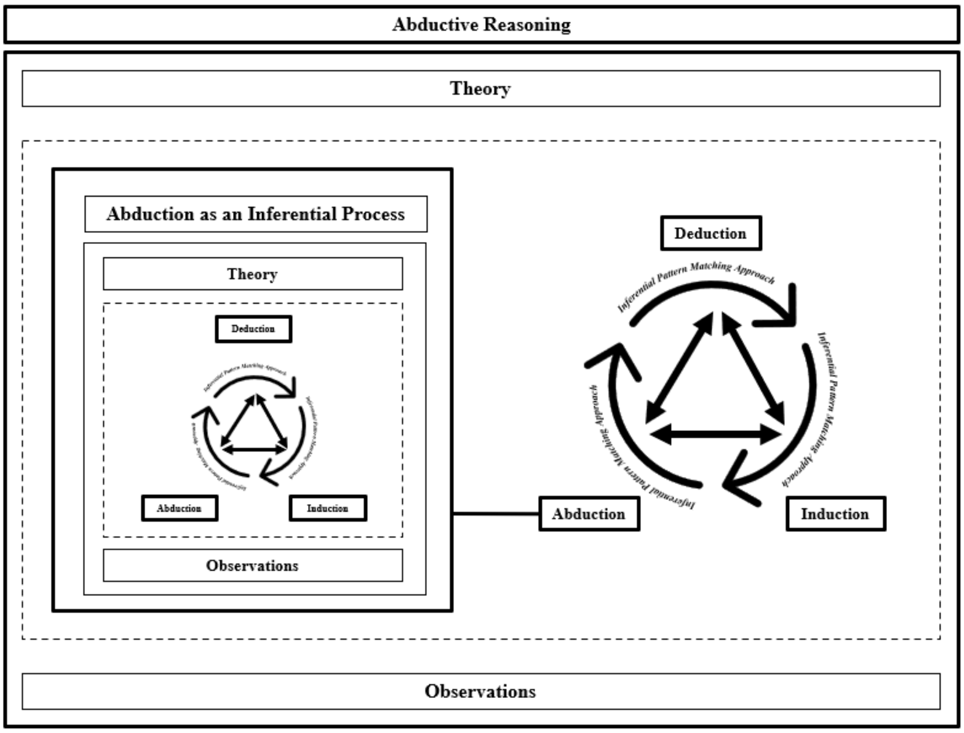
Figure 38. Abductive Reasoning and Abduction as an Inferential Process



Source: Author's representation

The figure illustrates the iterative pattern matching of multiple theoretical and empirical data. The **Inferential Pattern Matching Approach** hence appears particularly useful in the sense that the connection between data and theory is clearly demonstrated. The figure further proves that the first step of abductive reasoning represents itself a recursive inferential process (Timmermans & Tavory, 2012, pp. 179–180), with previous knowledge deduced from theoretical data and observational knowledge induced from the SLRs. This means that ABDUCTION is both simultaneously, abductive reasoning and abduction as an inferential process: with the **constructivist-pragmatist approach** (Nonhoff, 2011, p. 91), previous knowledge cannot be separated from observational knowledge as it is integral part of it (Charmaz, 2021, p. 158). The abductive reasoning contains abduction as an inferential process and is itself part of abduction as an inferential process (Timmermans & Tavory, 2012, pp. 179–180). This interrelationship is demonstrated in **Figure 39**.

Figure 39. Constructivist-Pragmatist Perspective of Abductive Reasoning



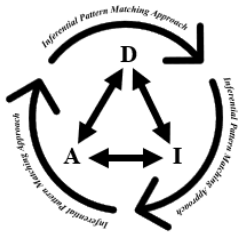
Source: Author’s representation

From the **constructivist-pragmatist perspective** (Nonhoff, 2011, p. 91) it appears therefore evident, why the term abduction has led to so much controversy in the past (Flach & Kakas, 2000, pp. 5–6): abductive reasoning and abduction as an inferential process cannot be viewed in isolation as they are interrelated; the inferential process is part of the abductive reasoning (Timmermans & Tavory, 2012, pp. 179–180). A new theory will emerge in abductive analysis as a result of an iterative conversation between facts and a combination of both, new and old conceptualizations (Timmermans & Tavory, 2012, p. 180).

Consistently with Constructivist GT and GM, a qualitative analysis of concepts is carried out, supporting the scientific rigor of this research (Gioia et al., 2013, p. 20). With a detailed analysis of each of the above-mentioned categories uniform patterns among prior literature are identified, not only regarding the selection criteria, but also regarding the prior motivations and influencing factors. The SLRs identify the questions to be asked and serves as the basis for the formation of the hypotheses (Snyder, 2019, p. 334).

The **Inferential Pattern Matching Approach**, illustrated in **Figure 40**, is thus applied in iteratively cycling between deduction, induction (Sinkovics, 2018 in Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252), and abduction (Minnameier, 2010, p. 241): theory is deduced from the SLRs, observations are inductively identified by CGTLRM and categories are abductively adjusted according to the iterative findings from data collection and analysis. As the only type of reasoning, abduction therefore contains the **Inferential Pattern Matching Approach** (Timmermans & Tavory, 2012, pp. 179–180).

Figure 40. Inferential Pattern Matching Approach

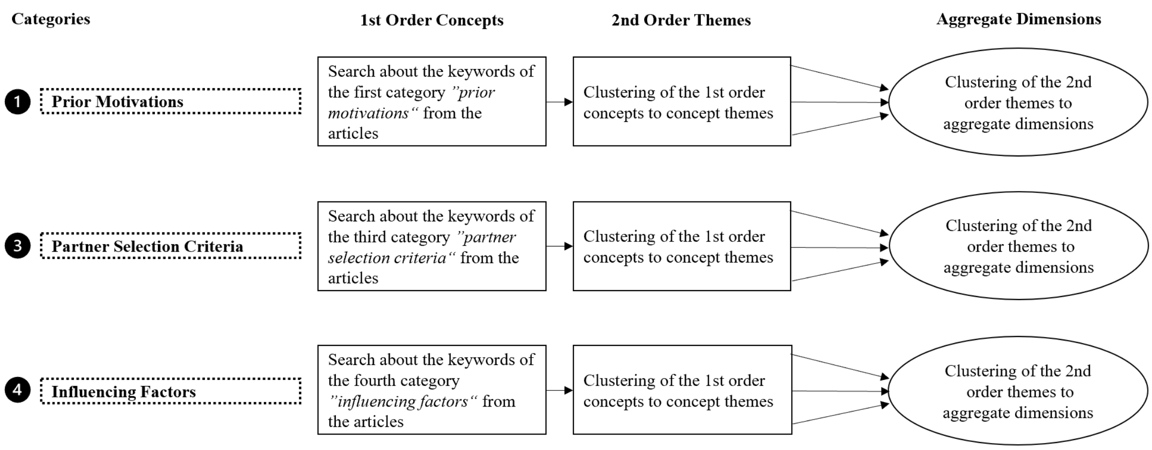


Source: Author’s representation

In a first-order concept step, the keywords of all categories except the category of the selection process itself were searched from the articles. These concepts were then clustered to concept themes. The selection process itself could not be investigated regarding the keywords, as it cannot be described by single concepts. The focus was therefore on the remaining three categories (Gioia et al., 2013, pp. 20–21).

According to the second-order themes of GM (Gioia et al., 2013, pp. 20–21), each article of the two literature reviews has been analyzed again regarding the newly identified concept themes and clustered again according to these themes. A schematic representation of the procedure can be found in **Figure 41**.

Figure 41. The Procedure for a Qualitative Concept Analysis According to the Gioia Method



Source: Author's representation, based on Corley and Gioia (2004)

The final result of the concept analysis for each category according to the GM is as follows: 19 dimensions were identified for the category prior motivations, 27 dimensions for the category selection criteria and 19 dimensions for the category influencing factors for SLR 2. As SLR 1 was not representative in terms of numbers of articles, the final result was 12 dimensions for the category selection criteria. No dimensions were identified for the category prior motivations, as the respective concepts were too context specific and mentioned ones only, so that they could not be categorized. Three dimensions of influencing factors were identified for SLR 1. When comparing the second-order themes for the **selection criteria** and **influencing factors** of SLR 1 with SLR 2, it can be ascertained that there is a **high congruency**. Even though codes are partially named differently among SLR 1 and SLR 2, their meaning is the same. An explanation could be that most of SLR 1 literature cited strategic alliance literature, which is represented by SLR 2. All but two second-order themes for selection criteria of SLR 1 can be found in SLR 2 as well. Only the second-order themes innovation and quality are specific for the partner selection within business ecosystems (SLR 1). Similarly, the second-order themes dynamism and complexity as influencing factors are the same in SLR 1 and SLR 2. Additionally, SLR 1 mentions the balancing of goals and interests as a further influencing factor. It is assumed that innovation and quality are important selection criteria, and the balancing of goals and interests is an important influencing factor. The partner-, learning-, task- and risk-related selection criteria are not specific selection criteria, but selection criteria groups. The consolidated list of selection criteria from SLR1 and SLR 2 contains 33 selection criteria in total, thereof 4 belonging to the selection criteria groups mentioned above and therefore **29**

consolidated selection criteria are found. There is a total of **20 consolidated influencing factors**. The consolidated selection criteria and influencing factors are demonstrated in **Table 15**.

Table 15. Specific Selection Criteria from the SLRs

No.	Prior Motivation	No.	Selection Criteria from the SLRs	No.	Influencing Factors from the SLRs
1	Competitive position	1	Prior alliance partner / prior ties	1	Strategic expediency (ability of managers to make high-quality, effective partner selection decisions under time pressures.)
2	Pre-empting competitors	2	Trust	2	Prior ties
3	Market access, power, and development	3	Strategic fit / compatible goals	3	Time constraints
4	Risk reduction	4	Geographic proximity	4	Uncertainty
5	Economies of scale	5	Reputation	5	Intuition
6	Cost reduction	6	Compatibility	6	Degree of market maturity
7	Low-cost sourcing	7	Financial stability	7	Opportunistic behavior / agency
8	Synergies	8	Company size	8	Trust
9	Access to resources	9	Commitment	9	Nationality
10	Access to international markets	10	Cultural fit	10	Environmental conditions & context
11	International expansion	11	Capability	11	Dynamism
12	Reduction of the liabilities of foreignness	12	Control	12	Time frame
13	New technology / technology transfer	13	Technology capability	13	Trust between management teams
14	Profit Sharing Between Software Development Companies	14	Complementarity / dissimilarity	14	Competitiveness
15	Exchange of skills / obtaining knowledge	15	Access to resources	15	Company size / portfolio size
16	Exploitation	16	R&d	16	Age
17	Exploration	17	Similarity	17	Universal list of criteria is critical
18	Strategic positioning	18	Market knowledge/access	18	Complexity
19	Strengthen customer positions and relationships	19	Partner´s competency	19	Absorptive capacity
		20	Managerial capabilities	20	Balancing goals and interests
		21	Interpersonal relationships		
		22	Product, development and research capabilities		
		23	Technical capabilities		
		24	Industry attractiveness		
		25	Age & experience		
		26	Differentiation between subjective and objective criteria		
		27	Target market size		
		28	Quality		
		29	Innovation		

Source: Author’s representation

The analysis of the prior motivations shows that there are several concepts which are mentioned by numerous authors. However, there are many concepts as well which are mentioned once only. Overall, the investigation of the different concepts emphasized that there is not necessarily a correlation between the number of mentions of a concept and its importance for the partner selection. Rather, the importance of a concept very much depends on the context in which the partner selection takes place. Furthermore, it is noticeable that overall, the concepts seem to be applicable to any type of business ecosystem.

The categorization of first-order concepts is a first step towards the identification of a schedule pattern but is not sufficient to explain the partner selection process. Business ecosystems are complex and context-dependent (Zahra & Nambisan, 2012, p. 220), so that a simple generalization of keywords per category does not give advice for a thorough partner selection process. It may be further stated that the industries investigated by the authors of SLR 1 are various so that a generalization of the topic is already difficult against the background of having no comparable business ecosystem environment among the literature. The clustering of concepts gives an idea about the topics which are treated within the different categories of the partner selection framework. A loose collection of the aggregated dimensions however does not present a partner selection framework. It is rather the interconnection of the identified categories of the partner selection framework, which leads to a systematic approach. This systematic approach for a partner selection framework will be developed in the following chapters.

5.6 Results

5.6.1 The Basic Partner Selection Framework

The strong influence of a careful partner selection for business ecosystem success is confirmed by the authors from the SLRs (Koot, 1988 in Hitt et al., 2000, p. 449; Akhavan et al., 2017, p. 167). Having a closer look at the contexts investigated by previous literature, the first step of the partner selection process, the prior motivations made preceding the partner selection, can further be subdivided into corporate objectives and business ecosystem objectives, as company- and business ecosystem-specific objectives need to be distinguished. The 19 prior motivations were therefore again analyzed regarding this new distinction. These resulted into 12 corporate objectives and 16 business ecosystem objectives or strategies, which are demonstrated in **Table 16**.

Table 16. Corporate Objectives and Business Ecosystem Objectives Extracted from the Analysis of "Prior Motivation" Concepts

No.	Prior Motivations	No.	Corporate Objectives	No.	Business Ecosystem Objective / Strategy
1	Competitive position	1	Competitive advantage / position	1	Co-opetition
2	Pre-empting competitors			2	Pre-empting competitors
3	Strategic positioning				
4	Market access, power, and development	2	Market access, power, and development	3	Market access, power, and development
5	Risk reduction	3	Risk reduction	4	Risk reduction / diversification
6	Economies of scale	4	Economies of scale	5	Economies of scale
7	Cost reduction	5	Cost reduction	6	Production collaboration
8	Low-cost sourcing			7	Low-cost sourcing
9	Synergies			8	Synergies
10	Access to resources	6	Access to resources	9	Different types and objectives of business ecosystems based on the respective resource needed
11	Access to international markets	7	Access to or Expansion of international markets	10	Access to or Expansion of international markets
12	International expansion				
13	Reduction of the liabilities of foreignness				
14	New technology / technology transfer	8	Technology transfer, technology development, speed to market	11	New technology / technology transfer
15	Profit Sharing Between Software Development Companies	9	Profit Sharing Between Software Development Companies	12	Profit Sharing Between Software Development Companies
16	Exchange of skills / obtaining knowledge	10	Exchange of skills / obtaining knowledge and learning skills	13	Exchange of skills through r&d collaboration
17	Exploitation	11	Foster innovation	14	Exploitation
18	Exploration			15	Exploration
19	Strengthen customer positions and relationships	12	Strengthen customer positions and relationships	16	Marketing / distribution collaboration

Source: Author's representation

The following **Table 17** chronologically arranges the **corporate objectives** according to their importance regarding their number of mentions. Multiple mentions by one author are only considered once. The table is arranged in a way to display equally ranked objectives horizontally.

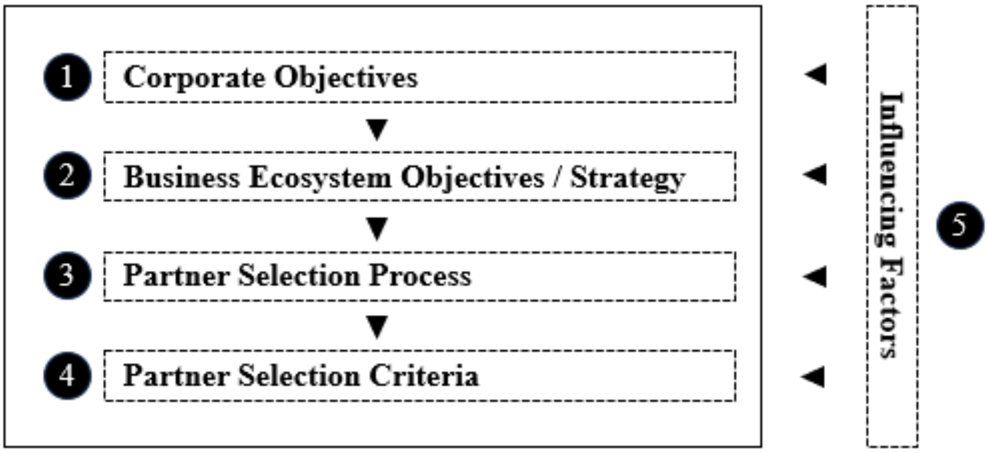
Table 17. Corporate Objectives Ranked According to their Number of Mentions

<table>
<tr><th>Ranking</th><th colspan="3">Corporate Objectives (Number of Mentions)</th></tr>
<tr><td>1</td><td colspan="3">Access to or expansion of (international) markets (12)</td></tr>
<tr><td>2/3</td><td>Exchange of skills
/ obtaining knowledge or learning skills (10)</td><td colspan="2">Competitive advantage / position (10)</td></tr>
<tr><td>4</td><td colspan="3">Cost reduction (8)</td></tr>
<tr><td>5</td><td colspan="3">Access to resources (7)</td></tr>
<tr><td>6</td><td colspan="3">Market access, power, and development (6)</td></tr>
<tr><td>7</td><td colspan="3">Technology transfer, technology development, speed to market (5)</td></tr>
<tr><td>8</td><td colspan="3">Risk reduction (4)</td></tr>
<tr><td>9</td><td colspan="3">Economies of scale (3)</td></tr>
<tr><td>10-12</td><td>Strengthen customer positions and relationships (2)</td><td>Foster innovation (2)</td><td>Profit sharing between software development companies (2)</td></tr>
</table>

Source: Author's representation

The subdivision of the first category into two separate ones leads to a total number of five categories instead of four and resembles the process proposed by Cummings and Holmberg (2012, pp. 139–140): the corporate objectives (1), the business ecosystem objectives / strategy (2), the partner selection process (3), the partner selection criteria (4) and the influencing factors (5), which have an impact on all preceding categories as outlined by **Figure 42**. The theoretical-conceptual framework hence is further developed, forming the basic framework for the partner selection in business ecosystems.

Figure 42. The Basic Framework for the Partner Selection in Business Ecosystems



Source: Author's representation

The partner selection in business ecosystems can be facilitated by this initial framework, which begins with the corporate objective of the company. The steps one to four are iterative:

In the **first step**, a company, which may be the orchestrator who creates the business ecosystem or a company willing to join an existing business ecosystem, has a business strategy and one or more resulting corporate objectives depending on that strategy (Holmberg & Cummings, 2009, p. 171).

The corporate objectives build the basis for the business ecosystem strategy in the **second step** (Visscher et al., 2021, p. 626). Companies should be clear about the meaning of the terms and they should articulate a clear business ecosystem strategy, which is the first prerequisite for a successful business ecosystem (Jacobides, 2022, p. 109). The business ecosystem strategy is defined as "[…] the way in which a focal firm approaches the alignment of partners and secures its role in a competitive ecosystem" (Adner, 2017, p. 47) and will be implemented by a SWOT-analysis to identify the driving forces of partners and the environment to identify the objective of the business ecosystem (Akhavan et al., 2017, p. 167). The business ecosystem objective is thus closely related to the corporate objective (Cummings & Holmberg, 2012, p. 139).

The **third step**, the partner selection process, is then conducted according to the business ecosystem objective based on a systematic investigation of the partners and their environment (Akhavan et al., 2017, p. 167).

Partner selection criteria in the **fourth step** are defined according to the three prior steps (Haskell et al., 2016, p. 483) and the fit of partners evaluated according to these criteria (Wong & Ellis, 2002 and Polyantchikov et al., 2017 in Vaez-Alaei et al., 2022, p. 1012).

The criteria are therefore specific to the prior steps, so that a universal list of selection criteria would not be expedient (Chen et al., 2008, p. 451). All of the four categories are exposed to several influencing factors as the **fifth step**, which makes the selection process unique and complex (Castro et al., 2014, p. 424; Haskell et al., 2016, pp. 489–494).

Working Hypothesis 2

A structured partner selection approach including the

- corporate objectives (1)
- business ecosystem objectives / strategy (2)
- the selection process (3)
- the selection criteria (4)
- as well as the influencing factors (5)

is pivotal for the successful partner selection in business ecosystems since a simple list of selection criteria would not take into account the underlying objectives of the company.

Business ecosystems have common characteristics, as for instance, an alignment structure, they have a set of partners having for objective a joint value creation, they have a focal value proposition and they are multilateral (Adner, 2017, p. 47). According to Adner (2017), business ecosystems are not only composed of bilateral relationships between actors, but represent a multilateral interdependence among these relationships leading to a complex network of relationships, which might not be decomposable to an aggregation of bilateral interactions (pp. 53-55). New digital technologies have transformed the boundaries and characteristics of traditional interdependencies (Subramaniam et al., 2019, p. 83), so that the relationships among the actors are further getting complex. Even though the interrelationships are more than an aggregation of bilateral relationships, this **complexity** can only be overcome by an investigation of each single element of the composition, trying to complete the puzzle by identifying potential interrelationships. The fact that criteria can be interpreted in different ways further complicates this investigation: Alves and Meneses (2015) for instance mention the criterion “prior personal ties” (p. 30), which is understood differently by the respective authors: while Das and He (2006) refer to them as partner-related criteria (p. 126), quite like Cummings and Holmberg (2012, p. 138), and Alves and Meneses (2015) classify them as network-related criteria (p. 30). This discrepancy in the naming of criteria makes it difficult to find a formally structured pathway for a partner selection framework (Alves & Meneses, 2015, p. 31) and further underlines the need for a systematic approach. A part from the complexity of interrelationships and the naming of criteria, it is important to consider the **dynamics** of partnership compositions from the present to the future desired composition of the business ecosystem, as selection criteria might change in importance or magnitude over time (Cummings & Holmberg, 2012, pp. 139–141). It is important to understand “how and why [companies] change the configuration of their [business ecosystems] over time” (Wassmer, 2010, p. 162).

Working Hypothesis 3

The partner selection framework for business ecosystems must be systematic and dynamic at the same time.

In the following chapter, this study proceeds as follows:

As literature on partner selection in business ecosystems is quite limited, the causal relations of the five categories of the partner selection framework among the better researched strategic alliance literature (SLR 2) will be investigated for the sake of providing a systematic frame and then fill in the structure with business ecosystem data from SLR 1. Afterwards, this general structure of the partner selection process will be enriched by investigating the application-specific causal relationships among the partner selection categories of the two literature reviews.

5.6.2 The General Partner Selection Process

The selection of one or more partners for business ecosystems is not an easy task and involves several complex considerations (Ding & Liang, 2005, p. 197). Specific selection processes for coopetition (Alves & Meneses, 2015, p. 23) and resource-sharing alliances (Cummings &

Holmberg, 2012, p. 142) do exist in the alliance literature. A general partner selection process for DBEs exists as well, but remains very fragmented and too much focused on specific industries (Beelen et al., 2022, p. 1; van Vulpen et al., 2022, p. 1).

Despite the fact that each business ecosystem is unique and that the application of a universal checklist of partner selection criteria would not be targeted (Chen et al., 2008, p. 451), the two SLRs however provide general data which can be assembled to a holistic and universally applicable partner selection framework, which is demonstrated by the following steps:

First Step

In the first step of the partner selection process in business ecosystems, **corporate objectives referring to the strategy of a company** (Cummings & Holmberg, 2012, p. 139) need to be formulated. Corporate motivations for a collaboration can be assigned to **four major clusters**, identified by Chen et al. (2008): strategy-oriented, such as maximizing the profit, cost-oriented for the reduction of costs, resource-oriented for the availability of resources and learning-oriented for the acquisition of newest knowledge and technology (pp.451-452). Part of the strategy definition is **the identification of missing capabilities** within the company (Beelen et al., 2022, p. 14). As soon as the corporate objectives are defined, a **market analysis and market entry strategy** must be conducted to identify key economic, technological, and other trends and to analyze the current competition situation in the market in order to derive the strategy for market entry (Beelen et al., 2022, p. 14; Cummings & Holmberg, 2012, pp. 142–144; Jacobides, 2022, p. 109). According to the market situation, a **make-or-buy decision** has to follow: companies need to consider whether they should provide a digital product by themselves or become part of a business ecosystem (Jacobides, 2022, p. 103; Olsson & Bosch, 2020, p. 19).

Working Hypothesis 4

The definition of the corporate objectives according to one of the four major clusters, strategy-, cost-, resource-, or learning-oriented, is the first step of the partner selection process within business ecosystems. Part of this first step is the identification of missing capabilities, a market analysis, a market entry strategy, and a make-or-buy decision.

Second Step

The second step consists of **defining business ecosystem objectives** and aligning them with the corporate objectives of the company (Akhavan et al., 2017, p. 166; Cummings & Holmberg, 2012, pp. 140–141; Holmberg & Cummings, 2009, pp. 171–172). An important prerequisite for the successful building of business ecosystems is according to Jacobides et al. (2022) the **focus on clear definitions**: the analysis of the two systematic literature reviews revealed that the authors do not clearly differentiate between the several business ecosystem types. Companies should get clear about the definitions around business ecosystems, as it is of utmost importance to have the right organization for the achievement of the corporate objectives (Jacobides, 2022, pp. 102, 108-109). For instance, they need to **differentiate between platforms** on the one hand, which allow actors to interact on a technology based platform and **business ecosystems** on the other hand, where players interact to produce groups of connected products or services (Jacobides, 2022, p. 102). **Different business ecosystem types thus fulfill different goals**: companies need to decide about the business ecosystem type based on their strategic goal (Cobben et al., 2022, p. 139). Being clear on business ecosystem definitions and their objectives is hence decisive for its success (Jacobides, 2022, p. 111). This leads to the following working hypothesis 5:

Working Hypothesis 5

There is a lack of clear definitions for business ecosystem objectives and strategies and a lack of clear distinction between business ecosystem types, which makes it difficult to choose targeted partners for the respective type of business ecosystem.

Besides the business ecosystem type the **number of actors needs to be defined, such as to decide how broad or narrow** the business ecosystem should be (Jacobides, 2022, p. 104). The literature reviews show that **no author mentioned an optimal number of actors**. Castro et al. (2014) mention the preference of orchestrators for a larger sized portfolio of actors, as this is related to the availability of managerial and financial resources as well as economies of scale and scope (Gulati, 1995 in Castro et al., 2014, p. 426). Furthermore, they confirm that actors having already a portfolio of alliances or business ecosystems are attractive as partners, since this demonstrates endorsement of quality as well as the simplification of transitivity in the network (Ahuja et al., 2012 in Castro et al., 2014, p. 427).

For achieving strategic goals that necessitate two-way commitment, the partnership model enables close interorganizational collaboration and tight technical integration that goes beyond what is possible through autonomous development. However, for complex connections, such open innovation partnerships are only possible with a limited number of collaboration partners. In that case, intensive bilateral collaboration with a limited number of partners is then favored or a hybrid open innovation approach that combines arm's length coordination with a large number of complementors via open interfaces (Hilbolling et al., 2020, p. 27). Having several partners helps to maintain changing conditions over the course of the business ecosystem's lifetime and strengthens complex interdependencies (Adner, 2021 in Malherbe & Tellier, 2022, pp. 4-5).

Working Hypothesis 6
The optimal number of actors within business ecosystems must be defined prior to the partner selection to define how broad or narrow the business ecosystem should be.

The choice of **the role of the company** is decisive and depends on the potential fit of already existent business ecosystems to their corporate objective: in the case of the creation of a new business ecosystem, the orchestrator must have the financial resources for the functioning of the business ecosystem. Few companies however have the technological and management skills, the competitive position, the access to data, or the AI know-how for the orchestrator role so that companies should start with a realistic sense of the best role, which is not necessarily the orchestrator, but the complementor role (Jacobides, 2022, pp. 111–114).

Working Hypothesis 7
The role of the company and the type of actors need to be defined prior to the partner selection process.

The **identification of potential partners** is preceding the partner selection process (Beelen et al., 2022; Ding & Liang, 2005, p. 204). Partners are identified according to the prior defined objectives. Managers identify partners from their network (Alves & Meneses, 2015, p. 32). Partners are found in the same industry or among small companies with strong business potential (Rong, Wu et al., 2015, p. 301). Often, small partners are identified by coincidence, as they lack of reputation and visibility (Visscher et al., 2021, p. 626).

Working Hypothesis 8
The identification of potential partners is based on the objectives and made from the managers' network, the same industry, or well-known companies. The identification of small, unknown companies is more based on coincidence than on a structured proceeding. Contact can be made by both, the orchestrator, or the partner.

When creating or joining a business ecosystem, not only the value proposition to customers is important. The business ecosystem must provide a **double value proposition**. This means that the orchestrator must be attractive for both, customers and partners (Fahimullah et al., 2019, p. 42859; Jacobides, 2022, p. 114).

Working Hypothesis 9

Double value proposition: the orchestrator must be attractive for both, partners and its customers.

Especially when collaborating with several other companies, it is important to have a **clear strategy** and to **make clear choices** in order to pursue a common business ecosystem goal (Jacobides, 2022, pp. 109–110).

Working Hypothesis 10

Having a clear strategy, making clear choices, and using clear terms are important prerequisites for a successful partner selection.

Third Step

The **partner selection process** itself might differ depending on the corporate and business ecosystem objectives, as for instance the partner selection process for a coopetition-oriented business ecosystem (Alves & Meneses, 2015, p. 33) differs from the standard procedure proposed by Cummings and Holmberg (2012, pp. 139–140). The analysis thus reveals that partner selection processes differ depending on the objectives the business ecosystem is pursuing.

Fourth Step

The fourth step of the partner selection process includes the **development of general partner selection criteria** according to the corporate objective and business ecosystem objectives (Akhavan et al., 2017, p. 166; Holmberg & Cummings, 2009, p. 172). The advantage of these criteria is a generalization of criteria groups which should be considered, so that these can in a further step be adjusted with more specific selection criteria referring to the individual characteristics of a business ecosystem (Ding & Liang, 2005, pp. 204–210). Several authors mention **task-related** selection criteria, which are associated with operational skills and resources and **partner-related** selection criteria, which refer to the personality of the partner, the strategic fit, as well as the efficiency and effectiveness of the collaboration (Geringer, 1991 in Alves & Meneses, 2015, pp. 25–26; Dong & Glaister, 2006, pp. 581–583; Holmberg & Cummings, 2009, p. 168). Their **relative importance** varies according to the **business ecosystem strategy** (Geringer, 1991, 1988 in Dong & Glaister, 2006, p. 582). Cummings and Holmberg (2012) add **risk-related** (pp. 149-152) and **learning-related selection criteria** (pp. 144-147) for a more holistic partner selection approach according to different corporate and business ecosystem related objectives (p. 137). Akhavan et al. (2017) and Chen et al. (2008) emphasize that not the sum of criteria, a rigid checklist of criteria or too specific criteria are of importance, but rather their relative weights and the selection of the **most important criteria** should be considered for a successful partner selection (p. 166, p. 450). Chen et al. (2008) and Chen et al. (2010) propose to select partners among four **clusters of selection criteria groups**: corporation compatibility, technology capability, resource for r&d, and financial conditions (p. 453, p. 280).

Working Hypothesis 11

The partner selection process depends on the objectives the business ecosystem is pursuing and shall be based on general partner selection criteria groups.

Fifth Step

For the fifth step it is suggested to **develop specific selection criteria** (Chen et al., 2008, p. 453; Cummings & Holmberg, 2012, pp. 139–140) as **sub-criteria** according to the more general selection criteria, which are unique to each industry and each business ecosystem objective (Ding & Liang, 2005, pp. 204–219).

Working Hypothesis 12

The development of general partner-, task-, risk-, and learning-related selection criteria according to the objectives and the further development of specific selection criteria according to these more general selection criteria is more important than having a rigid checklist of selection criteria.

Sixth Step

The whole partner selection process is accompanied by **influencing factors**, the sixth step. These influencing factors are various and very specific to each partner selection process. Within the systematic literature review several different influencing factors were identified, sometimes mentioned multiple times, sometimes mentioned once only. The timing is a general influencing factor accompanying all partner selection processes across the business ecosystem lifetime so that the time horizon of the business ecosystem needs to be determined to adapt the partner selection process accordingly (Holmberg & Cummings, 2009, p. 182).

Working Hypothesis 13

The time horizon of business ecosystems must be determined prior to the partner selection process.

The **development over time** is a criterion which is of major importance and must be especially considered for the shift in business ecosystem objectives (Jacobides, 2022, p. 116), as well as the selection criteria, which dynamically change over time (Ding & Liang, 2005, p. 199): Holmberg and Cummings (2009) suggest to assign relative importance weights to the general critical success factors across two time periods, for the current and the future situation, in order to consider the changing over time (pp. 165, 167, 181). Additionally, the specific selection criteria should be evaluated accordingly (Akhavan et al., 2017, p. 166).

Working Hypothesis 14

The development over time is an influencing factor, which is of major importance and must be especially considered for the general and specific selection criteria in accordance with the company and business ecosystem related objectives.

Results of SLR 1 reveal that half of the authors treated the expansion, respective joining of an existing business ecosystem (Beelen et al., 2022, p. 2; Olsson & Bosch, 2020, 1; Tsou et al., 2019, p. 1609; Visscher et al., 2021, p. 619), the other half based their research on the creation of a new business ecosystem (Hyysalo et al., 2019, p. 74; Jacobides, 2022, p. 99; Rong, Wu et al., 2015, p. 1; Shaikh & Levina, 2019, p. 2). Two articles treated both (Svensson et al., 2019, p. 20; van Vulpen et al., 2022, p. 1). Svensson et al. (2019) investigated the development of an existing business ecosystem for incumbents and the establishment of a new business ecosystem from the start-up perspective (p. 20). Apart from the company size, this article provided no insights on differences in partner selection processes. Surprisingly, no author commented on the consequences of either the expansion of, respective the joining of an existing business ecosystem, or the creation of a new business ecosystem on the partner selection process. This study suggests that there must be a substantial difference regarding the different timing between them, but also their different partner history to take into consideration. Bierly and Gallagher (2007) highlight the importance of the time influencing the partner selection in business ecosystems as a whole (p. 143). This study therefore suggests that based on the availability of time, companies need to decide whether to **expand or join an existing business ecosystem,** or to **create a new one**.

Working Hypothesis 15

The decision for the extension of, respective participation in an existing, or the creation of a new business ecosystem is dependent on the time available prior to the formation of the business ecosystem.

Working Hypothesis 16

The partner selection approach for the extension of, respective participation in an existing business ecosystem is different to the creation of a new business ecosystem.

Seventh Step

The general partner selection process is enlarged by a **seventh step**. Based on the dynamic component investigated by Holmberg and Cummings (2009), criteria for each category might change over time and therefore could have an impact on the whole partner selection process. Not only the current business ecosystem structure with its actors is of importance, but rather their congruence for the future, so that a **dynamic evaluation of general partner fit over time** is of main importance (Holmberg & Cummings, 2009, p. 172). The last step therefore is iterative – **the reevaluation of the partner fit over the entire business ecosystem duration**.

Working Hypothesis 17

The reevaluation of the partner fit over time is an important part of the partner selection process.

The seven steps of the general partner selection process now identified are indicated in the following **Figure 43**:

Figure 43. The General Partner Selection Process

	Categories	Authors
Step 1	**Corporate objectives according to the strategy of a company**	Cummings & Holmberg 2012, p. 139
	• Four major clusters of corporate motivations for a collaboration: strategy-, cost-, resource-, or learning-oriented	Chen et al. 2008, pp.451-452
	• Identification of missing capabilities within the company	Beelen et al. 2022, p. 14
	• Market analysis and market entry strategy	Beelen et al. 2022, p. 14; Cummings & Holmberg 2012, pp. 142-144; Jacobides 2022, p. 109
	• Make-or-buy decision	Jacobides 2022; Olsson & Bosch 2020, p. 19
Step 2	**Defining business ecosystem objectives and aligning them with the corporate objectives**	Akhavan et al. 2017, p. 166; Cummings & Holmberg 2012, pp. 140-141; Holmberg & Cummings 2009, pp. 171-172
	• Business ecosystem types need to be aligned with the strategic objectives of a firm	Cobben et al. 2022, p. 139; Jacobides 2022, p.111
	• Clear definitions	Jacobides 2022, pp. 102, 108-109
	• Optimal number of actors: deciding how broad or narrow the business ecosystem should be	Jacobides 2022, p. 104; Gulati 1995 in Castro et al. 2014, p. 426; Ahuja et al. 2012 in Castro et al. 2014, p. 427; Hilbolling et al. 2020, p. 27; Adner 2021 in Malherbe & Tellier 2022, pp. 4-5
	• The role of the company in accordance with the company's skills	Jacobides 2022, pp. 111-114
	• Identification of potential partners according to the objectives	Ding & Liang, 2005, p. 204; Alves & meneses, 2015, p. 32; Rong, Wu et al., 2015, p. 301; Visscher et al, 2021, p. 626
	• Ecosystem double value proposition: orchestrators must be attractive for both, partners and its	Fahimullah et al. 2019, p. 42859; Jacobides 2022, p. 114
	• Making clear choices and focus on profit sharing	Jacobides 2022, pp. 109-110; Fahimulla et al., 2019, p. 42859
Step 3	**Define the partner selection process in accordance with the corporate and business ecosystem objectives**	Alves & Meneses, 2015, p. 33; Cummings and Holmberg, 2012, pp. 139–140
Step 4	**Develop general partner selection criteria according to the corporate and business ecosystem related objectives**	Akhavan et al., 2017, p. 166; Holmberg & Cummings 2009, p. 172; Ding & Liang, 2005, pp. 204-210
	• Task- and partner-related selection criteria	Geringer, 1991 in Alves & Meneses, 2015, pp. 25–26; Dong & Glaister, 2006, pp. 581–583; Holmberg & Cummings, 2009, p. 168
	• Risk-related and learning-related selection criteria	Cummings & Holmberg 2012, pp. 144-152
	• The selection of the most important criteria instead of a complete list of criteria	Akhavan et al. 2017, p. 166; Chen et al. 2008, p. 450
	• Select partners among four clusters of selection criteria groups: corporation compatibility, technology capability, resource for r&d, financial conditions.	Chen et al. 2008, p. 453; Chen et al. 2010, p. 280
Step 5	**Develop specific selection criteria as sub-criteria according to the more general selection criteria**	Chen et al. 2008, p. 453; Cummings & Holmberg 2012, pp. 139-140; Ding & Liang, 2005, pp. 204–219
Step 6	**Identify influencing factors accompanying the partner selection process**	
	• Define time horizon of business ecosystem	Holmberg & Cummings, 2009, p. 182
	• Consider the development over time of general and specific selection criteria	Jacobides, 2022, p. 116; Ding & Liang, 2005, p. 199; Holmberg & Cummings, 2009, pp. 165, 167, 181; Akhavan et al., 2017, p. 166
	• Availability of time: expansion of, respective participation in an existing or the creation of a new business ecosystem	Bierly & Gallagher, 2007, p. 143
	• The partner selection approach for the expansion of, respective participation in an existing business ecosystem is different than for the creation of a new business ecosystem	suggestion based on the results of SLR 1
Step 7	**The reevaluation of the partner fit over the entire business ecosystem duration.**	Holmberg & Cummings 2009, p. 172

Source: Author's representation

5.6.3 The Application-Oriented Partner Selection Process

The motivation to create a business ecosystem or to further develop an existing business ecosystem, is to remain competitive in times where the digital transformation does not allow for one single company to keep up with the fast pace of change (Valdez-de-Leon, 2019, p. 43). The different steps of the partner selection process provide a general perspective on how to systematically select partners within business ecosystems. In this chapter the application-oriented partner selection process is investigated based on application-specific causal relationships among the partner selection categories, providing a practical perspective on how to systematically select partners in business ecosystems and discovers precise objectives related to the company and its business ecosystems, as well as selection criteria and influencing factors with the aim to develop a general approach for partner selection processes related to specific objectives. Empirical cases are discovered in matching the patterns identified to the general partner selection process. This is consistent with the theoretical sampling process (Glaser & Strauss, 1967, p. 45) described by the **Inferential Pattern Matching Approach** as illustrated in **Figure 44**: based on the theoretical-conceptual framework, the investigation is further developed due to iterations between theory and data.

Figure 44. Inferential Pattern Matching Approach

Source: Author’s representation

The underlying **corporate objectives of SLR 1 and SLR 2 or business ecosystem strategies are the starting point** of the analysis of application-specific causal relationships among the partner selection categories. Companies can have numerous corporate objectives, which precede the business ecosystem objectives. These objectives can vary according to company-specific factors, the industry, and the environmental context (Holmberg & Cummings, 2009, p. 172). Ding and Liang (2005) summarize the resulting challenges as “4RC situations; rapid change, rising competition, rising complexity, and radically challenging environments” (p. 198). This study investigates the most cited corporate objectives extracted from the SLRs for the purpose of presenting some general **pathways** of partner selection in business ecosystems. **Path dependency** is typically viewed as a feature that limits what may be done, with any changes in path that may arise being ascribed to some kind of shock or deliberate action intended to undermine the current framework (Brekke et al., 2023, pp. 2–5; Teece et al., 1997, pp. 522–523). The application-oriented partner selection process refers to this **path dependency theory** (Teece et al., 1997, pp. 522–523), as the initial objective of a company clearly defines the pathway to follow when selecting partners in business ecosystems.

A holistic data structure was created, investigating the application-specific causal relationships among the categories of the general partner selection process. This data structure allowed for an in-depth analysis of the whole partner selection framework, as the interlinkages of the different categories of the corporate objectives, business ecosystem objectives and strategies, the respective selection criteria, and influencing factors have been analyzed. Results indicate that one or numerous corporate objectives can precede business ecosystem objectives and vice versa. The prior identified 16 corporate objectives are consolidated into **eleven pathways**. The order of priority of the below mentioned objectives does not follow a strict order, as the importance of the corporate objective depends on the unique requirements of each company and industry. Rather the order of priority considers interrelationships among the corporate objectives.

1st Pathway: Strengthening of the Competitive Position

The first pathway and **corporate objective** of a company to create a new or develop or participate in an existing business ecosystem is the strengthening of its competitive position (Bierly & Gallagher, 2007, p. 135; Franco & Haase, 2015, p. 169). According to Chand and Katou (2012), the competitive position of a companies in a market is very much dependent on a successful partner selection (pp. 168-169). The further underlying corporate objectives for the strengthening of its competitive position are, among others, the development of technology (Dong & Glaister, 2006, p. 579), speed to market (Holmberg & Cummings, 2009, p. 167), cost and risk reduction (Cummings & Holmberg, 2012, p. 143; Dong & Glaister, 2006, pp. 580–581; Holmberg & Cummings, 2009, p. 167), acquisition of knowledge in research and development, product development, innovation, production or marketing (Dagnino, 2009; Bengtsson & Kock, 2000 and Zineldin, 2004 in Alves & Meneses, 2015, p. 24).

The resulting **business ecosystem strategies** are: pre-empting of competitors (Cummings & Holmberg, 2012, p. 138; Holmberg & Cummings, 2009, p. 167) or coopetition (Alves &

Meneses, 2015, p. 23), the latter one being a way to keep up with the fast pace of digitalization (Rijswijk et al., 2023, p. 1). Coopetition is a means of increase for the competitive position of a company (Bouncken & Fredrich, 2012, p. 2), with multiple underlying corporate objectives (Alves & Meneses, 2015, p. 24).

The **selection process** for coopetition is based on three major steps: coopetition partnerships are initiated by prior personal relationships, as they act as important channels for the flow of knowledge (Schmiele & Sofka, 2007 in Alves & Meneses, 2015, p. 24) and a catalyzer for the formation of a collaboration based on coopetition as prior relationships tend to reduce the perception or risk towards a potential coopetition partner (Alves & Meneses, 2015, p. 33). Prior personal or business relationships are the first crucial step and prerequisite for the formation of coopetition partnerships, irrespective of the company's size (Alves & Meneses, 2015, p. 33), as they uncover a potential group of partners. The second step is the identification of synergies with a conscious and judicious selection based on specific criteria related to partner's operational skills, resources, effectiveness, and trust (Alves & Meneses, 2015, pp. 23, 32). The third step is the refinement of partner selection among those partners with synergies to identify the partners with the best fit (Alves & Meneses, 2015, p. 32).

Regarding the **partner selection criteria**, Alves and Meneses (2015) mention a weighting of partner-, task-, risk-, and learning-related criteria (p. 32). Detailed criteria are depending on the industry context, but the most important specific selection criteria are prior personal relationships and trust (Alves & Meneses, 2015, p. 33).

Influencing factors can be seen in the different ages and sizes of companies: start-ups tend to avoid coopetition with incumbent companies, as they fear the risk of appropriation (Diestre & Rajagopalan, 2012, p. 1115). The dynamism of the competitive market is a second influencing factor: companies are willing to cooperate with foreign companies in order to maintain their competitive position at their home market (Dong & Glaister, 2006, p. 587). The effectiveness of a cooperation depends on tacit rules for cooperative and competitive interactions between partners, which are based on their prior relationship-specific experiences and thus trust (Dahl, 2014 in Alves & Meneses, 2015, p. 26). The competition among companies and the resultant interdependent choices have an impact on the partner selection (Cabral & Pacheco de Almeida, 2014 in Mindruta et al., 2016, p. 207).

2nd Pathway: Technology Transfer, the Technology Development and the Increase of the Speed to Market

The second pathway and **corporate objective** of a company is the technology transfer, the technology development and the increase of the speed to market, which are accompanied by the corporate objectives cost and risk reduction (Holmberg & Cummings, 2009, pp. 167, 172). The corresponding **business ecosystem objectives** are: access, diversification, and exchange of technology (Dong & Glaister, 2006, pp. 586–587).

There is **no specific selection process** mentioned. The first **partner selection criterion** is the potential partner's ability to create value: the partner's level of technological relatedness and the partner's development experience increase the likelihood of business ecosystem formation (Rothaermel & Boeker, 2008 in Diestre & Rajagopalan, 2012, p. 1117).

Second, companies looking for diversification and technology exchange will select a partner which provides access to production technology (Dong & Glaister, 2006, pp. 593–594).

Third, the cultural and managerial proximity, which are related to the characteristics of attractiveness and trust, facilitate the technology transfer among partners (Michailova & Hutchings, 2006 in Krammer, 2018, p. 933).

Fourth, companies with the simultaneous objectives of technology exchange and market development, market power, as well as market diversification will select a partner with international knowledge and product knowledge (Dong & Glaister, 2006, p. 592). The time frame can be seen as **influencing factor**: the significance of the technological capability increases from short- or medium-term partnerships to long-term partnerships (Jalali, 2017, p. 69).

3rd Pathway: Risk Reduction

Risk reduction is a **corporate objective** of a company and presents the third pathway. The corresponding **business ecosystem objective**s are to reduce, diversify (Holmberg & Cummings, 2009, p. 172), or share risks. This can be done by fostering r&d collaborations (Haskell et al., 2016, p. 494), the creation of synergies (Franco & Haase, 2015, p. 170), or marketing collaborations with partnerships in emerging countries (Haskell et al., 2016, pp. 500–501).

Companies motivated by cost and risk reduction attribute great importance to the following **partner-related selection criteria**: reputation, trust, and prior ties. This relationship is even stronger for collaborations within the tertiary sector (Dong & Glaister, 2006, p. 594). In emerging markets, companies usually do not possess these characteristics and are rather selected due to their specialized assets and market skills to outweigh emerging economies' foreignness and the increased risk that could exist in an unfamiliar setting (Haskell et al., 2016, p. 494). When companies decide for a coopetition partnership, prior personal relationships are of major importance, as they increase the trust and thus decrease the perceived risk (Alves & Meneses, 2015, p. 31). Among other selection criteria, partners are selected for r&d alliances according to their ability to share risks and for marketing alliances in emerging markets according to their capacity to diversify risks (Haskell et al., 2016, p. 497).

Orchestrators of business ecosystems need to be aware of general **risk-related selection criteria**, which can be grouped into two subgroups: first, collaboration risks, which are performance risks, relational risks, unequally shared risks, emergent competition risks, quality risks, customer relationship risks, idiosyncratic risks and second, the not-partnering risks, which refer to the locking out of partners and loss-prevention strategies (Cummings & Holmberg, 2012, pp. 149–152).

The business ecosystem performance is very much dependent on the value appropriation risks, so that partners should be carefully selected according to their tendency to pursue a common goal instead of appropriating knowledge from the business ecosystem (Pisano, 1997 and Durand et al., 2008 in Diestre & Rajagopalan, 2012, p. 1117).

4th Pathway: Cost Reduction

The fourth pathway is the corporate objective of cost reduction combined with the corporate objective of **economies of scale**. The corresponding **business ecosystem objectives** are the creation of synergies (Franco & Haase, 2015, p. 170), the building of production collaborations (Haskell et al., 2016, p. 497), or the pursuit of low cost sourcing (Dong & Glaister, 2006, pp. 591–592). Among other **selection criteria**, partners are selected for production collaborations according to their compatibility, their ability to provide low production costs, or to share cost and experience (Haskell et al., 2016, p. 497). According to Dong and Glaister (2006), **task-related** selection criteria of factor inputs and local knowledge are emphasized, particularly in the tertiary sector for the strategic motive of low-cost sourcing (p. 591-592). As for risk reduction, the selection criteria to be focused for the objective of cost reduction majorly refer to the local market skills of the partners (Dong & Glaister, 2006, pp. 591–592; Haskell et al., 2016, p. 494).

5th Pathway: Market Access, Power, and Development

Market access, power, and development demonstrates the fifth pathway and is a **corporate objective**, which is closely related to the objectives of cost and risk reduction, technology transfer, technology development, speed to market, and the access to international markets, as their selection framework overlaps partially.

The **business ecosystem objectives** are to gain market power, and market access or the strategic positioning in search for the maximization of profit or collaborations increasing the market share, the shortening of time for new technologies or products, the entering of new markets, or the preventing of competition (Chen et al., 2008, p. 451).

Market access can be interpreted as a national or international market access. Companies looking for market development and cost and risk reduction will **select a partner** with the task-related selection criteria of value chain access as well as task-related criteria for factor inputs and local knowledge (Dong & Glaister, 2006, pp. 591–593), as well as the partner-related selection criteria business relatedness, company size, financial stability, reputation, trust, prior ties (Dong & Glaister, 2006, pp. 594–595), and the willingness to share costs and risks (Franco & Haase, 2015, p. 178).

Companies having for objective the market development, market power, diversification and technology exchange, will decide for the task- and resource-related selection criteria of product knowledge, production technology, and international knowledge (Dong & Glaister, 2006, p. 592). Further, the partner-related criteria complementarity and reputation, the willingness to share costs and risks and prior experience are important (Franco & Haase, 2015, p. 178).

The results of the corporate objective of market power, development, and access are applicable to the national or the international level. The access to international markets has some further properties, which will be discussed in the **9th pathway**.

6th Pathway: Fostering of Innovation

The fostering of innovation as a **corporate objective** is the sixth pathway and can be subdivided into two major **business ecosystem strategies**: exploration and exploitation (Lavie & Rosenkopf, 2006 in Krammer, 2018, p. 930; Visscher et al., 2021, p. 621). Exploration refers to new possibilities, innovation, flexibility, experimentation and risk taking, while exploitation includes the identification, development, and materialization of added value. It focuses more on refinement or efficiency (Visscher et al., 2021, p. 621). For a business ecosystem strategy to succeed, a good balance of both, exploration and exploitation is necessary (March, 1991, p. 71). In order to gain new knowledge with exploration, companies need to be open for new avenues and have to have a clear strategy to reach this objective (Franco & Haase, 2015, p. 175).

For this reason, the **selection criteria** for **exploration** are focused on institutional distance, distant normative and cognitive environments, and distant regulatory environments, which allow for increased opportunities for learning, cross-feeding, pooling of resources, institutional arbitrage, and lower risks of leakages (Gimeno, 2004 and Nathan & Lee, 2013 in Krammer, 2018, p. 931). A relative similarity of partners regarding company knowledge, age, size, and market size favors exploration (Krammer, 2018, p. 938). Detailed selection criteria might be various, but they are always based on reputation, resource contribution, business culture, and regionalism (Franco & Haase, 2015, p. 178). For an **exploitation** strategy, similarity is an important characteristic for the selection criteria: similar cognitive, normative, and institutional environments reduce uncertainty, increase the absorptive capacity, and help to reduce coordination costs. In general, appropriation risks can be reduced, which will have a positive impact on the cooperation success (Belderbos et al., 2018; Delerue & Simon, 2009; Gulati & Singh, 1998 and Michailova & Hutchings, 2006 in Krammer, 2018, p. 931). A relative similarity of partners is needed to encourage the effective knowledge, planning, and carrying out of exploitative activities as well (Levinthal & March, 1993 and Koza & Lewin, 1998 in Krammer, 2018, p. 932). Of further importance are the similarity in market growth potential, in previous experience / interactions between two partners (Krammer, 2018, p. 938). Managerial proximity has a positive impact on the attractiveness of and trust between the partners, which in turn facilitates the technology transfer between partners (Michailova & Hutchings, 2006 in Krammer, 2018, p. 933). Cognitive-normative similarity leads to an increased absorptive capacity (Xu et al., 2004 and Pisano, 1990 in Krammer, 2018, p. 933).

Overall, an institutional similarity is needed for exploitation and an institutional distance favors exploration (Krammer, 2018, p. 938).

Among the **influencing factors** for **exploration** are all elements, which are complementary to the existing strategy and organization: within the business ecosystem, companies are willing to cooperate with competitors (coopetition) (Visscher et al., 2021, p. 627), **heterogeneous** actors allow for variation, experimentation and discovery of new innovation opportunities to arise (Visscher et al., 2021, p. 621). This is supported by a business ecosystem with a loosely coupled relationship among the heterogeneous actors and without a centralized structure with leader/follower dynamics (Brusoni & Prencipe in Visscher et al., 2021, p. 627).

Influencing factors for **exploitation** are contrary to those of the exploration strategy: there is no interaction with competitors (coopetition), opportunities are implemented and materialized in innovations that add value, which means that the exploitation is responsible for value adding and value capturing activities (Visscher et al., 2021, p. 621).

Company size plays an important role, as smaller companies fear an appropriation risk and the risk of losing their independence when cooperating with bigger companies success (Belderbos et al., 2018; Delerue & Simon, 2009; Gulati & Singh, 1998 and Michailova & Hutchings, 2006 in Krammer, 2018, p. 931 and von Raesfeld & Roos, 2008 in Visscher et al., 2021, p. 628).

For both, exploration and exploitation, the actors of the business ecosystem need to consider the impact of tensions between them: exploration might lead to too many ideas to follow-up or to too few ideas to add value within the exploitation strategy (Visscher et al., 2021, p. 627). Due to the different requirements of exploration and exploitation, the complexity of business ecosystems might become important (Visscher et al., 2021, p. 621).

7th Pathway: Acquisition of Capabilities and Knowledge

The seventh pathway and **corporate objective** is the acquisition of capabilities and knowledge. Accordingly, the **business ecosystem objective** is the exchange of skills and knowledge through r&d collaboration. Business ecosystems are an important external knowledge source (Cumming et al., 2009 in Haskell et al., 2016, p. 486). Skills and knowledge can be referred to technology, marketing (Yu et al., 2011 in Haskell et al., 2016, p. 489), or organizational learning skills in general (Cummings & Holmberg, 2012, p. 138). Technology-related collaborations attempt to complete a lack of resources or to reduce the time of development (Haskell et al., 2016, p. 489).

Selection criteria are learning-related (Cummings & Holmberg, 2012, pp. 144–147) and involve the evaluation of whether the partners have the needed knowledge and are able to make it available (Cummings, 2003 in Cummings & Holmberg, 2012, p. 145). This includes the evaluation of the extent to which the actors are **able to share both, explicit and tacit knowledge**, and the ability to locate the specific knowledge (Cummings & Holmberg, 2012, pp. 145–146). This is particularly relevant for technical knowledge, which is majorly tacit, as it is embedded in people and organization's routines (Volkoff et al., 2007 in Krammer, 2018, p. 933; Cummings & Holmberg, 2012, p. 145). Selection criteria referring to technology-related collaborations are: complementarity / compatibility, financial resources, r&d competencies, credibility / reputation, acceleration to market, possible future alliances, add to portfolio (pipeline), accepts shared risk and survival (Haskell et al., 2016, p. 497). For organizational learning, capability and compatibility are the most important selection criteria, for organizational positioning, control and commitment are necessary to avoid an opportunistic behavior of the partners (Medcof, 1997, pp. 727–728).

Cummings and Holmberg (2012) emphasize the importance of dynamic and time-sensitive elements as **influencing factors**. The dynamic components include the observation of the changing of selection criteria over time and the allocation of short- and long-term contracts to different partners (p. 153). The specific knowledge should be gained in a timely efficient manner (Cummings & Holmberg, 2012, p. 145), as this can be critical to the company's competitive advantage. The success of knowledge acquisition not only depends on the partners but also on the focal company's capability to effectively assess and acquire the relevant knowledge (Cummings & Holmberg, 2012, pp. 144–145). Therefore companies need the **capability to assess and the capacity to absorb** the partners knowledge or technologies (Mowery, 2002 in Krammer, 2018, p. 933; Cohen & Levinthal, 1990, p. 128).

8th Pathway: Strengthening of Customer Positions and Relationships

The strengthening of customer positions and relationships is the eighth pathway and **corporate and business ecosystem objective**. Business ecosystem types involve marketing or distribution collaboration to foster foreign market sales (Haskell et al., 2016, p. 489). Marketing- or distribution-specific **selection criteria** are: target market size, existing sales force, marketing competencies, capacity to buy, potential price, approval time, reimbursement policy, developed healthcare system, total population, respect of intellectual property, proximity, market diversification, risk diversification (Haskell et al., 2016, p. 497). A local partner with an experienced and established distribution of related products (Davidson, 1982 in Haskell et al., 2016, p. 489), market knowledge and access to distribution channels (Haskell et al., 2016, p. 490), and distribution networks is the ideal partner (Haskell et al., 2016, p. 495).

9th Pathway: Access to or Expansion of International Markets

The **objective** of access to international markets leads to the following specific **corporate and business ecosystem objectives**: access or entry to international markets (Hitt et al., 2000, p. 449; Jalali, 2017, p. 59), international expansion (Dong & Glaister, 2006, p. 577; Franco & Haase, 2015, p. 178; Holmberg & Cummings, 2009, p. 173), reduction of the liabilities of foreignness (Zaheer, 1995 and Mezias, 2002 in Franco & Haase, 2015, p. 170; Dong & Glaister, 2006, p. 588).

The **selection criteria** involve international knowledge, product knowledge (Dong & Glaister, 2006, p. 592) as well as market knowledge, access to distribution channels (Haskell et al., 2016, p. 490), and managerial capabilities (Hitt et al., 2000, p. 461). According to Hitt et al. (2000), companies from emerging markets emphasize the selection criteria financial assets, technical capabilities, intangible assets, and willingness to share expertise, while companies from developing countries preferred unique competencies and local market knowledge and access (p. 449). Cultural and organizational compatibility and similarity are important criteria as they lead to trust (Lunnan & Haugland, 2008 in Franco & Haase, 2015, p. 171; Bierly & Gallagher, 2007, pp. 140–141). Cultural similarity leads to lower organizational complexity, to higher knowledge sharing, to faster growth in trust and therefore facilitates innovation (Park & Lee, 2014 and Sunardi et al., 2015 in Vaez-Alaei et al., 2022, pp. 1009, 1016). However, the type of similarity seems to play an important role: cooperating similarity will lead to collaboration success, while competing similarity has a negative impact on collaborations (Kim & Parkhe, 2009 and Gulati, Wohlgezogen, & Zhelyazkov, 2012 in Vaez-Alaei et al., 2022, p. 1009).

Due to resource needs, learning opportunities, and other contextual factors, there is a difference in motives and partner selection criteria between developed and emerging markets (Hitt et al., 2000, p. 449) so that partner selection criteria are largely **influenced by** different nationalities (Brouthers et al., 1995 in Chand & Katou, 2012, p. 173) and institutional backgrounds (Dong & Glaister, 2006, p. 582). According to Hitt et al. (2000), a critical capability for international collaboration success is the **absorptive capacity** of the focal company to learn from international partners, especially in collaborations with developing markets and emerging markets (Cohen & Levinthal, 1990, p. 128 and Dyer & Singh, 1998 in Hitt et al., 2000, p. 453). Other influencing factors include collaboration experience and managerial capabilities, which reduce the spatial transaction costs of international collaborations (Hitt et al., 2000, p. 464).

When it comes to **international innovation activities** with the objective of exploration, the **international selection criteria** are similar to the national criteria, but complemented by the geographical distance, which has a positive effect on partner selection (Krammer, 2018, p. 938). For international exploitation, the international selection criteria are equally the same as the national criteria and extended by cultural similarity, and the fact that partners from similar or stronger regulatory environments regarding intellectual property (IP) rights are preferred for the purpose of innovation protection (Krammer, 2018, p. 933). Apart from **international**

function-specific objectives, the **selection criteria** for partners from emerging and from developing countries in general slightly differ: for developing countries, shared costs (acceptance to share costs) and performance are criteria which have to be additionally emphasized to the aforementioned function-specific criteria (Haskell et al., 2016, p. 504).

For international r&d collaborations shared risk and survival are further critical criteria (Haskell et al., 2016, p. 497). The priority of selection criteria differs between partners from developing and emerging countries: while financial resources, r&d competencies and credibility/reputation are the first priorities unique to companies from developing countries, the overall priorities for both, companies from developing and emerging countries are r&d competencies, acceleration to market, and financial resources (Haskell et al., 2016, p. 502).

The international marketing-specific selection criteria for developed markets are: target market size, marketing competencies, existing sales force, capacity to buy, potential price, approval time, reimbursement policy, developed healthcare system, and respect of intellectual property, and for both, companies from developing and emerging markets together: proximity, capacity to buy, approval time, existing sales force, target market size, potential price, total population, market diversification, respect of intellectual property and risk (Haskell et al., 2016, p. 504).

10th Pathway: Access to Resources

The **corporate and business ecosystem objective** access to resources can have multiple motives depending on the type of source needed, among others the leveraging of: financial capabilities, local knowledge, specialized skills, increasing their operational cost-effectiveness, address consumer privacy and security concerns (Doz & Hamel, 1998 and Willmott, 2000 in Cummings & Holmberg, 2012, p. 143). “Resource-sharing alliances may be formed to fill resource gaps, strengthen a market position, develop technologies, expand or enter new markets, strengthen customer positions and relationships or conduct joint production” (Cummings & Holmberg, 2012, p. 142) and companies can gain synergy advantages (Cummings & Holmberg, 2012, p. 143).

The **selection criteria** are based on a dynamic weighing of task-related, partner-related, risk-related, and learning-related criteria according to the underlying objectives and environmental factors (Cummings & Holmberg, 2012, pp. 141–152).

11th Pathway: Profit Sharing Within Software Development

The **corporate and business ecosystem objective** of profit sharing between software development companies aims for a fair profit distribution when developing software together and is thus specific to DBEs (Fahimullah et al., 2019, pp. 42860–42861). Not only the interest of the orchestrator, but the interests of all actors need to be considered, as all partners must agree to collaborate with each other within a business ecosystem (Mindruta et al., 2016, p. 208).

The **selection criteria** answer the question if and under which circumstances companies should cooperate within a business ecosystem composed of software companies. A cooperation is favored if the additional value of a DBE is higher than coordination cost and investment (Fahimullah et al., 2019, p. 42869).

The first criterion for the cooperation decision considers the impact of knowledge investment and thus the general contribution by both companies: equal and high contributions by both companies favor collaboration and greater payoffs will be achieved (Fahimullah et al., 2019, p. 42867).

A second criterion for the decision to cooperate or not is the impact of knowledge complementarity: if knowledge investment by all actors is equal and high, a collaboration is recommended and will lead to an equal payoff (Fahimullah et al., 2019, p. 42868). The distribution of payoff for the actors of a DBE is determined by the impact of knowledge complementarity, which is the difference of knowledge between the companies: the increase of knowledge complementarity leads to a decrease in total payoff for all actors, as the companies do not have enough **absorptive capacity** to acquire the knowledge from the other actors (Cohen & Levinthal, 1990, p. 128; Fahimullah et al., 2019, p. 42868). An equally high and similar knowledge investment (Fahimullah et al., 2019, p. 42868) and a cognitive-normative similarity thus favor a successful collaboration (Xu et al., 2004 and Pisano, 1990 in Krammer, 2018, p. 933).

The third criterion is the added value: a new product, a new technology, or a major innovation favors a collaboration. If there is only a minimum upgradation of an existing product or technology, the added value is less than the coordination cost and investment so that a collaboration is not recommended (Fahimullah et al., 2019, p. 42869).

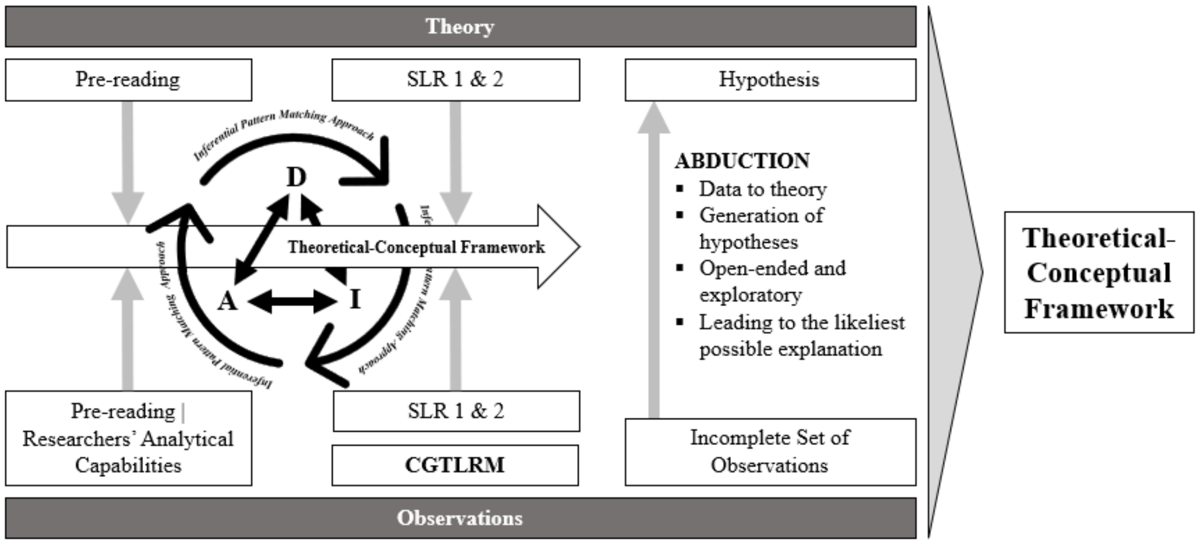
Working Hypothesis 18

Predefined objectives define the pathway for the partner selection approach and the final composition of the business ecosystem. They are transferable to different industries.

5.7 Development of the Theoretical-Conceptual Framework

The two SLRs serve both, as source for theoretical and observational data and they advance the theoretical-conceptual framework by abduction as an inferential process due to the cycling between observations and theory, leading to ABDUCTION, the first step of the **Inferential Pattern Matching Framework**. The complete methodological process of **ABDUCTION** developing the **theoretical-conceptual framework** is depicted in **Figure 45**.

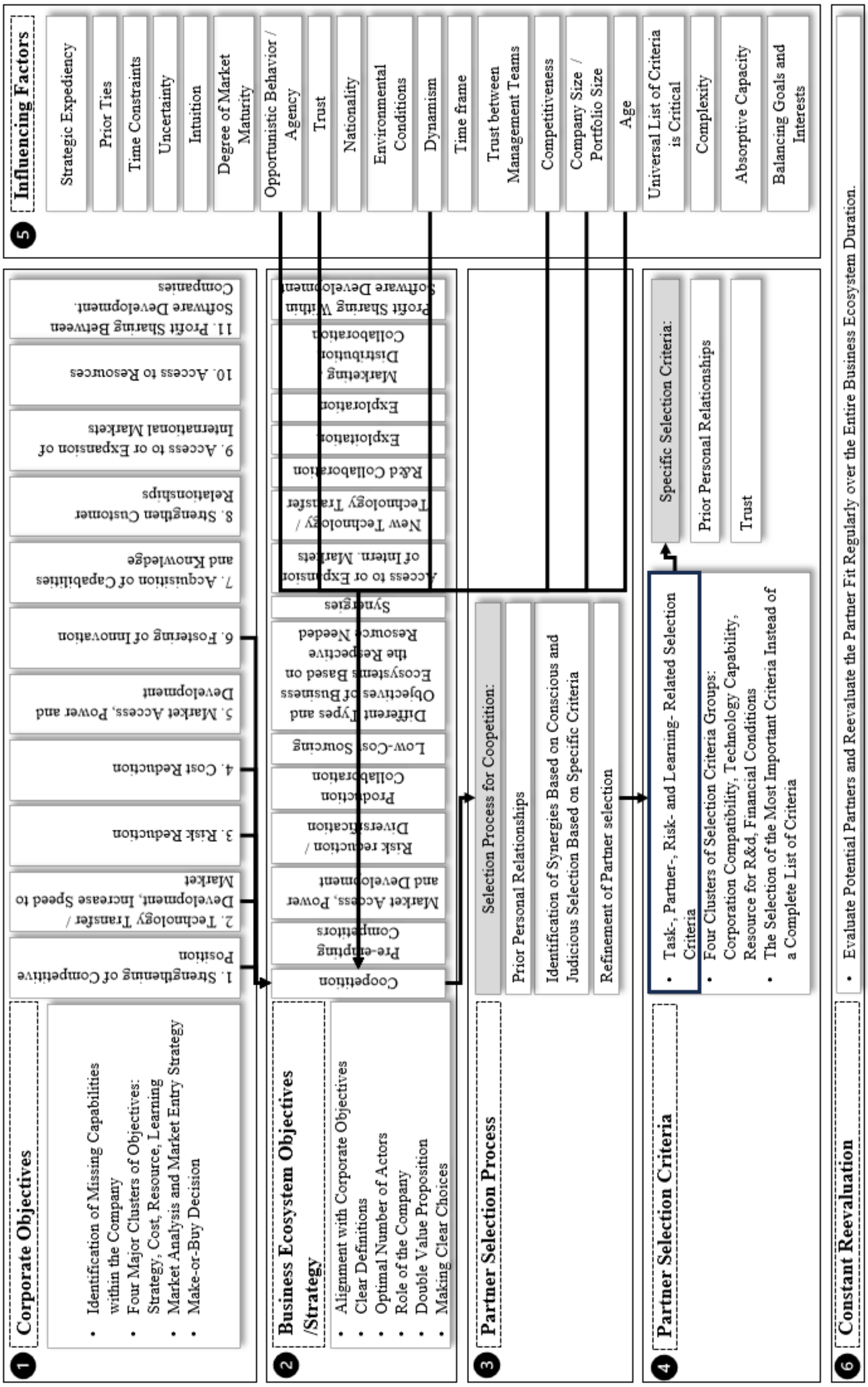
Figure 45. Development of the Theoretical-Conceptual Framework by Abduction



Source: Author's representation

The content of this theoretical-conceptual framework results from a consolidation of the following elements: the basic partner selection framework (**chapter 5.6.1**), the general partner selection process (**chapter 5.6.2**) and the application-oriented partner selection process (**chapter 5.6.3**). The systematic framework, exemplified by the first pathway of strengthening of competitive position and the business ecosystem strategy of coopetition is demonstrated in **Figure 46**. It further contains the corporate objectives for which partner selection processes could be identified, as well as the identified business ecosystem strategies and major influencing factors, which were mentioned more than once by the authors from the SLRs. This partner selection framework does not claim to be holistic in the sense of providing all possible application-oriented pathways, but it provides the major steps and relationships for a systematic partner selection framework. Together with the working hypotheses, this framework serves as the basis for the ongoing investigation and will be developed iteratively with the new insights generated by the **Inferential Pattern Matching Approach**.

Figure 46. A Systematic Partner Selection Framework for Business Ecosystems



Source: Author's representation

5.8 Identification of Research Gaps and Summary of Working Hypotheses

Based on an initial theoretical-conceptual framework, a hybrid method involving GT and GM was applied in this ABDUCTION chapter for the systematic collection and analysis of data, iterative coding and constant comparison of data between the two SLRs, which allowed for a structured approach to guarantee qualitative rigor but enabled enough flexibility at the same time for the exploratory extension of knowledge of this innovative topic (Gioia et al., 2013, p. 20). This approach therefore perfectly represents an abductive approach involving both, the inferential process and abductive reasoning (Timmermans & Tavory, 2012, pp. 179–180).

The resulting framework highlights that the identification of business ecosystem strategies and selection criteria according to the initial corporate objectives can be demonstrated by a general partner selection process and application-oriented pathways identified from observations and theories based on the SLRs. Despite the interesting insights, the observations made during the ABDUCTION chapter reveal the following **research gaps**, which will require further investigation:

First, despite some attempts to provide systematic partner selection processes, prior literature remains very fragmented in providing a systematic and holistic partner selection framework for business ecosystems (Beelen et al., 2022, p. 15; Holmberg & Cummings, 2009, p. 172).

Second, each application-oriented pathway identified is based on insights from a small number of articles. The generalizability of their applicability will thus need confirmation by further investigations.

Third, the interrelationships between the first steps of the partner selection process and the influencing factors are fuzzy, as well as the interrelationships among the different influencing factors.

Overall, a more in-depth investigation is needed. Based on the research gaps and insights gained by the abductive approach, the following **18 working hypotheses** were identified. These are illustrated in **Table 18**.

Table 18. Overview of Working Hypotheses

Working Hypotheses	Content	Topic
WH 1	Companies do not have a systematic approach for the selection of partners in business ecosystems.	**A Systematic and Dynamic Partner Selection Approach**
WH 2	A structured partner selection approach including the ▪ corporate objectives (1) ▪ business ecosystem objectives / strategy (2) ▪ the selection process (3) ▪ the selection criteria (4) ▪ as well as the influencing factors (5) is pivotal for the successful partner selection in business ecosystems since a simple list of selection criteria would not take into account the underlying objectives of the company.	
WH 3	The partner selection framework for business ecosystems must be systematic and dynamic at the same time.	
WH 4	The definition of the corporate objectives according to one of the four major clusters, strategy-, cost-, resource-, or learning-oriented, is the first step of the partner selection process within business ecosystems. Part of this first step is the identification of missing capabilities, a market analysis, a market entry strategy, and a make-or-buy decision.	**The Definition of Corporate Objectives as the First Step**
WH 5	There is a lack of clear definitions for business ecosystem objectives and strategies and a lack of clear distinction between business ecosystem types, which makes it difficult to choose targeted partners for the respective type of business ecosystem.	**Clear Definitions**
WH 6	The optimal number of actors within business ecosystems must be defined prior to the partner selection to define how broad or narrow the business ecosystem should be.	**Optimal Number of Actors**
WH 7	The role of the company and the type of actors need to be defined prior to the partner selection process.	**Roles**
WH 8	The identification of potential partners is based on the objectives and made from the managers' network, the same industry, or well-known companies. The identification of small, unknown companies is more based on coincidence than on a structured proceeding. Contact can be made by both, the orchestrator, or the partner.	**Identification of Potential Partners**
WH 9	Double value proposition: the orchestrator must be attractive for both, partners and its customers.	**Double Value Proposition of the Orchestrator**
WH 10	Having a clear strategy, making clear choices, and using clear terms are important prerequisites for a successful partner selection.	**Clear Strategy and Clear Choices**
WH 11	The partner selection process depends on the objectives the business ecosystem is pursuing.	**Partner Selection Process Based on Business Ecosystem Objectives**
WH 12	The development of general partner-, task-, risk-, and learning-related selection criteria according to the objectives and the further development of specific selection criteria according to these more general selection criteria is more important than having a rigid checklist of selection criteria.	**General Selection Criteria Instead of Checklist of Criteria**
WH 13	The time horizon of business ecosystems must be determined prior to the partner selection process.	**Timing**
WH 14	The development over time is a criterion which is of major importance and must be especially considered for the general and specific selection criteria in accordance with the company and business ecosystem related objectives.	
WH 15	The decision for the extension of, respective participation in an existing, or the creation of a new business ecosystem is dependent on the time available prior to the formation of the business ecosystem.	**Extension of, or Participation in Existing vs. Creation of New Business Ecosystem**
WH 16	The partner selection approach for the extension of, respective participation in an existing business ecosystem is different to the creation of a new business ecosystem.	
WH 17	The reevaluation of the partner fit over time is an important part of the partner selection process.	**Reevaluation of Partner Fit over Time**
WH 18	Predefined objectives define the pathway for the partner selection approach and the final composition of the business ecosystem. They are transferable to different industries.	**Pathway and Composition**

Source: Author's representation

Drawing on the results of this ABDUCTION chapter, the new insights and working hypotheses lead to a redirection of the research question (Tecuci et al., 2018, p. 10):

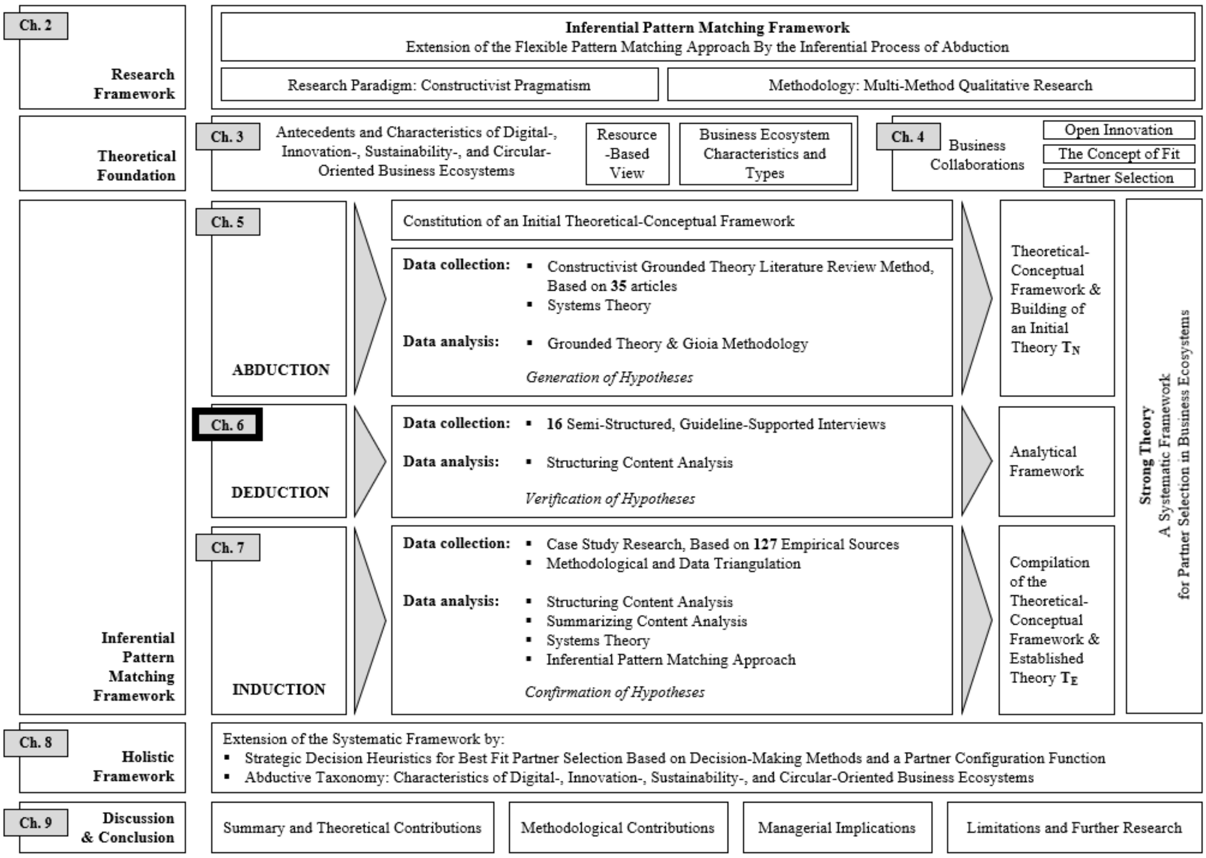
Research Question 3

How do companies systematically select partners in business ecosystems? What are the major elements and interrelationships within a systematic partner selection framework?

According to Sutton and Staw (1995), **strong theory** is achieved through the focus on one single research idea (p. 377). For the extensive investigation of the systematic partner selection framework in business ecosystems, a **high number of hypotheses** is necessary to consider the different perspectives on the partner selection framework, contributing to high deepness, as well as guaranteeing rigorous scientific research and the building of a strong theory (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377; Sutton & Staw, 1995, p. 378). The long list of working hypotheses identified in the ABDUCTION chapter is not completely used to build theory, it is rather iteratively narrowed down as the investigation progresses to identify the relevant elements leading to theory (Sutton & Staw, 1995, p. 377). In qualitative research the objective is to achieve comprehensive results rather than having a specific sample size (Morse, 1995, p. 147). As the developed working hypotheses illuminate the investigation from different perspectives, it is assumed that the 18 hypotheses are adequate to guarantee **data saturation** (Charmaz, 2006, p. 189; Glaser & Strauss, 1967, p. 61). This long list of working hypotheses builds $\mathbf{T_N}$, the beginning of theory building. The working hypotheses will be verified with the deductive approach in the following chapter (Minnameier, 2010, pp. 241-242; Peirce, 1931-58 in Ormerod, 2024, p. 59; Behfar & Okhuysen, 2018, p. 326).

Figure 47 illustrates the thesis structure leading to chapter 6.

Figure 47. Thesis Structure



Source: Author's representation

"Deduction [...] starts from a hypothesis, the truth or falsity of which has nothing to do with the reasoning; and[,] of course[,] its conclusions are equally ideal."

Charles Sanders Peirce

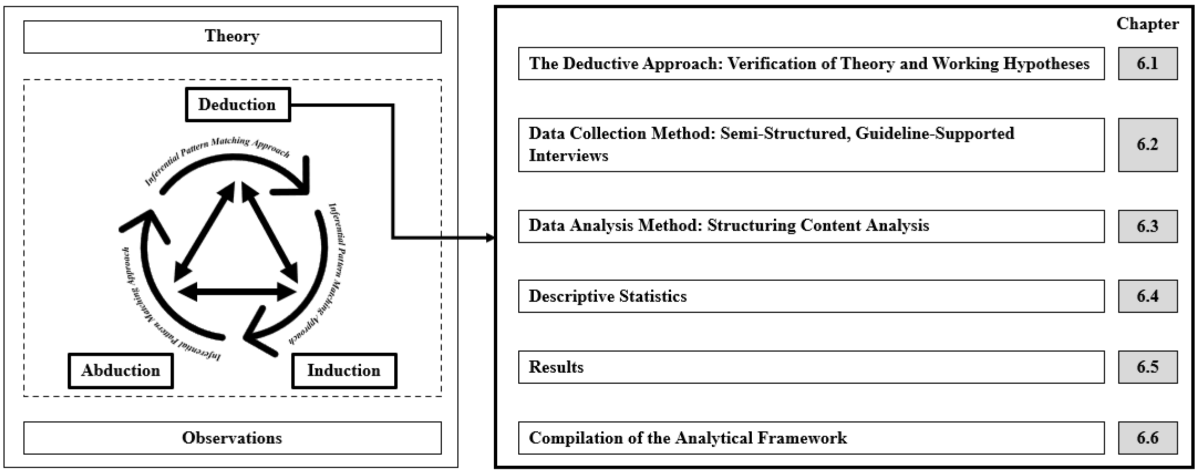
(Peirce EP 2: 205, 1903a in Wible, 2018, p. 145)

6 DEDUCTION

6.1 The Deductive Approach: Verification of Theory and Working Hypotheses

The gaps identified in the theoretical-conceptual framework in chapter ABDUCTION shall be verified and closed by patterns observed with the deductive approach in drawing the consequences from the resulting working hypotheses (Minnameier, 2010, pp. 241-242). The structure of this DEDUCTION chapter is illustrated in **Figure 48**.

Figure 48. The Structure of Chapter DEDUCTION

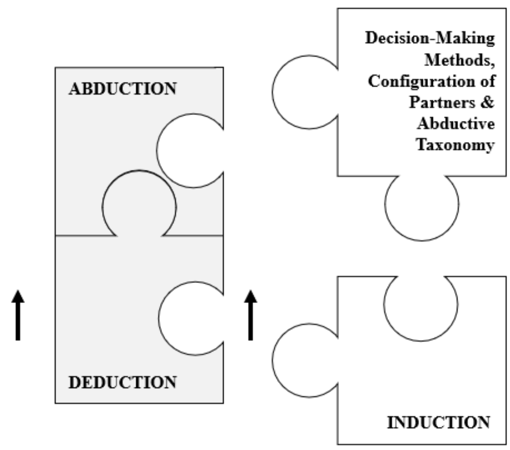


Source: Author's representation

This study employs the structured approach for **deductive qualitative analysis** according to Fife and Gossner (2024): after the determination of qualitative deduction as the appropriate methodology to answer the research question, the **guiding theory** as well as the **theoretical-conceptual framework** of the ABDUCTION chapter are employed. The research question is revised to ensure the fit to the guiding theory (p. 3). The verification of the working hypotheses can be accomplished with the deductive qualitative analysis, where the coding is focused on the already available theory and the theoretical-conceptual framework, which will be observationally verified (Fife & Gossner, 2024, p. 3; Linneberg & Korsgaard, 2019, p. 264). The DEDUCTION chapter finalizes with the further development of the guiding theory: evidence for the themes is interpreted and interconnections are proposed to provide the rationale for further research and the extension of the initial theory (Fife & Gossner, 2024, p. 7). **Theory building** is the iterative process taking place across the whole study, including induction or abduction and deduction, is tightly linked to data (Eisenhardt, 1989b, p. 532), and consists in operationalizing the **guiding theory**, implementing data analysis, gathering evidence, and validating or developing the guiding theory according to the findings (Gilgun, 2014 and Valencia Mazzanti & Freeman, 2023 in Fife & Gossner, 2024, p. 7; Shepherd & Sutcliffe, 2011, p. 362; Thompson, 1956, p. 104). It thus allows for the verification of theory and working hypotheses, in which evidence is supported, contradicted, refined, or expanded by combining an inductive or abductive analysis with deductive analysis within a same study (Fife & Gossner, 2024, p. 10). This highlights the importance of the deductive chapter in-between the abduction and induction steps for the **Inferential Pattern Matching Framework**.

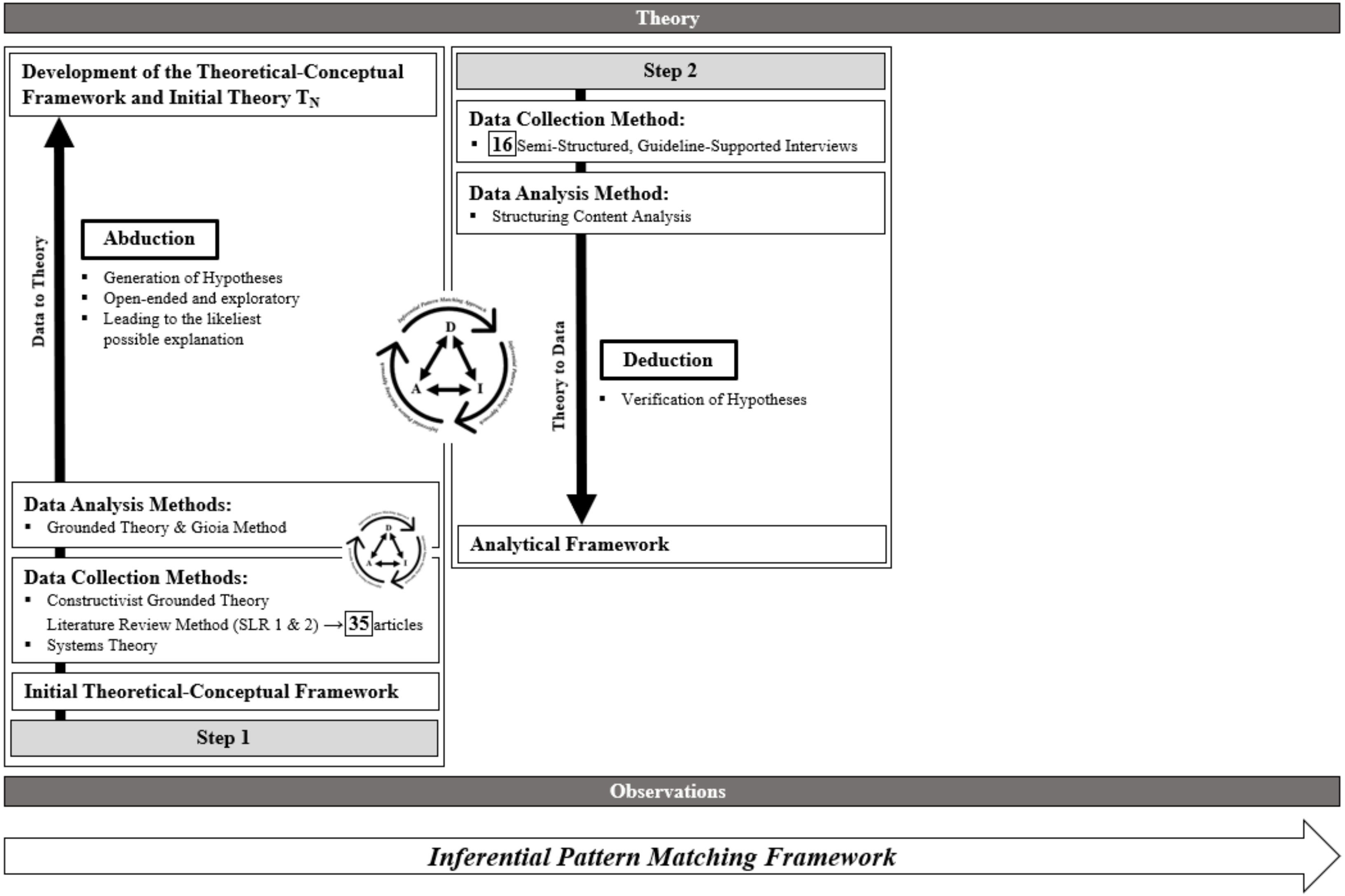
The DEDUCTION chapter will close the knowledge gaps of the ABDUCTION chapter and is illustrated as the deductive piece of the **Quadruple Puzzle of Holistic Research** in **Figure 49** and the second step of the **Inferential Pattern Matching Approach** in **Figure 50**, and builds the analytical framework of this investigation.

Figure 49. The Deductive Piece of the Puzzle



Source: Author's representation

Figure 50. Step 2: The Deductive Approach



Source: Author's representation

6.2 Data Collection Method: Semi-Structured, Guideline-Supported Interviews

For the **deductive qualitative** part of this study semi-structured, guideline-supported interviews are employed to systematically **verify, refine, or refute the hypotheses** (Gilgun, 2005 in Fife & Gossner, 2024, p. 2). Interviews are the most widely used tool in qualitative research (Qu & Dumay, 2011, p. 238) and will address the working hypotheses generated in the ABDUCTION chapter (Pearse, 2019 in Fife & Gossner, 2024, p. 5). The implementation of data collection from semi-structured, guideline-supported interviews is not an easy undertaking, involving a careful preparation and the development of expertise to ask informed questions (Qu & Dumay, 2011, p. 239).

Based on the quality criteria for qualitative research, validity and reliability are ensured by a questionnaire focusing on the research question, the hypotheses, and the guiding theory developed in the ABDUCTION chapter (Bryman et al., 2008, p. 274; Morse et al., 2002, p. 13; Yadav, 2022, p. 679). Semi-structured interviews allow for deviations from the questions for the purpose of exploring new insights from the interviewees: rigor is provided by a verification process based on constant interactions within the study leading to **constructivist-pragmatist scientific evidence** (Morse et al., 2002, pp. 16–19; Nonhoff, 2011, p. 91). Hence, the development of the questionnaire was based on these quality criteria and in line with the Interview Protocol Refinement Framework (IPR) including four major steps (Castillo-Montoya, 2016, p. 812):

1. Aligning interview questions with research questions such as to address the major gaps (Castillo-Montoya, 2016, p. 812)
2. Constructing a conversation which balances inquiry and conversation: questions need to be adapted to the language of the respondents (Castillo-Montoya, 2016, p. 813).
3. Receiving continuous feedback from interviewees as well as giving them feedback ensures that questions are well understood and in line with the research goal to enhance the quality of the responses (Castillo-Montoya, 2016, pp. 824–825; Patton, 2002, p. 375).
4. Piloting the interview protocol consists in simulating the interview and potential outcomes (Castillo-Montoya, 2016, p. 827) and involves for instance the determining of the order of interview questions (Merriam, 2009, p. 104 in Castillo-Montoya, 2016, p. 827).

According to this IPR, the interview was prepared: the questions were selected in such a way that the interviewees were given as much scope as possible in terms of content. The order of the questions in the questionnaire does not necessarily follow the order of the working hypotheses. The intention is to enable the interviewees to have a pleasant conversation thereby providing a maximum of direct and indirect information on the individual topics. At the same time, it ensures that the types and order of questions do not influence the direction of the answer. Potential respondents were contacted early in the process and questions were iteratively adjusted regarding the feedback on the overall topic. This approach supports the openness for discovery of the broad topic (Roberts, 2020, p. 3200) and ensures the generation of high quality data.

The semi-structured interviews were conducted by a second researcher under the guidance of this author with experts holding leadership positions from the field of business ecosystems and include senior managers, founders, partners, or directors from industry or consultancy companies. Contact was made by telephone, email, and the online network LinkedIn. The latter one was by far the most successful contact tool. In addition to a short introduction to the topic, an explanation of the relevance of the person addressed, and information about the interview, a standardized interview guide with the broad topics in German or English language was sent to the interviewees with the goal to provide them a rough picture of the research and interview topic, but without getting too much into detail. Sixteen interviews were conducted between April and July 2023 with interviewees based in Germany and lasted around 30 to 60 minutes.

Table 19 provides an anonymized overview of the sixteen interview participants and their organization characteristics. Most of the companies surveyed are important international or German companies from different industries: two of them belonging to the US stock market index Dow Jones Industrial Average, another two belonging to the German stock market index DAX, one belonging to the Swiss Market Index (SMI), the others representing very important German companies. Further to the companies, the survey includes six consultancy companies with four of them belonging to the highest ranked international top consultancies (Pütter, 2022, p. 2). This exquisite selection of top companies guarantees a high quality of statements and thus a maximum relevance. Personal and company names are anonymized, that is why the following overviews of company and industry characteristics are deliberately presented with largely reduced content.

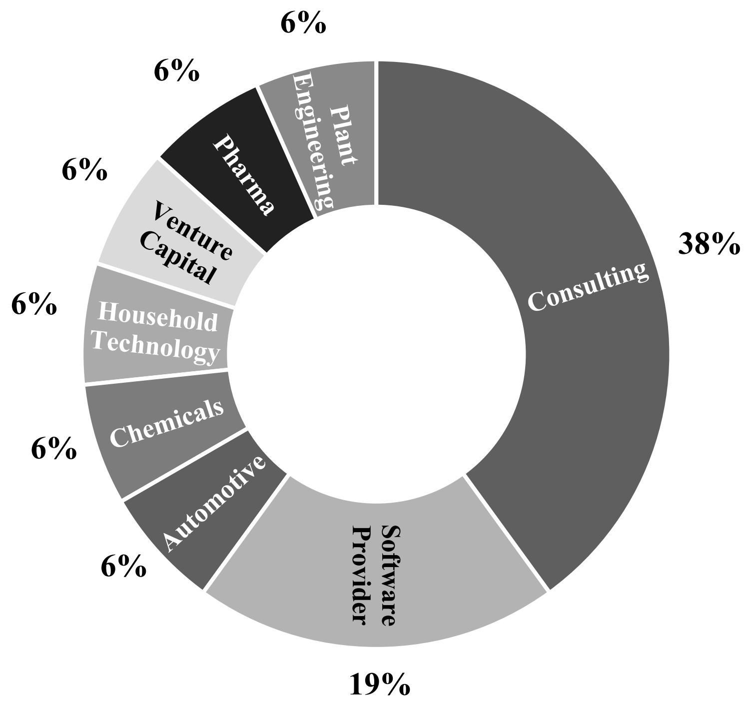
Table 19. Overview of Interviewee's Company Characteristics Listed According to Sales and No. of Employees

	Sales in Billion €	No. of Employees	Sales in Billion €	No. of Employees
	> 100	> 100 000	> 10	> 10 000
	> 100	> 100 000	> 1	> 10 000
	> 10	> 100 000	< 1	> 1 000
16 interviewees	> 10	> 100 000	< 1	> 1 000
	> 10	> 100 000	< 1	> 1 000
	> 10	> 100 000	< 1	< 1 000
	> 10	> 100 000	< 1	< 1 000
	> 10	> 100 000	< 1	< 1 000

Source: Author's representation, based on anonymized interview data

The **distribution of respondents' industries** is shown in the diagram in **Figure 51** and demonstrates that there is a wide coverage across seven different industries, enabling a multi-perspective view. This effect is enhanced by a major part of 38% represented by interviewees from consulting companies, having insights into multiple companies. In sum, this composition of interviewees guarantees a simultaneous generalized and specialized perspective and therefore provides a well-founded basis for multi-perspective analysis.

Figure 51. Composition of the Respondents' Industries



Source: Author's representation, based on anonymized interview data

Transcription means the transformation of recordings from an interview to a text (Duranti, 2006 in Davidson, 2009, p. 38). As it is impossible to record all features, the transcription is always to some extend selective (Duranti, 2006, p. 303). The researcher's interpretative competence is thus of major importance to understand underlying meanings and interrelationships inherent in an interview (Mero-Jaffe, 2011, p. 233).

6.3 Data Analysis Method: Structuring Content Analysis

6.3.1 General Aspects of the Qualitative Content Analysis

The **data analysis** is carried out by the deductive **qualitative content analysis** according to Mayring (2020), a qualitative data evaluation technique that allows for structured theory- and rule-driven evaluations (pp. 2-3), "seek[ing] to classify the discussion material into an effective number of categories that represent similar meanings" (Moretti et al., 2011, p. 420). The roots of qualitative content analysis can be traced back to its use in quantitative research: "a research technique for the objective, systematic, and quantitative description of the manifest content of communication" (Berelson, 1952, p. 18 in Cho & Lee, 2014, p. 3). In contrast to a simple content analysis (Moretti et al., 2011, p. 420), the advantage of the qualitative content analysis is the handling of large quantities of material and the capturing of deeper meanings due to its qualitative-interpretative nature (Mayring, 2015 in Mayring, 2020, p. 3). At the same time, the procedure is strictly rule-governed and can thus be verified intersubjectively thanks to precise rules (Mayring & Fenzl, 2019, p. 633).

The peculiarity of this procedure compared to other procedures is the category-driven focus, where raw data is coded into categories. This is indeed similar to the GT approach, but although the open coding in a first step developed theoretically from the material in an exploratory process, the categorization of a text passage in qualitative content analysis rigorously follows rules (Mayring & Fenzl, 2019, pp. 634–635). While GT is strongly oriented towards inductive or abductive theory-building and focuses on a theoretical sampling process, qualitative content analysis focuses on the deep analysis and interpretation after the collection of data (Cho & Lee, 2014, p. 5; Glaser & Strauss, 1967, p. 45).The basic concepts of content analysis are the determination of the goal of analysis, rule-drivenness through a content-analytical process model, the grouping of categories, and the provision of comprehensive results according to quality criteria (Mayring, 2000, p. 3).

There are three basic forms of qualitative content analysis.

First, in the **inductive** content analysis, also called the **summarizing content analysis**, or inductive category formation, the data is reduced to a manageable short text so that only the essential content remains. The focus is on the content level of the data. Open-ended interviews or different types of material are often the data source for summarizing content analysis. This procedure is thus very extensive. The aim is to derive categories from observations and not from theory (Mayring, 2014, p. 79).

Second, the **explication content analysis** is just the opposite: potentially unclear parts of the text that require interpretation are enriched by additional data to explain gaps in knowledge within the observational data. The challenge of explication content analysis is to determine how narrow or broad the context should be analyzed (Mayring, 2014, p. 88). Induction consists in an iterative process of observed data which are tested against more evidence to derive generalizations (Flach & Kakas, 2000, p. 3; Mantere & Ketokivi, 2013, p. 72). Abduction provides an explanation concluded from a rule and a result, with a conclusion being hypothetically plausible (Sarbo & Cozijn, 2019, p. 246) and the researcher's interpretative capabilities (Timmermans & Tavory, 2012, p. 179). Therefore, explication content analysis could be either **inductive or abductive** due to the iterative gathering of data to close knowledge gaps (Mayring, 2014, p. 88).

Third, the **deductive** category assignment, the **structuring content analysis** or content-analytical analysis, highlights certain aspects of the data. The assessment of data is carried out according to previously defined criteria by means of a coding guide. Based on theory, the coding guide is initially developed and further advanced and supplemented by the material. The text components addressed by the prior defined categories are then systematically extracted from the observations (Mayring, 2014, p. 95, 2020, p. 6; Mayring & Fenzl, 2019, p. 638).

The aim of qualitative content analysis is to make these basic forms of interpreting text describable and verifiable using content analysis rules (Mayring, 2020, p. 6). Scientific rigor is ensured by the integrity of the researcher demonstrated by the transparent presentation and traceability of the qualitative data (Ahrens & Dent, 1998, p. 9; Grodal et al., 2021, p. 607; Morse et al., 2002, p. 14; Prager et al., 2019, p. 377).

The breadth of the different analysis techniques also distinguish it from more intuitive methods of content analysis (Mayring & Fenzl, 2019, p. 635). The different types of qualitative content analysis and are compared in the following **Table 20**.

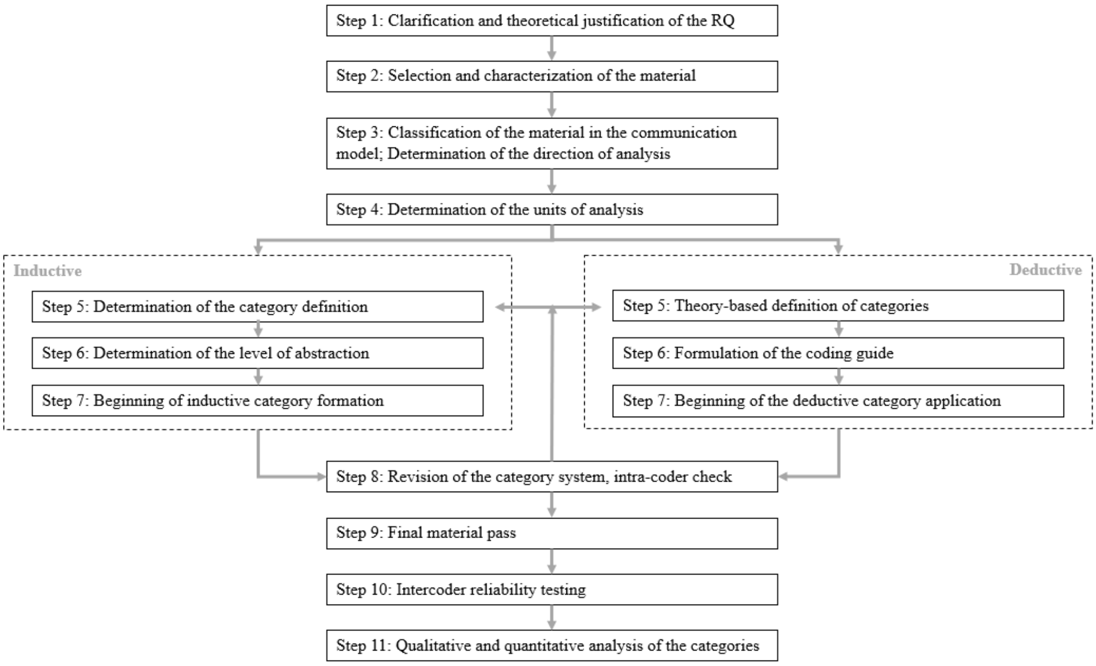
Table 20. Types of Qualitative Content Analysis

	Summarizing Content Analysis	Explication Content Analysis	Structuring Content Analysis
Aim	Data is **reduced** to a manageable short text.	The context of a statement is included. Potentially unclear parts of the text are **enriched** by additional data to explain gaps in knowledge.	Categories are built from the hypotheses. Relevant data is identified and extracted from the interviews to achieve a **match** to the categories.
Reasoning	Inductive	Inductive or Abductive	Deductive

Source: Author's representation, content adapted from Mayring (2014, pp. 64–65); Mayring (2020, pp. 4–7)

The qualitative content analysis procedure follows the process model for inductive category formation and deductive category application as illustrated in the following **Figure 52**: central to the procedure is the coding guide. Categories are derived inductively or deductively and then the text passages are assigned to the categories or new categories are inductively created according to the data. A modification of the categories during the process is possible but must then be consistently used in the final material pass. The content-analytical units such as coding, context, and evaluation units must be determined in advance. While the coding unit determines the smallest possible portion of text that can be divided into a category, the context unit determines which information can be used for the classification. The evaluation unit defines which material is available for analysis and categorization. An additional category for further information is intended to guarantee that information relevant to the hypotheses that do not fit into a category is recorded. To guarantee reliability, the data analysis is repeated to ensure stability of the categorization (Mayring & Fenzl, 2019, pp. 635–637).

Figure 52. Process Model for Inductive Category Formation and Deductive Category Application



Source: Author's representation adapted from Mayring and Brunner (2006) in Mayring (2020, p. 7) and Mayring and Fenzl (2019, p. 640)

Computer programs such as for example MAXQDA enable basically the **qualitative, content-analytical preparation and evaluation of large amounts of text** by creating codes and memos (Mayring, 2020, p. 8). However, for the deductive category application, the coding guide has to be placed in the memo window in a very complicated manner (Mayring, 2020, p. 8). With regard to the summary content analysis as an inductive approach, this is hardly possible with MAXQDA as it requires the flexible use of tables (Mayring, 2020, p. 8). The results of the interviews are so finely nuanced and statements are so implicit, that it requires the complete interpretation of a researcher instead of a program, especially with regard to the **constructivist-pragmatist** approach (Nonhoff, 2011, p. 91). In this respect, there is **no advantage in using a computer program like MAXQDA** for this investigation. The additional use of such a software could even lead to a false sense of security, as the researcher might rely on the fact that basic data has already been sufficiently grasped by the program and therefore might oversee implicit statements. In that case, relying on a computer program like MAXQDA, even partially, **could even be disadvantageous.** For this reason, a thorough and complete data analysis was conducted by the researcher using **Microsoft Excel**, which seems more appropriate due to its flexibility for the creation of classification tables enabling the analysis of complex datasets (Meyer & Avery, 2009, p. 91).

6.3.2 Application and Implementation of the Structuring Content Analysis

The interview survey follows a **deductive approach**; therefore, the **structuring content analysis** is applied. According to Mayring (2020, p. 12), the coding framework for deductive category application contains three elements: the category definition, the anchor examples, and the coding rules. The coding framework has been developed in this study by a more detailed framework and is shown as an example in **Table 21** for the purpose of demonstrating transparency in how the findings were developed from the data (Linneberg & Korsgaard, 2019, p. 260). This transparency is consistent with the quality criteria related to qualitative content analysis (Mayring, 2000, p. 3). This coding framework appears more sophisticated than the one proposed by Mayring (2020, p. 10), since contents are more clearly structured by a condensed meaning unit and a further column containing the interpretative meaning of the researcher enabling an in-depth understanding of the data.

Table 21. Coding Framework

Category	**Reference Example**	**Condensed Meaning Unit**	**Interview / Citation**	**Interpretative Meaning Unit**
Definition of Digital Business Ecosystems	This is a question of definition. What does platform mean? These terms are often used synonymously.	Terms are often used synonymously.	1.4 (interview 1, line number 4)	No distinction between platform and business ecosystem

Source: Author’s representation, in parts adapted from Mayring (2020, p. 10)

The structure of the **interview citations within the text** is as follows: *letter number.number*. The letter, D, indicates that the interview stems from this DEDUCTION chapter. The first number is the interview number, and the second number is the line number of the interview transcription. For instance, D 1.135 is interview 1, line 135. The line number always indicates the beginning of the relevant section of the cited text.

Based on the **constructivist-pragmatist approach** (Nonhoff, 2011, p. 91) this coding framework was dynamically adjusted in the course of the investigation in different ways, depending on the respective content:

First, for some topics, one interpretative meaning unit is not sufficient, the division into topic-oriented sub-categories hence delivers more targeted details.

Second, often, the assignment of the respective industry type to the data leads to more insightful findings. **Table 22** illustrates the exemplary sub-division of the interpretative meaning unit of the coding framework for the category "number of actors" with exemplary content.

Table 22. Exemplary Sub-division of Interpretative Meaning Unit of the Coding Framework for "Number of Actors"

Interpretative Meaning Unit						
Industry	**It depends / dynamic / other criteria more important**	**No optimal number**	**High scaling**	**High number**	**Small number**	**Number**
Software	It depends.	The optimal number is a black box.	High scaling	The more players, the better.	Small number is easier to manage than large number.	Minimum 4 partners.

Source: Author's representation

Third, a horizontal analysis of the different coding frameworks enables the uncovering of interlinkages among the categories. As for instance the selection criteria will be assigned to the corporate objectives to identify potential partner selection processes according to the pathway approach in the ABDUCTION chapter.

The data evaluation therefore follows a highly flexible coding framework, but which remains very close to the qualitative content analysis structure (Mayring & Brunner, 2006 in Mayring, 2020, p. 7 and Mayring & Fenzl, 2019, p. 640) for the purpose of ensuring **deep data gathering** and hence **rigorous scientific research** (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377; Grodal et al., 2021, pp. 591–593).

For the **data validation** the researcher considers Scheele and Groeben's (1988) suggestion of **validation of interview results**: elements not being validated by the interviewees will not be further considered in the investigation (Scheele & Groeben, 1988 in Flick, 2022, p. 537). This is consistent with the aim of this investigation to only use data confirmed among at least two of the main chapters, **ABDUCTION, DEDUCTION, and/or INDUCTION** in applying the **Inferential Pattern Matching Approach** with a move forward or backward.

6.4 Descriptive Statistics

6.4.1 Corporate Objectives for Digital Business Ecosystems in Practice

The purpose of the descriptive statistics is to give an overview of relevant figures, which are not directly part of the data analysis for the verification of the working hypotheses, but which are nevertheless important to understand the background of the results. The interviews reveal that there are several, different objectives for creating, developing, or joining a business ecosystem. According to the interviewees, the objectives either "depend" (D 4.126) or there are multiple objectives at the same time (D 6.107). Those of the interviewees who explicitly gave examples of objectives, mentioned at least two objectives, which are pursued in parallel.

Table 23 illustrates the objectives and their number of mentions. Figures in % were rounded off to whole numbers. The results indicate that even though the interviewees come from very different industries and have quite individual objectives, the major objectives can be **consolidated to nine most important objectives**, mentioned more than once. There are **nineteen objectives in total**. Only one count per interviewee is made. Objectives are ranked according to their number of mentions. At least one objective per interviewee is mentioned.

Table 23. Corporate Objectives Mentioned by the Interviewees

No.	Corporate Objectives	References	No. of resp. out of 16	% of resp.	Ranking
1	Generating sales, new sources of income, improve margins	D 1.86; D 2.97; D 3.92; D 5.153; D 5.172; D 8.106; D 15.98; D 16.63	8	50 %	**1**
2	Providing a complete package for customers. (Service), enlarge the service offering, increase overall customer benefit and comfort, lock-in-effects with the customers (upselling possibilities), credibility with the customer	D 5.175; D 6.13; D 13.98; D 14.6; D 8.114; D 10.71	6	38 %	**2/3**
3	New sales channels, market access, address more potential customers	D 5.159; D 6.120; D 8.106; D 9.51; D 10.71; D 14.71	6	38 %	**2/3**
4	Access to sales- or scarce resources	D 1.28; D 2.95; D 8.110; D 12.62	4	25 %	**4/5**
5	Joint (digital) innovations / innovative, shared solutions	D 2.100; D 11.114; D 13.90; D 16.45	4	25 %	**4/5**
6	Saving implementation costs and operating costs, cost optimization	D 6.13; D 7.133; D 8.108	3	19%	**6/7**
7	To do more for sustainability, reduction of CO_2, to transform the company towards environment	D 3.88; D 13.90; D 15.95	3	19%	**6/7**
8	Scaling trough partners / platforms	D 1.28; D 13.40	2	13%	**8/9**
9	Economies of scale or network effects	D 2.98; D 9.51	2	13%	**8/9**
10	Reduce delivery risks	D 5.166	1	6%	**10-19**
11	Remaining relevant for the market	D 6.120	1	6%	**10-19**
12	*It depends on*	D 4.126	1	6%	**10-19**
13	Enlarge networking of technology suppliers	D 6.110	1	6%	**10-19**
14	*Several at the same time*	D 6.107	1	6%	**10-19**
15	Growth	D 9.51	1	6%	**10-19**

16	Intermediary connecting technology companies with customers	D 5.159	1	6%	**10-19**
17	Satisfy suppliers	D 14.75	1	6%	**10-19**
18	To transform the company towards healthcare and future mobility	D 15.95	1	6%	**10-19**
19	Quality	D 16.63	1	6%	**10-19**

Source: Author's representation

An assignment of these empirical corporate objectives to the theoretical corporate objectives identified from the SLRs in the ABDUCTION chapter and ranked according to their number of mentions (**Table 17**) is depicted in **Table 24**. This table includes also those empirical objectives having no fit to the theoretical objectives but with multiple mentions.

Table 24. Comparison of Theoretical and Empirical Corporate Objectives

Corporate Objectives (=theoretical)	**Ran-king**	**Objectives Mentioned by Interviewees (=empirical)**	**% of Resp.**	**Ran-king**
Overarching objective		Generating sales, new sources of income, improve margins	50 %	**1**
Access to or expansion of (international) markets	**1**	Remaining relevant for the market	6 %	**10-19**
Exchange of skills / obtaining knowledge or learning skills	**2/3**			
Competitive advantage / position	**2/3**			
Cost reduction	**4**	Saving implementation costs and operating costs, cost optimization	19 %	**6/7**
Access to resources	**5**	Access to sales- or scarce resources	25 %	**4/5**
Market access, power, and development	**6**	New sales channels, market access, address more potential customers	38 %	**2/3**
Technology transfer, technology development, speed to market	**7**			
Risk reduction	**8**	Reduce delivery risks	6 %	**10-19**
Economies of scale	**9**	Economies of scale or network effects	13 %	**8/9**
Strengthen customer positions and relationships	**10-12**	Providing a complete package for customers. (Service), enlarge the service offering, increase overall customer benefit and comfort, lock-in-effects with the customers (upselling possibilities), credibility with the customer	38 %	**2/3**
Foster innovation	**10-12**	Joint (digital) innovations / innovative, shared solutions	25 %	**4/5**
Profit sharing between software development companies	**10-12**			
		To do more for sustainability, reduction of CO_2, to transform the company towards environment	19 %	**6/7**
		Scaling trough partners / platforms	13 %	**8/9**

Source: Author's representation

A total of **12 theoretical corporate objectives** is compared to a total of **19 empirical corporate objectives**. Results reveal that **more than half** of the theoretical corporate objectives (67%, eight out of twelve) are confirmed by practitioners. Among the six most important theoretical objectives are four objectives: **access to or expansion of markets / market relevance**, **market access, power, and development**, **cost reduction**, and **access to resources**, which are the most important ones in theory, and they are among the top seven in practice as well. The remaining theoretical objectives were not mentioned by the practitioners, which might be attributed to the following explanations:

- The theoretical objectives are too specific and do not correspond to the respective business ecosystem of the interviewees.
- The respondents did not provide a full list of objectives, but mentioned simply the most important ones, while the SLRs provided a larger range of objectives. As mentioned by D 6.107 and as stated within the SLRs, there is not just one single objective but several objectives, which are pursued simultaneously.

Generating sales, new sources of income, or improve margins is an objective mentioned by 50% of the respondents and is therefore of high relevance. Nonetheless, this corporate objective was not mentioned in theory. This might be explained by the fact that this objective is an overarching objective, superior to the more specific objectives. Each of the individual objectives has the overall goal of generating more sales or improving margins. There is thus no discrepancy in the theoretical and empirical objectives.

Among the most important corporate objectives for practitioners, which were not mentioned in theory, are the **promotion of sustainability and the reduction of CO_2 emissions**, ranked as the 6th or 7th of the most important objectives. Ecological sustainability and the reduction of CO_2 emissions are quite current topics, which have only recently gained momentum, especially with regard to business ecosystems (Yin et al., 2020, pp. 1–2). This might be an explanation why this objective has not been included in the two SLRs, even though the SLRs contain recent literature. It takes time for scientific literature to absorb new economic trends. The relevance of ecological sustainability should therefore not be neglected as a corporate objective.

Furthermore, practitioners mentioned the **scaling through partners or platforms** as the 8th or 9th important objective. Scaling is usually associated with platforms, but can also be an objective within business ecosystems, for instance the digital or international scaling (Tatarinov et al., 2023, p. 632; Zeng et al., 2023, pp. 608–609). The boundaries between DBEs and platforms are often not clear, neither in literature, as demonstrated by the SLRs, nor among practitioners, as demonstrated by the interviews (D 14.4). The fact that companies are present in many business ecosystems also implies high scaling (D 13.4). Even though not mentioned explicitly by the literature included in the SLRs, the scaling could be associated with the theoretical corporate objectives **market access, power, and development**, **access to international markets**, **international expansion**, and **technology transfer, technology development, speed to market**. Further, as demonstrated with the SLRs and as mentioned by the practitioners, there are several objectives which are pursued simultaneously (D 6.107). Scaling through partners or platforms could hence represent a core objective or a secondary objective, even though not explicitly mentioned.

6.4.2 Selection Criteria for Partner Selection in Digital Business Ecosystems in Practice

6.4.2.1 Analysis of the Selection Criteria

A total of 37 different selection criteria were identified from the interviews. As already stated within the analysis of the SLRs, the interviews confirm that an analysis of the importance of each single criterion is not expedient, as the selection criteria always depend on the corporate strategy and therefore the objective of the company (D 8.157; D 3.132; Chen et al., 2008, p. 451). Nevertheless, it is interesting to study the fit between the theoretical and empirical selection criteria. An assignment of the 37 selection criteria from the interviews (=empirical) to the 29 selection criteria from the SLRs (theoretical) is illustrated in **Table 25**.

Table 25. Fit of the Empirical and the Theoretical Selection Criteria

Selection Criteria from SLRs (=theoretical)	**Selection Criteria from Interviews (=empirical)**
Prior alliance partner / prior ties	Prior successful collaboration / personal relationships
Trust	Trust / confidence
Strategic fit / compatible goals	Strategic fit
Geographic proximity	International: Available partners in different international regions
Reputation	Reputation
Compatibility	Strategic fit
Financial stability	Partners with stability
Company size	Company size / Experience
Commitment	-
Cultural fit	Cultural compatibility
Capability	Innovative technology / skills / expertise
Control	-
Technology capability	Innovative technology / skills / expertise
Complementarity / dissimilarity	Complementarity (something we cannot make ourselves)
Access to resources	-
R&d	Innovative technology / skills / expertise
Similarity	-
Market knowledge/access	Market Reach: How many customers and potential new customers can be brought in?
Partner’s competency	Innovative technology / skills / expertise
Managerial capabilities	-
Inter-personal relationships	Prior successful collaboration / personal relationships
Product, development and research capabilities	Innovative technology / skills / expertise
Technical capabilities	Innovative technology / skills / expertise
Industry attractiveness	-
Age & experience	Company size / Experience

Differentiation between subjective and objective criteria	-
Target market size	Sales potential / Growth potential
Quality	Premium partners
Innovation	Innovative technology / skills / expertise
29	**14 different criteria, 22 criteria in total (multiple assignment)**
Confirmed:	**76% (=22/29)**

Source: Author's representation

From the 29 theoretical selection criteria, 76% (=22/29) can be confirmed in practice. In practice, the selection criteria are more generalized, so that many criteria from theory can be grouped to one single criterion in practice. Out of the 37 empirical selection criteria, 59% (=22/37) of the criteria can be overall assigned to the theoretical criteria due to multiple assignments, representing 38% (=14/37) different criteria. That means the other way around, 24% (=7/29) of the theoretical and 62% (=23/37) of the empirical selection criteria are without a respective fit.

Results emphasize that the selection criteria might have different definitions while meaning the same, so that many selection criteria from theory could be grouped to one single criterion in practice. Among the empirical selection criteria, the **strategic fit** appears to have a special status. The relative importance is indicated by the five respondents who mentioned strategic fit. There were two respondents who paid special attention to the strategic fit (D 12.33; D 15.133). One respondent even highlighted that the strategic fit is the only relevant selection criterion (D 11.151). According to one respondent, strategic fit is of major importance (D 12.93). Strategic fit can therefore be seen as a kind of **overarching selection criterion, preceding the remaining selection criteria**.

6.4.2.2 Application of the Inferential Pattern Matching Method

With the **Inferential Pattern Matching Approach** patterns are matched iteratively through the cycling between abduction, deduction, and induction (Sinkovics, 2018, pp. 6–8; Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 256; Minnameier, 2010, pp. 241-242; Linneberg & Korsgaard, 2019, p. 264; Timmermans & Tavory, 2012, pp. 179–180). At this stage, the INDUCTION part has not been treated so far, so that the cycling still concentrates on iterations among the chapters ABDUCTION and DEDUCTION. The **Inferential Pattern Matching Approach** is illustrated in **Figure 53**.

Figure 53. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

A feedback loop to the SLRs from the ABDUCTION chapter further supports the statement that **strategic fit** is the most important selection criterion (Bierly & Gallagher, 2007 in Alves & Meneses, 2015, p. 25): strategic fit cannot replace a thorough selection process but is the key criterion when the objective is the **access to resources** or **access to geographic or product markets** (Bierly & Gallagher, 2007, p. 136).

6.4.3 Summary of the Descriptive Statistics

A summary of the descriptive statistics is given in **Table 26** and provides a comparison between theoretical and empirical corporate objectives and selection criteria to demonstrate high congruence between the data.

Table 26. Summary of the Descriptive Statistics

No.	Topic	Descriptive Statistics
1	**Corporate objectives**	A total of **12 theoretical corporate objectives** is compared to a total of **19 empirical corporate objectives**.
2		**More than half** of the theoretical corporate objectives (67%, eight out of twelve) are confirmed by practitioners.
3		Among the **six most important theoretical objectives** are **four objectives,** market relevance, market access, power, and development, cost reduction and access to resources, which are the most important ones in theory, and they are among the most important ones (among the top seven) **in practice as well**.
4		**Generating sales, new sources of income or improve margins** was mentioned by **50% of the respondents** and is therefore an objective of high relevance, but can be regarded as an overarching objective, superior to the more specific objectives.
5		The **promotion of sustainability and the reduction of CO_2 emissions (1)** and the **scaling through partners or platforms (2)** are two empirical objectives without correlation to the SLRs but they are of high relevance due to its current trend
6	**Selection Criteria**	**29 theoretical selection criteria** are compared to **37 empirical selection criteria**.
7		**76%** (22/29) of the theoretical selection criteria are confirmed by the empirical selection criteria.
8		Due to multiple assignments, **59%** (22/37) of the empirical selection criteria can be assigned to the theoretical criteria.

9		**24%** (=7/29) of the theoretical and **62%** (=23/37) of the empirical selection criteria are without a respective fit.
10		**Strategic fit** can be seen as a kind of **overarching selection criterion**, preceding the other selection criteria.

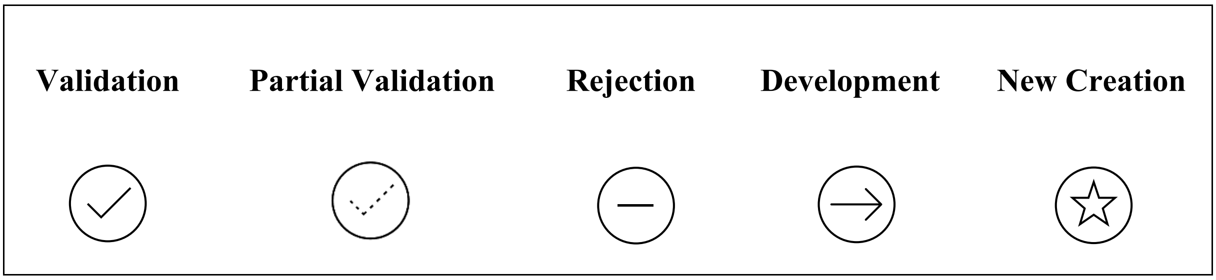
Source: Author's representation

6.5 Results

6.5.1 Clear Definitions of Business Ecosystem Types and Platforms and Their Distinction

The data analysis evidences if the working hypotheses from the ABDUCTION chapter are validated, partially validated, rejected, or newly created (Casula et al., 2021, p. 1709; Grodal et al., 2021, p. 605). For each of the three cases, dedicated symbols, as illustrated in **Figure 54**, are applied to make it easier to keep track. As the content of the working hypotheses generated in this chapter builds partially on each other, their order deviates in parts from their initial order.

Figure 54. Symbols for Validation, Partial Validation, Rejection, Development or New Creation of the Working Hypotheses



Source: Author's representation

The analysis in the ABDUCTION chapter revealed that a clear definition for different business ecosystem types as well as a clear distinction between different business ecosystem types and platforms is a major prerequisite for the successful choice of targeted partners (Cobben et al., 2022, p. 139; Jacobides, 2022, pp. 102–111). To test this working hypothesis 5 and based on the assumption that most types of business ecosystems in practice are called DBEs, the interviewees were asked how they would define and characterize their business ecosystem. The results indicate that the interviewees describe their types of business ecosystems as business ecosystems, DBEs, or platforms. The descriptions of each type are classified in the **Tables 27, 28, and 29**.

Table 27. Description of Business Ecosystems

Description	Interviewee / Citation
It represents how we interact with partners. And in terms of structure, we have three different pillars on how we interact with partners.	D 1.5
There is no ecosystem without some kind of platform. The BE is composed of processes, procedures, the companies, the people because they all work together and together produce the result.	D 3.14
A classical BE with our own Core IT, Cyber-Security and Digitization and work closely with external partners. Partners can be founder, or other consulting companies who support us with software development or with technology. Traditional ecosystem. Even with digital parts, like Generative AI or Large Language Models, it remains classically structured IT organizations.	D 16.4

Source: Author's representation

Table 28. Description of Digital Business Ecosystems

Description	Interviewee / Citation
Platform ecosystems are the best known and what most people associate with ecosystems - but we don't, because we say ecosystems are actually much broader. Ecosystems are much more than platforms and contain partnerships, governance and strategic questions.	D 2.6
DBE are socio-technical systems, where different organizations and human beings cooperate voluntarily for a mutual benefit.	D 3.8
The sum of all processes which are supported by IT, with interfaces to business. There are many actors and therefore the environment is heterogeneous. Each business function is supported by IT. This support does not happen once, but for a whole product or service lifecycle.	D 7.4
DBE means that companies have a solution and wish to connect it with further solutions they receive form partners, where they have no own solution.	D 8.4
Companies use a wide variety of elements from different types of ecosystems and thus individually put together their own ecosystem.	D 13.4

Source: Author's representation

Table 29. Description of Platforms

Description	Interviewee / Citation
A platform is more of a means to an end that can ultimately represent the ecosystem or bring the partners together.	D 2.9
Platform is the technical enabler. Platform is always part of an ecosystem. There is no ecosystem without some kind of platform.	D 3.13
Platforms are Hyperscaler, like AWS, Microsoft, Google, or Alibaba, but also SAP, Salesforce, or Oracle. Each of these platforms also has a new ecosystem around it.	D 5.21
A multi-sided platform model where they try to save implementation and operating costs. To broaden the service offering.	D 6.13

Source: Author's representation

This classification of the different descriptions made by the interviewees regarding business ecosystems, DBEs, and platforms confirms what is stated by some of the respondents: the **boundaries** between the characteristics and notions are **blurring** and there is **not a universal definition or description** (D 1.4; D 8.4; D 12.4; D 16.4). Interviewee 13, for instance, sees a DBE as a composition of different elements coming from different DBEs (D 13.4). Interviewee 5 recognizes that a business ecosystem is always context-specific and that it can take many different forms, that is why a single definition cannot be given (D 5.5). Despite the fuzzy notions, most of the respondents understand platforms as a kind of enabler, who brings partners together and which is part of a business ecosystem (D 3.13; D 2.9). Business ecosystems in turn, contain partnerships, governance, and strategic questions, representing socio-technical systems, where different organizations and human beings cooperate voluntarily for a mutual benefit, while DBEs are further supported by IT (D 2.6; I 7.4).

An interpretation of the results reveals that two out of sixteen respondents have difficulties in defining business ecosystems, DBEs and platforms (D 1.4; D 1.19; D 13.4). They know what they are doing, but there is no unified definition of the type of business ecosystem used. This is demonstrated by interviewee 15 whose company seems to have an **innovation ecosystem** for the purpose of being connected into all directions, which is combined with a **DBE** for the purpose of data sharing (D 15.13; D 15.155).

Even though the notions for the types of business ecosystems are different and sometimes their distinction is not clear, there is no empirical evidence that a lack of clear definitions for different business ecosystem types and a lack of clear distinction between business ecosystems and platforms complicates the partner selection process, though a correlation can be assumed. Working hypothesis 5 can therefore only partially be confirmed and needs to be further investigated.

Working Hypothesis 5
There is a lack of clear definitions for business ecosystem objectives and strategies and a lack of clear distinction between business ecosystem types, which makes it difficult to choose targeted partners for the respective type of business ecosystem.

6.5.2 Number of Actors

The empirical data is consistent with the SLRs regarding the optimal number of actors to be selected: no author from the SLRs mentioned an optimal number of actors and 44% (7/16) of the respondents explicitly stated that there is **no optimal number of actors**. 69% (11/16) clearly state that the number of actors depends on the industry, is dynamic, or that other criteria like quality, fit of the partner, or a mix of different partners with big players and niche partners (D 10.89; D 14.101; D 15.125; D 16.84) are more important than the number of actors.

25% (4/16) mention high scaling as important, which means having as much actors as possible. They can be attributed to platform or software providers (D 1.112; D 3.115; D 7.153; D 8.135).

31% (5/16) of the respondents mention a **small number of actors**. They believe that a small number is easier to manage than a large number. All of them can clearly be attributed to a strategic oriented type of business ecosystem and not to a platform (D 4.149; D 8.135; D 13.120; D 15.125; D 16.84).

One of these four respondents additionally states that from a customer perspective it is better to have a **high number of actors** (D 13.120). Respondent 13 can be attributed to a DBE (D 13.4). 25% (4/16) of the respondents name a minimum of 4 to 20 actors (D 2.116; D 12.79; D 15.125; D 16.84).

According to interviewee 2, it is important to check whether taking on another partner and the associated trade-off balance each other out and whether it is worth taking on more partners (D 2.83). The number of actors thus results from a **step-by-step approach** according to the needs of the business ecosystem.

In summary, it is not a surprise that high-scaling platforms favor a very high number of actors, while other types of business ecosystems favor lower numbers of actors. The results are controversial and indicate that the number of actors depends on the industry, is dynamic, a step-by-step approach, or other criteria, like the quality, fit, or right mix of partners are more important than the number of actors. Especially for DBEs there is no clear statement if a low or high number of actors is needed. Further, it is not clear from the data what is exactly meant by a low or a high number. The data illustrate some trends, but no generalization can be made, and no empirical evidence can be found to support the hypothesis that the number of actors within business ecosystems is decisive and must be defined prior to the partner selection process. Working hypothesis 6 is rejected.

Working Hypothesis 6 The optimal number of actors within business ecosystems must be defined prior to the partner selection to define how broad or narrow the business ecosystem should be.	⊖

6.5.3 Distribution of Roles

The role distribution is relatively balanced among the respondents. 31% (5/16) of the respondents state that they have **both, the role of the orchestrator and the role of the partner**. Each role depends on the respective objective (D 11.26). Several roles increase the complexity of the network, especially when competitors are part of it (D 1.42). This highlights the importance of a careful role assignment. Respondent 2 confirms the importance of the right role: "having a shared understanding of the roles and equal distribution is important and to accept not being the orchestrator" (D 2.40).

25% (4/16) of the respondents describe themselves as an **orchestrator**. The reasons for being interested in obtaining the role of orchestrator are multiple: being owner of the core competence (D 16.16), having the capabilities for it so that the business ecosystem is efficient (D 12.62), or as a large company having the power to control everything (D 9.11). According to respondent 9, "everyone tries to be the orchestrator, to be the one who owns or manages the whole thing" (D 9.11). It can be concluded that the orchestrator role implies power.

25% (4/16) of the respondents describe themselves as an **actor or partner**. In the **financial services industry**, there is a tendency towards being an actor and not an orchestrator, simply because the know-how and technology are lacking in-house (D 6.31). The **household industry** tries to be one partner among equals in many different areas of home applications (D 13.23). The objective for this industry is more target oriented and focused on providing a premium solution to its customers (D 13.62), than having control over the business ecosystem. The type of actors and its designation varies depending on industries or business ecosystem types and purposes: The **sustainability-software platform provider** mentions three different roles inherent to the platform: the buyers, the mediator, which is the orchestrator, and campaign providers which are companies carrying out sustainability campaigns (D 3.36). A **software provider** mentions academic institutions for research, consulting companies for cross-selling, and technology providers for reselling of their software (D 10.19).

The word complementor was not even mentioned by the interviewees. The words partner and actor are used interchangeably among the respondents, as it is the case in literature (Adner, 2017, p. 42; Poblete et al., 2022, p. 301). While platforms are about scaling, other types of business ecosystems focus on the manageability of the different roles (D 11.26). Due to the increasing complexity to manage several different roles, the importance to carefully define the role of the company and the type of actors or partners becomes even more evident.

In summary, the empirical data highlight that it is important to carefully assign the roles (D 2.40). The role of the orchestrator is dedicated to those having the core competence or capabilities to manage the business ecosystem efficiently (D 12.62; D 9.11). Often, large companies with a claim to power try to obtain the orchestrator role (D 9.11). The partner or actor role is usually taken when in-house resources are lacking and an access to resources is needed. Another reason for the partner role is when the objective is not the thrive for power, but a focus on providing premium solutions to customers. According to the empirical data, role distribution appears to be dependent from the industry context and the respective objective (D 3.36; D 6.31; D 10.19; D 13.23; D 13.62). It can be concluded that the role distribution plays a major role for the partner selection. Working hypothesis 7 is thus clearly supported.

Working Hypothesis 7

The role of the company and the type of actors need to be defined prior to the partner selection process.

The role of the orchestrator is important due to the double value proposition: the orchestrator must be attractive for both, customers and partners (Jacobides, 2022, pp. 112, 116). This double value proposition is confirmed by the respondents: “I definitely always have to make sure that I have a certain support structure, both for the partners and that the support knows what’s going on with customers when they’re networked with the ecosystem with several partners” (D 8.38). The customer perspective is often forgotten, but important part of it (D 2.40). Having an excellent partnership is as important as being orchestrator for the customers (D 5.32). The double value proposition is of particular interest for platform providers, who connect partners with customers (D 12.13).

In summary, the double value proposition is important to be considered when selecting partners in business ecosystems or platforms. Working hypothesis 9 is thus clearly supported.

Working Hypothesis 9 Double value proposition: the orchestrator must be attractive for both, partners and its customers.	✓

It has to be acknowledged that usually **a company holds many different roles**, as the company business ecosystem is seen as a **portfolio of different business ecosystems** and this portfolio needs to be managed by the company (D 4.11; D 12.33).

6.5.4 Identification of Potential Partners

The empirical data regarding the **identification of potential partners** delivers interesting new insights: 44% (7/16) of the respondents confirm that contact can be made by both, the orchestrator, or the partner and that the initiative for contact depends on several different influencing factors. 13% (2/16) confirm that contact is made by the orchestrator, equally 13% (2/16) state that contact is made by the partner and 25% (4/16) confirm that contact is made from outside or the one who has the greatest need, without mentioning the respective role. The empirical data imply that the focus is not so much on the respective role, orchestrator or actor, or the type of actor, but on the respective objective and especially fit of the partner: “we can only work together if they show a certain level of commitment” (D 10.46).

There are mainly four contact channels: potential partners are identified from the same industry or market (D 5.136; D 6.79), from customer projects (D 5.136), from personal relationships or contacts (D 6.79), from hearsay (D 1.77), or a market review is made to actively identify potential partners (D 5.136).

Small companies usually actively approach bigger companies, as they are unknown (D 6.79; D 8.88), while larger companies are generally addressed by the partners, as they are well-known due to their size (D 3.81; D 6.95; D 8.88; D 16.45). Large companies only take the initiative for actively contacting partners for an innovation leap (D 13.81). The one who has the greatest need approaches the other, independent of the company size and the role (D 4.112; D 6.75).

The identification process is either a structured approach or more opportunistic, as companies often identify partners based on prior relationships (D 6.84). It is thus assumed, that for all company sizes the identification of potential partners is often based on coincidence. Overall, the interviews make the impression that the identification process changes with the experience and maturity of the business ecosystems. Business ecosystems appear to be long-term oriented so that there is not a regularly recurring identification process; rather the **identification is made once, and gaps are filled later to optimize the partner composition** (D 10.46). Working hypothesis 8 is partially dropped and partially confirmed.

Working Hypothesis 8 The identification of potential partners is based on the objectives and made from the managers' network, the same industry, or well-known companies. The identification of small, unknown companies is more based on coincidence than on a structured proceeding. Contact can be made by both, the orchestrator, or the partner.	

At this point it comes into play again the **Inferential Pattern Matching Approach**, as indicated by **Figure 55**, to find potentially confirming insights back in the ABDUCTION chapter:

Figure 55. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

Insights from the ABDUCTION chapter reveal that the identification process is a more structured one and partners are actively identified in applying a market review, also termed network approach (Chen, 2003 in Rong, Wu et al., 2015, p. 3).

As it is not targeted to follow up a partially dropped working hypothesis, working hypothesis 8 is further developed. This is consistent with Grodal et al. (2021), who propose to constantly develop the working hypotheses, which "[…] allows the researcher to examine whether the data truly support the theoretical conclusions reached in the prior stages and to be more actively reflexive of how these conclusions were reached" (p. 603). The new findings lead to a **development of working hypothesis 8**, thereby forming the following new working hypothesis 8A (Grodal et al., 2021, pp. 603–604):

Working Hypothesis 8A

The identification of potential partners is based on their objectives and made from prior relationships / hearsay, by coincidence, or a market review is made to actively identify potential partners. Contact can be made by both, the orchestrator, or the partner. Small companies usually actively approach bigger companies, as they are unknown, while larger companies are generally addressed by the partners, as they are well-known due to their size.

6.5.5 General Partner Selection Criteria Groups in Practice

Cummings and Holmberg (2012) provide a detailed understanding of the general partner selection criteria groups: partner-, learning-, task-, and risk-related selection criteria (pp. 142-152). An assignment of the partner selection criteria from the interviews to these general partner selection groups is demonstrated in **Table 30**. The highlighting of the congruent selection criteria with the **theoretical selection criteria** identified from the SLRs shows that **partner-related selection criteria** are majorly focused when selecting partners.

Table 30. Assignment of the Selection Criteria from the Interviews to General Partner Selection Criteria Groups

Partner selection criteria group	**Specific selection criteria from interviews (congruent selection criteria with theoretical selection criteria are in bold letters)**	**Partner selection criteria group**	**Specific selection criteria from interviews (congruent selection criteria with theoretical selection criteria are in bold letters)**
Partner-related selection criteria	**Reputation**	**Task**-related selection criteria	Relevance of the partner
	Strategic fit		Market Reach: How many customers and potential new customers can be brought in?
	International: Available partners in different international regions		Sales potential / Growth potential
	Prior successful collaboration (personal relationships)		Scalability (platforms and interfaces)
	Flexibility		Maturity of a service or product
	Trust / confidence		Business Impact
	Cultural compatibility		Content
	Company size / Experience		Technically agree on certain rules
	Being on trend in collaborating with start-ups with media attention		Brand fit
	Partners with stability		**Complementarity (something we cannot make ourselves)**
	Premium partners		Shaping the service of the partner
	Shared understanding of the experience for the customer	**Risk**-related selection criteria	Risk Management / Security aspects
	Timeline (are the partners currently available and have the resources)		Data-protection
Learning-related selection criteria	**Innovative technology / skills / expertise**		How long-lasting is the digital system? / Dependency on the digital supplier / Business continuity
	Digital-specific		Compliance due diligence to avoid corrupt partners

	Products: Quality		Reliable Technology
	Solution capability		Contract conditions
	Established product: Commercially available product, which can quickly be incorporated into the ecosystem and offered to the customers.	**Cost-benefit-** related selection criteria	Price (non-monetary)
			Incentive system: Can we provide the benefit the partner is looking for? Can we find a compromise?

Source: Author’s representation, criteria groups adapted from Cummings and Holmberg (2012, pp. 142–152), Chen et al. (2008, p. 453)

The application of the **four clusters of criteria groups**, corporation compatibility, technology capability, resources for r&d, and financial conditions, described by Chen et al. (2008, p. 453) is partially redundant with Cummings and Holmberg’s (2012, pp. 142–152) criteria groups. The first ones lack the risk-related group, which appears to be important, especially for DBEs, as data protection and software continuity are major concerns of the interviewees (D 4.168). Instead, Chen et al. (2008, p. 453) provide a financial conditions group to which the selection criteria incentive system and price (non-monetary) can be attributed. Non-monetary price (D 7.183; D 16.107) can be interpreted as a cost-benefit analysis such as to evaluate the cost of sharing data or information with other companies compared to an estimated benefit. Cummings and Holmberg’s (2012, pp. 142–152) criteria groups are validated, as their description more precisely fits to the selection criteria (pp. 142-152). Further, the cluster financial conditions from Chen et al. (2008) is added to the list and denominated into **cost-benefit-related selection criteria** (p.453).

Referring to the interviews, the assignment of selection criteria to the cluster of criteria nevertheless offers no added value. The significance of such a table is low, as no distribution scheme among the different selection criteria groups can be identified. Companies use a criteria or requirements catalog which is specific to their corporate objective (D 11.146; D 4.71). Working hypothesis 11 is confirmed and working hypothesis 12 is rejected.

Working Hypothesis 11 The partner selection process depends on the objectives the business ecosystem is pursuing.	✓

Working Hypothesis 12 The development of general partner-, task-, risk-, and learning-related selection criteria according to the objectives and the further development of specific selection	—

criteria according to these more general selection criteria is more important than having a rigid checklist of selection criteria.

Due to the new insights, working hypothesis 12 is modified to working hypothesis 12A (Grodal et al., 2021, pp. 603–604):

Working Hypothesis 12A

A criteria or requirements catalog is not used solely but as part of the partner selection process.

6.5.6 Time Horizon and Development

6.5.6.1 Analysis of the Duration and Time Development of Business Ecosystems

The analysis of the duration of the different business ecosystems reveals the following results: despite the mix of different types of business ecosystems, 69% (11/16) of the respondents are of the majority opinion that there is no predefined timing, no time-limit, or that the tendency is versus a long-term duration, while only one respondent states that the duration is definitely predefined and contractually agreed but contracts are constantly being extended (D 16.70). In this sense, a long-term orientation can generally be assumed, as the constant extension of contracts can be regarded as a precautionary measure. 31% (5/16) of the respondents mention an ongoing evaluation process. The duration in years is quite different, ranging from 3-5 years (D 12.71), 1-10 years (D 11.133), minimum 3-10 years (D 4.128) to minimum 10 years (D 3.105). The long-term orientation particularly for platforms might be explained by the fact that platforms thrive on the large number of actors, so a time limit on participation makes little sense. By their nature, relationships in business ecosystems in general are rather soft, so partners are not required to deliver and that is why there is usually no time-limit (D 15.110). Most business ecosystems are very **long-term oriented**, without any predefined end so that the considering of the time horizon is not relevant for the partner selection process. Working hypothesis 13 must therefore be rejected.

Working Hypothesis 13

The time horizon of business ecosystems must be determined prior to the partner selection process.

The **development over time** leads to the following results: 19% (3/16) of the respondents argue that selection criteria remain fundamentally the same over time (D 5.228; D 9.83; D 16.122). 44% (7/16) of the respondents clearly state that business ecosystems develop over time and that particularly the selection criteria change over time (D 8.157). Working hypothesis 14 is thus supported.

Working Hypothesis 14 The development over time is a criterion which is of major importance and must be especially considered for the general and specific selection criteria in accordance with the company and business ecosystem related objectives.	✓

6.5.6.2 Application of the Inferential Pattern Matching Method

A move back to the ABDUCTION chapter and matching with data from the DEDUCTION chapter in applying the **Inferential Pattern Matching Method** as illustrated in **Figure 56** uncovers deeper insights and thus contributes to the goal of rigorous research (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377).

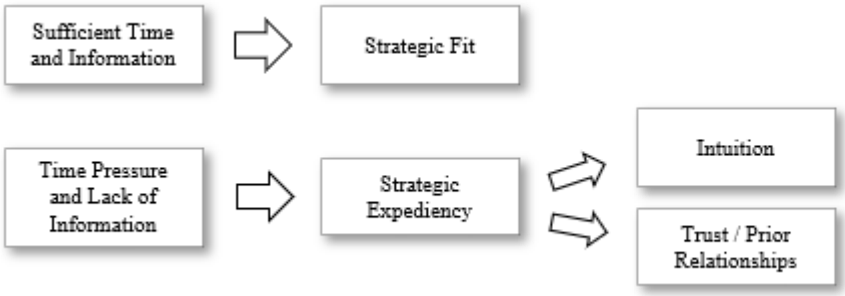
Figure 56. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

The investigation reveals that the **timing has clear implications for the selection criteria** in the way that with **sufficient time** and information, the focus is on the **strategic fit** when selecting a partner. In the case of time pressure, effective partner selection is described as **strategic expediency**, which is "the capability to make rapid, high-quality decisions within a simplified, bounded framework" (Bierly & Gallagher, 2007, p. 135). With a lack of time available prior to the partner selection process managers will rely on **intuition** and **trust** instead of rational decision-making criteria (Bierly & Gallagher, 2007, p. 135; Bierly & Gallagher, 2007 in Alves & Meneses, 2015, p. 25). The interviews provide evidence for this behavior, as with a lack of systematic selection processes identifying the partner fit, partners rely on **prior relationships** indicating a certain level of trust (D 5.98; D 6.60).

This relationship is illustrated in **Figure 57**.

Figure 57. Influence of Time and Information on the Selection Criteria



Source: Author's representation

The lack of time and information effect can be to some extent moderated by a **DBE**, as "you can onboard faster and are more flexible. And you can simply act faster. Simply because data can be stacked more quickly if the interfaces fit" (D 2.146). This statement is consistent with the findings of Beelen et al. (2022, p. 2): Time pressure and lack of information can be overcome by a DBE. Therefore, the type of business ecosystem has an impact on the selection criteria and influencing factors. This leads to the newly created working hypothesis 19.

Working Hypothesis 19

The time and information available prior to the partner selection process determine how much companies rely on strategic expediency instead of rational decision-making criteria. This effect depends on the type of business ecosystem and is less pronounced within a DBE.

6.5.7 Special Characteristics of DBEs

6.5.7.1 Opportunities of DBEs

As the type of business ecosystem and particularly DBEs appear to have different impacts on partner selection processes and as the abductive approach revealed little evidence on specific digital characteristics regarding the partner selection process, these will be investigated in more detail in the following:

Interview results underline the impression from the ABDUCTION chapter: there is no clear difference made between DBEs and other types of business ecosystems (D 1.125). A closer look at individual elements, however, uncovers several peculiarities, so that their impact on the partner selection process will be analyzed according to the chances and risks of a DBE.

A special feature of DBEs is the **faster onboarding**, **flexibility** and **faster acting** (D 2.146; D 7.207). Interfaces enable a **faster data exchange** (D 2.146) and the **interconnection** of individual products (D 4.210). Further, it allows for a **better user experience** and **greater access** to supply or demand (D 3.161). Thus, DBEs and platforms have a **big leverage effect** and therefore enable **scalability** (D 3.161; D 7.191; D 8.175). **Harmonization** of the business is increased due to **optimized workflows** and the **exchange between the users** is facilitated (D 3.161; D 15.132). DBEs foster the **interconnections of other business ecosystem types** (D 4.210; D 7.191). The **provision of a data pool**, like an umbrella function is quite common for DBEs (D 4.210). This includes for instance **critical data mass**, allowing for hyper-personalized offers, which can be sent to the customers (D 9.90; D 13.120). DBEs enable **efficiency and synergy** effects, as they avoid redundancies (D 4.210; D 11.168; D 15.132) and help to **manage complex digital solutions** (D 15.132). DBEs further enable to **leverage the innovation potential** of a company and to provide **state-of-the-art, complementary technology** (D 5.236; D 8.175; D 10.117; D 11.168). This avoids using own resources and facilitates the **outsourcing** (D 7.191; D 13.158). DBEs enable bringing together people with **different perspectives and know-how to a specific topic** (D 11.168) and building new services and business models together (D 13.120). **Reputation** can be triggered within the DBE known as a safe place, especially within platforms which are rule-based (D 14.136).

6.5.7.2 Risks Within DBEs

The major risk is seen in **security risks**, such as to give up some control sovereignty (D 2.146; D 8.175; D 10.117) and therefore needs trust for sharing the data (D 9.80). This means, the question of **data protection**; where the data is located and who has data access and supports the development of the data (D 4.168; D 6.213; D 8.175). The degree of data sharing increases with the time (D 9.83). Closely linked to the data protection issue are **politics of a company** or **internal resistances**: within a company, the data protection topic is a welcome excuse not to have to deal with a new, unknown topic (D 6.213; D 6.229).

Further, the **dependency or reliability** is an often-cited concern, which means the business continuity, the question of how long-lasting the underlying system will be, being the DBE as a system, the interfaces connecting the partners, the geopolitical situation, or the partners themselves (D 4.168; D 4.188; D 4.177; D 5.236; D 7.207). A third major risk is the **reputation** risk (D 2.146; D 5.236; D 8.175; D 13.158): surges of indignation can engender reputation problems (D 2.146) and the partner performance has a direct impact on the reputation of all partners. This is especially a concern when working together for joint customers (D 5.236) and can even lead to a loss of customers (D 8.175). The outsourcing of technology skills leads to standardization and incorporates the risk to **lose the unique selling proposition**, which is a **trade-off to the speed** provided by DBEs (D 7.191). Communication and interests might be difficult to align (D 10.117). There is the risk of not speaking the same language (D 11.168) and not being able to align the systems via interfaces, as often the **existing systems are not ready for being digitalized** (D 11.168; D 12.99) and workflows are not interconnected (D 12.99). Finally, there is the risk of **attributing capacity without generating profit initially** (D 11.168). **Governmental regulations on digitalization** issues are different among countries and industries and must be followed with attention (D 12.99). The results of the interviews indicate that DBEs cannot be entirely digital and human beings are still needed: even though being digital, one must not underestimate the **manpower needed for the maintenance and development** of a DBE or platform (D 1.146). Further, DBEs are not applicable without limits: purely digital ecosystems can only be used for less complex products, so that for complex products, a **consulting functionality** needs to be combined with the DBE (D 6.213). The **initial investment** for a DBE creation must not be underestimated. That is why most companies follow a fast-follower-strategy in waiting until another company, for instance a competitor, establishes a DBE (D 6.243).

The peculiarities of DBEs compared to other types of business ecosystems are multiple, being chances or risks. Even though the comparing data is lacking within other types of business ecosystems, it can be strongly assumed, though not specifically confirmed by the interviews, that the partner selection approach for DBEs is different than for other types of business ecosystems. This leads to the new working hypothesis 20.

Working Hypothesis 20

The partner selection process depends on the type of business ecosystem. Especially the partner selection process for DBEs differs from other types of business ecosystems.

6.5.8 Extension of or Participation in an Existing Business Ecosystem, or Creation of a New Business Ecosystem

The abduction chapter has put forward the theory that based on the availability of time, companies need to decide whether to build or advance an own business ecosystem or to join an existing business ecosystem. This can be confirmed by the empirical data: “you start small, or you join other ecosystems” (D 2.108), “we do not have time to create a new ecosystem” (D 12.115). The available time majorly influences the core decision of creating a new or expand a or participate in an existing business ecosystem. Working hypothesis 15 is supported.

Working Hypothesis 15

The decision for the extension of, respective participation in an existing, or the creation of a new business ecosystem is dependent on the time available prior to the formation of the business ecosystem.

Independently of the time available prior to the business ecosystem formation, 75% of the respondents (12/16) explicitly state that an existing business ecosystem is advanced, or they join an existing one, so usually a business ecosystem is not created. This is consistent with the long-term orientation identified in **chapter 6.5.6.1**.

Generally, different types of business ecosystems according to the respective strategy are chosen (D 4.226). Three respondents however argue that it is not possible to set up a new business ecosystem for each goal, as this will impede synergies (D 7.243) and confuse partners and customers if there are too many different business ecosystems (D 8.202; D 9.100).

For platforms, in particular, scalability is relevant; that is why the focus is more on existing platforms and not on the creation of new platforms (D 15.174).

The start is usually made with few close partners to build the **Minimal Viable Ecosystem (MVE)** (D 2.78). Suitability is verified constantly (D 2.80). It can be concluded that once established, a business ecosystem is constantly further developed. Thus, there is a **clear focus on advancing or joining existing business ecosystems instead of creating new ones**, so that data on business ecosystem creation is very limited. The empirical data provides no evidence for working hypothesis 16.

Working Hypothesis 16

The partner selection approach for the extension of, respective participation in an existing business ecosystem is different to the creation of a new business ecosystem.

Generally, the answers of the interviewees indicate that the development of existing business ecosystems is favored instead of creating new business ecosystems, as the creation of new ecosystems is complex and expensive (D 1.131; D 3.102; D 4.137; D 9.59). The focus is thus on long-term orientation and sustainable growth of existing business ecosystems (D 4.137). Hypothesis 16 therefore does not play a relevant role for answering the research question and will therefore not be further investigated. Instead, emphasis is placed on a continuous evaluation process of existing business ecosystems to reevaluate the partner fit over time (D 1.101; D 4.128; D 5.199; D 16.70). Working hypothesis 17 is thus supported.

Working Hypothesis 17 The reevaluation of the partner fit over time is an important part of the partner selection process.	✓

6.5.9 A Systematic Partner Selection Approach

6.5.9.1 A Systematic Approach Beginning with the Corporate Objectives

The careful selection of partners is decisive for the success of the business ecosystem, as a good partnership fit is needed in the operational life (D 5.124; D 13.149). It must be considered that in an unsuccessful business ecosystem, failure does seldom fall back to the business ecosystem itself, but to the company and its brand (D 13.149). This influence underlines the importance of a thorough partner selection for business ecosystems. Furthermore, a systematic process for partner selection is needed to handle the complexity of operations and number of partners involved (D 15.75).

The analysis of the interview data regarding a systematic approach for the selection of partners in DBEs reveals that 88% of the companies (=14/16) have some kind of systematic approach for the selection of partners (D 1.58; D 2.68; D 3.57; D 4.38; D 5.64; D 7.71; D 8.63; D 9.31; D 10.46; D 11.47; D 12.33; D 14.40; D 15.75; D 16.37). One respondent states that attention is paid on the brand fit, global reach and on premium partners, but they do not have a systematic approach. Another respondent confirms that there is not a structured process, but only a due diligence which is carried out as soon as partners are identified informally from prior relationships. The situation of platforms is particular in the sense that they have predefined rules, which are rather static and applied to each new candidate. This is more a passive approach (D 3.60; D 3.67; D 6.52; D 6.60; D 13.62; D 14.40).

According to four respondents, the process is systematic but dynamic and thus depends on partners, corporate objectives, or international circumstances (D 9.31; D 10.46; D 11.47; D 12.33).

In general, large companies usually have a structured process, small companies rather not (D 8.63; D 1.58; D 5.77).

The interviews show that there are companies that claim to have a systematic selection process, but either do not disclose this process, or ultimately do not proceed as structured as they claim to be (D 5.64-5.124). Conversely, there are also companies who do not claim to have a systematic selection process, but ultimately proceed in a very systematic manner (D 6.50-6.60).

With 88%, most of the respondents have some kind of systematic partner selection approach. Holisticness of their partner selection approaches can be questioned, but overall, working hypothesis 1 must be rejected and does not need to be further investigated.

Working Hypothesis 1 Companies do not have a systematic approach for the selection of partners in business ecosystems.	⊖

Working hypothesis 1 revealed that 88% of the respondents pursue a systematic partner selection approach. This leads to the question of **how companies proceed when applying their systematic partner selection approach**. An analysis of the structure of the interviewees' business ecosystems is based on a cross-comparison analysis among the results from the prior working hypotheses:

The analysis strongly confirms that the definition of one or more **corporate objectives (1)** is the first step prior to the partner selection (D 11.26; D 13.179; D 15,75; D 3.94). The **core motivations for a collaboration** are the following: generating sales, maximizing profit, customer access, new sales channels / remaining relevant for the market, quality and profitability, generate a new product with available data , outsourcing / access to resources, increase overall customer benefit and comfort, outsourcing, cost optimization, market access, address more potential customers / more sales, growth, economies of scale, range (D 1.86; D 3.92; D 6.120; D 7.133; D 8.106; D 9.51; D 10.71; D 11.114; D 12.59; D 13.98; D 14.71; 15.98; D 16.63). These can theoretically be assigned to **four major clusters**, identified by Chen et al. (2008): strategy-oriented, cost-oriented, resource-oriented and learning-oriented (pp. 451-452). The interviews reveal that **in most cases several objectives are pursued simultaneously**: 88%

(=14/16) of the interviewees mentioned more than one objective. The challenge is to have a systematic approach which can consider the whole range of objectives. In practice the core motivations are more fine-grained and entail further objectives so that these four major clusters are too general to provide any benefit for analyzing the partner selection process.

The identification of **missing capabilities** (Beelen et al., 2022, p. 14) is closely related to the **make-or-buy decision** (Jacobides, 2022, p. 103; Olsson & Bosch, 2020, p. 19). Both are clearly relevant as companies must decide whether they will need a business ecosystem or not (D 15.75; D 2.70) and is the basic decision for joining or creating a business ecosystem. Further, a **market analysis** is done to evaluate who is already in the market (D 8.70). This includes the **market entry strategy**, such as to decide whether to create or join a business ecosystem (D 8.70).

The role of platforms is particular; as they focus on scalability, the approach with predefined rules is different from other types of business ecosystems. Nevertheless, this passive selection process follows a structured approach, including the definition of corporate objectives as the first step (D 3.60; D 3.67; D 3.115; D 8.70; D 14.40).

The definition of the corporate objectives is the first step of the partner selection process within different types of business ecosystems and platforms and includes the identification of missing capabilities and the make-or-buy decision. The make-or-buy decision then entails a market analysis and a market entry strategy. Working hypothesis 4 is in large parts, but not entirely confirmed, as there is no evidence for the assignment of the corporate objectives to the four major clusters of corporate objectives.

Working Hypothesis 4 The definition of the corporate objectives according to one of the four major clusters, strategy-, cost-, resource-, or learning-oriented, is the first step of the partner selection process within business ecosystems. Part of this first step is the identification of missing capabilities, a market analysis, a market entry strategy, and a make-or-buy decision.	

According to the new findings, working hypothesis 4 is developed to working hypothesis 4A, which needs to be verified in the further course of the study (Grodal et al., 2021, pp. 603–604):

Working Hypothesis 4A

The definition of the corporate objectives is the first step of the partner selection process within different types of business ecosystems and platforms and includes the identification of missing capabilities and the make-or-buy decision. The make-or-buy decision then entails a market analysis and a market entry strategy.

6.5.9.2 The Partner Selection Process

The analysis of the **partner selection process (3)** itself leads to interesting results: despite the heterogeneity of the respondent's industries and the statement of one respondent that the partner selection process depends on the industry and cannot be generalized (D 6.50), there are many similarities in their approaches. The selection process is dependent on the respective objective pursued, so that companies apply different selection processes depending on the underlying objectives (D 4.38 - 4.81; D 11.47 - 11.67). This leads to the conclusion that the **correlation** of the **partner selection process** with the **underlying objective is higher** than with the **respective industry**. This leads to the creation of the new working hypothesis 21.

Working Hypothesis 21

The correlation of the partner selection process with the underlying objective is higher than with the respective industry.

Platforms pursue a **passive selection process**, including the definition of **corporate objectives** and the definition of **selection criteria accordingly** (D 3.92; D 3.115; D 14.71; D 14.126). The selection process itself is passive, nevertheless the search for partners depends on the **company reputation and/or size**: while small companies must actively search for partners, bigger companies, or companies with higher reputation are actively contacted by partners and do not need to search for them (D 3.81; D 6.95; D 8.88; D 15.75; D 16.45). The partner selection process of mere platforms is thus a reduced one, based on corporate objectives and selection criteria. The partner search is active or passive depending on the orchestrator's reputation and/or size, and the partner selection process follows **predefined rules and/or selection** criteria (D 14.40; D 3.57- 3.71).

As indicated within working hypothesis 5, the definitions of the different business ecosystem types and especially the boundaries between DBEs and platforms are not sharp. The interviews show that characteristics overlap; for instance, the term scalability is used for both, platforms and DBEs and can be both, a corporate objective (D 1.28; D 13.40) and a selection criterion (D 3.115; D 9.31; D 9.38). For this reason, the interview data regarding platforms are not excluded from this analysis, as they contribute to the knowledge for the systematic partner selection approach for DBEs. Therefore, independent from the business ecosystem type, a **clear corporate objective** is the first step for active partner selection, which is closely interwoven with the question of whether establishing or developing an own business ecosystem or being part of a foreign business ecosystem and what shall be the **value proposition** of the business ecosystem (D 8.70; D 2.68). The interviewees do not explicitly but intuitively separate between corporate objective and **business ecosystem objectives / strategy (2)** (D 8.70; D 2.68): "[h]ave to be **clear where to go with the ecosystem**" (D 8.70). Here, again, it becomes clear that although the procedure is systematic, not every step is specifically named by the respondents.

A frequently mentioned approach, cited by 25% of the respondents is a process which shall be termed **down-selection** in this investigation (D 4.81; D 7.80; D 11.47; D 15.75): a **long list** of partners is created (D 15.75), for instance with classic methods, such as an Excel table (D 11.47). Starting point of the long list can be either a company with high reputation and/or size, being contacted by partners, or an unknown and/or smaller company, which needs to actively engage in public relations work (D 11.47; D 15.75). From this long list, the possible **synergy-points** are identified, and selection interviews undertaken to **identify potential markets** (D 11.47). This iterative approach is made until some point where a maximum of a **handful of partners** is discovered with whom the company enters the business ecosystem (D 7.80). This approach is usually pursued when having a range of direct contacts (D 11.47).

Another approach is the **capability analysis**, mentioned by 13% of the respondents (D 2.70; D 4.50). The capability analysis is interpreted differently by the respondents, as they distinguish between the capabilities of the orchestrator and the partner. The first one is an analysis of the own missing capabilities. This is related to the make-or-buy decision as already mentioned within the corporate objectives (D 2.70) and therefore part of step one and not part of the mere selection process in step three of the framework. The second one is referring to an analysis of the partners' overall fit to the defined requirements (D 4.50). At this point the importance of using a clear terminology becomes apparent once again (Jacobides, 2022, pp. 109–110). Companies may use different terminologies for how they proceed and the most important is to be consistent among the actors of a business ecosystem. Having a clear strategy, making clear choices, and using clear terms are therefore important prerequisites for a successful partner selection. Working hypothesis 10 is confirmed.

Working Hypothesis 10

Having a clear strategy, making clear choices, and using clear terms are important prerequisites for a successful partner selection.

A capability analysis can be followed by a **requirements process** in which the functional, technical, contractual, and commercial requirements are defined and result in a tender document, which is sent to the partners previously defined within the capability analysis. This tender is a multi-stage process, in which further questions can be asked by the partners. The requirements catalog is then transferred to an **evaluation catalog based on school grades** which evaluate the partners with an overall score (D 4.38 – 4.81). The process is dedicated to supplier selection but might be used for other types of partners as well. One respondent terminates this process with a **down-selection**, followed by a **due diligence** or a **hackathon** to obtain a small number of candidates with the best fit to the company's requirements (D 4.81). Typically, the down-selection process starts with a broad pool of candidates and ends with a small number of final candidates who will need to undergo a thorough investigation during the due diligence stage; a **comparison with the M&A screening process** is obvious at this point (Calipha & Brock, 2019, p. 20), but must be put aside and investigated in depth within the INDUCTION part since neither the ABDUCTION nor the DEDUCTION part provides observational knowledge on this topic so that in line with **rigorous scientific research** the different steps must be clearly separated from each other (Grodal et al., 2021, pp. 591-593; Morse et al., 2002, p. 14; Prager et al., 2019, p. 377). The due diligence itself depends very specifically on the respective company's objectives. One respondent mentions data protection and security, stability of the partner, company size, and reputation (D 6.52).

Moving back to the literature from the ABDUCTION chapter applying the **Inferential Pattern Matching Approach** as indicated in **Figure 58** reveals rich new insights.

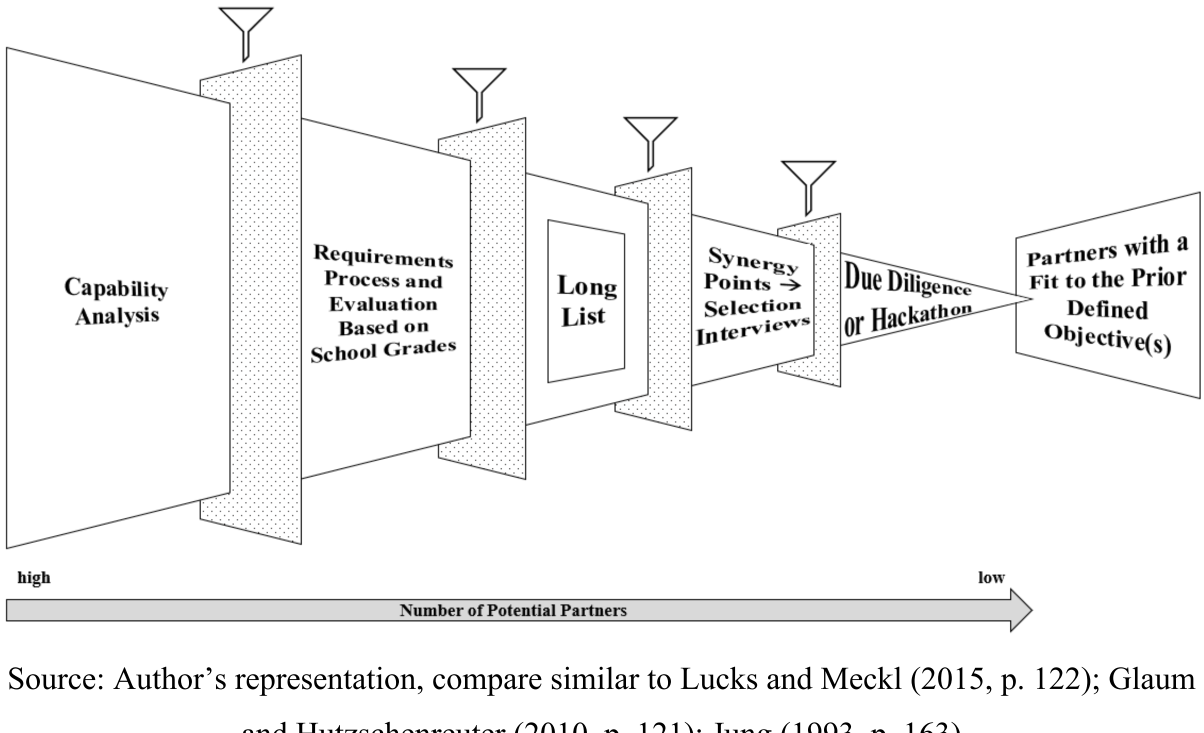
Figure 58. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

Regarding the **down-selection process**, a move back to the literature from the ABDUCTION chapter reveals consistency with the empirical findings, evidencing the use of a list with potential partners and narrowing the list down to identify the partner with the best fit (Beelen et al., 2022, p. 8). This approach is equally supported by the partner selection approach for coopetition partners (Alves & Meneses, 2015, p. 32).

The types of selection processes identified from the interviews according to this procedure can be either used **standalone** (D 7.81) **or combined with each other** (D 4.38-4.81). The following **Figure 59** illustrates the down-selection process, containing different types of iterative steps identified and consolidated from the interviews, in which a long list of potential partners is narrowed down to a short list of partners having an overall fit to the previously defined objective. The number and type of steps used from this figure are company-specific. More important than the single steps is that companies follow the idea of narrowing down a long list of candidates to a short list of candidates with a fit to the prior defined objective.

Figure 59. Down-Selection Process

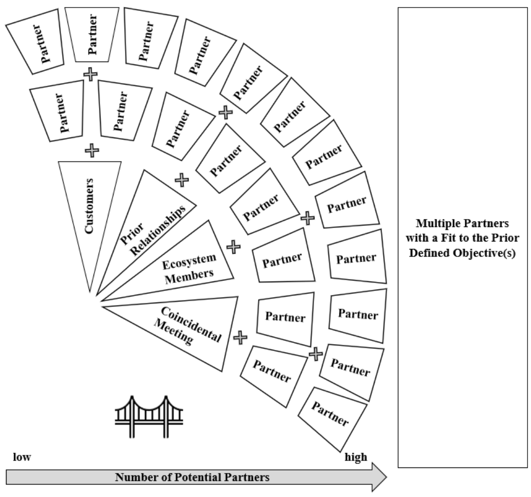


Source: Author's representation, compare similar to Lucks and Meckl (2015, p. 122); Glaum and Hutzschenreuter (2010, p. 121); Jung (1993, p. 163)

As uncovered with working hypothesis 8 and 8A, the identification of potential partners can be based on both, an active search process, opportunistic contacts, or prior relationships (D 6.84).

For this reason, the partner selection is not always based on an iterative, down-selection-based process, but rather on a converse process beginning with one potential partner, **identified by coincidence**: “Often it’s more opportunistic or when someone comes around the corner and says I know Mr. XY, should I make an appointment and then they talk to each other and say, that’s a cool idea, let’s do something or not” (D 6.60). It becomes obvious that in most cases it is talked about small companies lacking reputation and visibility which are discovered by coincidence (Visscher et al., 2021, p. 626). Though, when pursuing an explorative strategy, this might not only be focused on small companies, but any size of company or business ecosystem that a company may not have had on the radar before (Visscher et al., 2021, p. 626). This approach is often dismissed with the suggestion that a partner met by coincidence cannot be equated with a systematic partner selection process (D 6.60; D 13.4). This thesis, however, suggests, that this coincidence approach has the same right to exist as the down-selection process, as there is a clear strategy and objective for exploration with a systematic partner selection process behind. For instance, respondent 13 follows the strategy to join as many business ecosystems as possible to identify innovative partners which fit to their premium brand and then trying to reach as many users as possible with such premium partners (D 13.4; D 13.62). In this study this reverse process shall be called **up-selection process** and is demonstrated in **Figure 60**. This process is based on a small number of contacts or partners generating multiple new partner contacts.

Figure 60. Up-Selection Process



Source: Author’s representation

A move back to the literature from the ABDUCTION chapter applying the **Inferential Pattern Matching Approach** as indicated in **Figure 61** confirms the insights from the interviews.

Figure 61. Move Back According to the Inferential Pattern Matching Approach

Source: Author’s representation

New knowledge resources are developed by strengthening the relationships with coincidental partners, business ecosystem partners or prior relationships to obtain new partners again opening up opportunities for so-called network effects inside and outside the boundaries of the business ecosystem (Jacobides et al., 2018, p. 2270 and Nambisan & Baron, 2013, p. 1086 in Visscher et al., 2021, p. 627; D 6.60). This includes the global reach as well: connecting with partners to advance the **international network expansion** (D 13.62; Dunning & Lundan, 2008, Rong et al., 2011, Chen, 2003 and Johanson & Mattsson, 2013 in Rong, Wu et al., 2015, pp. 1–4). The word network should be understood in a figurative sense, as business ecosystems are not the same as networks.

There are several ways to approach new partners. Contact can be made from prior project relationships, for instance from customers (D 5.136), from local teams within the company (D 12.41), from the same industry or market (D 5.136; D 6.79) or from hearsay (D 1.77); the benefit being that the partners are often very well-known so that a comprehensive selection process is not necessary (D 5.98; D 8.70). The partner selection process takes place iteratively, from very few partners and leads to a network effect with multiple partners which fit to the company.

Further approaches of **selection processes (3)** consist in **incubator networks**, where special innovative projects are being worked on in early-stage processes (D 11.60; D 12.33), or **screening days**, which are like a speed dating: wish lists are evaluated regarding a potential fit with a partner (D 11.67). Finally **simple criteria catalogs are applied with school grades** to evaluate the fit of a potential candidate (D 11.146). **Outsourcing** of the partner identification and selection process is being considered by the companies when they look for international partners to which they do not have access through their networks, as **local teams** have the knowledge about local markets (D 12.33), or when they want to avoid the not-invented-here syndrome, **experts within the company** are commissioned with the selection process (D 11.99).

6.5.9.3 Selection Criteria and Influencing Factors

Selection criteria (4) are used within **simple lists or combined within the selection process**. The use of simple selection criteria lists does not imply a lack of a systematic process, rather criteria lists are used in accordance with corporate objectives (1) and business ecosystem objectives / strategy (2) (D 3.57- 3.71; D 4.71; D 9.38; D 11.146). Digital-specific criteria include scalability and flexibility of the interfaces (D 9.38) and data protection (D 6.52).

Several **influencing factors (5)** can be identified, though not directly, but indirectly from the respondents' statements. The partner selection approach is **dynamically** adapted according to the **maturity or complexity** of the business ecosystem (D 12.33). **Company size and / or reputation** is an influencing factor, as small companies must actively search for partners, as they are not visible, while larger companies, or companies with higher reputation are actively contacted by partners and do not need to search for them (D 3.81; D 6.95; D 8.88, D 15.75; D 16.45). The selection criteria are thus dependent on the company size (D 6.198). **Reputation** plays a major role for the acquisition of new partners and can be either an opportunity (D 14.136) or a risk (D 2.146; D 5.236; D 8.175; D 13.158) and therefore strongly influences the partner selection process. **Trust** is an influencing factor as well, especially for the sharing of data (D 9.80) and is therefore considered being particularly relevant for DBEs. With regard to the up-selection process, the **number of prior relationships**, for instance customers or project partners is essential for the identification of potential partners having a fit to the own company (D 5.98; D 8.70), as this already implies trust and reputation, which can also be interpreted as a cultural fit (D 5.98). **Access to different sources of prior relationships** determines the **speed and fit of new partnerships** (D 5.98; D 8.70). Further, the identification of the **right contact person within the partner company** highly influences the partner selection process. First, having the right contact person simplifies the identification of the right partner company and second, it considerably speeds up the partner selection process (D 11.73).

Especially for DBEs and platforms the **existence of interfaces and the ability of existing systems ready for being digitalized** (D 11.168; D 12.99) largely influences the creation potential of partnerships, as they need to communicate efficiently with each other.

Financial stability is especially relevant for an orchestrator, as the **initial investment** for the creation of a business ecosystem and especially of a DBE with the digital infrastructure must not be underestimated (D 6.243) as well as the availability of **manpower for the maintenance and development** of a DBE or platform (D 1.146). Other factors are **politics of a company** or **internal resistances** (D 6.213; D 6.229) and **governmental regulations**, especially on digitalization issues (D 12.99).

6.5.9.4 Application of the Inferential Pattern Matching Approach

Applying the **Inferential Pattern Matching Approach** as indicated in **Figure 62** reveals that the following **influencing factors** have an impact on the overall partner selection process and especially on the partner selection criteria. They are evidenced by the literature from the ABDUCTION chapter and thus match with the influencing factors identified empirically in this DEDUCTION chapter:

Figure 62. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

Dynamic fit or adaptation (Bierly & Gallagher, 2007, p. 145; Cummings & Holmberg, 2012, p. 139; Dong & Glaister, 2006, p. 597; Holmberg & Cummings, 2009, p. 165),

Company size and / or reputation (Castro et al., 2014, p. 424; Chand & Katou, 2012, p. 169; Mindruta et al., 2016, p. 218),

Trust (Alves & Meneses, 2015, p. 25; Dong & Glaister, 2006, p. 594; Krammer, 2018, p. 934; Liou et al., 2011, p. 3515; Shah & Swaminathan, 2008, p. 473; Vaez-Alaei et al., 2022, p. 2),

and **prior relationships** (Alves & Meneses, 2015, p. 26; Bierly & Gallagher, 2007, p. 147).

With regard to DBEs and platforms the **existence of interfaces and the ability of existing systems ready for being digitalized** (D 11.168; D 12.99; D 2.146) has already been confirmed by a prior **Inferential Pattern Matching** as being an influencing factor (Beelen et al., 2022, p. 2). These influencing factors can be generalized, as they are strongly evidenced.

6.5.9.5 Structure of the Partner Selection Framework

The **reevaluation of the partner fit over time (6)** of the partner selection process has already been confirmed by working hypothesis 17: large companies having complex business ecosystems use digital systems to monitor their selected partners according to their solutions and qualifications within a quarterly **reevaluation** (D 1.65).

To conclude, the whole partner selection process including the corporate objectives (1), the business ecosystem objectives / strategy (2), the selection process (3), the selection criteria (4), the influencing factors (5), and the reevaluation of the partner fit over time (6) is empirically confirmed as being decisive for the successful partner selection in business ecosystems. Working hypothesis 2 is supported.

Working Hypothesis 2

A structured approach including the

- corporate objectives (1)
- business ecosystem objectives / strategy (2)
- the selection process (3)
- the selection criteria (4)
- as well as the influencing factors (5)

is pivotal for the successful partner selection in business ecosystems since a simple list of selection criteria would not take into account the underlying objectives of the company.

It becomes further evident that the partner selection process depends on several factors, like the industries, company size, or environments so that the partner selection framework needs to be adapted to the specific requirements of a company and to changing conditions. Working hypothesis 3 is thus supported.

Working Hypothesis 3

The partner selection framework for business ecosystems must be systematic and dynamic at the same time.

Even though many interviewees claim that they do not have a structured approach, one indirectly exists, even though they are not fully aware of its existence. Each company has its own approach, and the analysis indicates that partner selection processes are quite similar but terms the companies use within their partner selection approach are quite different. Due to different definitions, the line is often not drawn between different business ecosystem types (D 16.4). As evidenced by **working hypothesis 20** the partner selection process depends on the type of business ecosystem. Especially the partner selection process for DBEs differs from other types of business ecosystems. Generally, the results reveal the complexity of business ecosystems. First, distinction is rarely made between the definition of DBEs and other types of business ecosystems. Second, the business ecosystem of a company is not one single business ecosystem but rather a **portfolio of different business ecosystems managed by the company** (D 4.11; D 10.19; D 12.33; D 13.33). For instance, an **innovation ecosystem** with the purpose of being connected to all directions is combined with a **DBE** with the purpose of data sharing (D 15.13; D 15.155).

Therefore, this study proposes that there is a high interrelationship between different business ecosystem types in the sense that DBEs can be either standalone business ecosystems, or enablers for many other, heterogeneous business ecosystem types ensuring the IT support and providing the interfaces, thereby representing socio-technical systems (D 3.8; D 7.4; D 13.4; D 15.13; D 15.132). As the purposes of each type of business ecosystem are different, different partner selection processes must be taken into consideration and then combined with each other.

6.5.10 The Application-Oriented Partner Selection Process in Practice

6.5.10.1 General Analysis of the Application-Oriented Partner Selection Process

The descriptive statistics gave an overview of the corporate objectives and the selection criteria in theory and in practice. Major corporate objectives were identified, while a ranking of the selection criteria has not been made due to the fact that they depend on the companies' objectives (D 8.157; D 3.132).

As some objectives and selection criteria are represented more than once, they can be grouped for the identification of paths and patterns so that the application-oriented partner selection process in practice is investigated.

Among all interviewees, all but one (D 11.114) mentioned more than one corporate objective. The first step therefore is the identification of the core objectives and their separation from the less important objectives. It is assumed that the core motivation and primary goal of a company is to earn money (Schaltegger & Wagner, 2011, p. 223). For this reason, all corporate objectives in reference to generating profit or sales are ranked as major objectives. In a next step, all corporate objectives are analyzed according to their interpretative meaning and are finally summarized according to a joint objective. This is necessary because often, interviewees define the objectives and selection criteria differently, although they mean the same.

6.5.10.2 The Software Industry – Pathway, Objective and Selection Criteria of Market Access, Power, and Development

Similarities of the fifth pathway of **market access, power, and development** can be found in the empirical data for the **software industry**. An interpretation of the results indicates that in the software industry, there are basically two objectives, the **scaling of sales of software products** by means of a DBE or platform (D 1.86; D 1.28; D 3.29; D 3.115) and the **gaining of customers** (D 10.71; D 14.71). As already mentioned within the descriptive statistics in chapter 6.4.1, there is a high correlation between the empirical objective **scaling through partners or platforms** and the theoretical objective **market access, power, and development**. Borders of definitions are not sharp; the meaning might therefore overlap or even be identical. The **gaining of customers** can hence be seen as a form of **market access, power, and development** (Chen et al., 2008, p. 451). Evidence for this assumption is given by interviewee 10, who mentions, among others, market reach and customer access as selection criteria (D 10.107).

The empirical selection criteria show a high level of agreement for the **fifth pathway** of **market access, power, and development** from the ABDUCTION chapter. Common specific selection criteria identified from the interviews and with a match to the theoretical findings are **innovative technology/skills/expertise** (3/4 of the respondents, D 1.127; D 10.107; D 14.126) and **reputation** (3/4 of the respondents, D 1.132; D 3.136; D 10.107). The task-related criterion of **local knowledge** is indirectly confirmed by two respondents for international markets and regions (“available partners in different international regions”: D 1.132; near regions first, later everyone: D 3.146). **Geographic proximity and availability** (1/2 of the respondents, D 1.132, D 3.146) can be assigned to the criterion local knowledge as well. **Business relatedness** (“business impact”: D 1.127), **company size** (company size / experience: D 3.136) and **prior relationships** (“prior personal relationships of C-Levels”: D 10.111) are confirmed by one respondent, respectively. The selection criterion **trust** is confirmed by one respondent from the software industry (“trust / confidence”: D 1.132) and a consultant as well (D 9: “trust for sharing data”: D 9.80).

The remaining theoretical selection criteria are too specific to being generalized. There are however **empirical selection criteria not mentioned within the theoretical pathway**, but which should receive attention because they have been mentioned more than once: the **relevance of the partner** (1/2 of the respondents, D 1.132; D 14.126) is equally confirmed by another respondent (“how relevant are partners for my customers? “, D 8.160). **Access to resources** (“access to sales resources”: D 1.28) is confirmed by another respondent as well (D 8.110). **Scalability** (D 3.115), mentioned once by a representative of the software industry, is confirmed by two independent consultants (“scalability”: D 9.31, “sales potential”: D 8.163). In this context, one respondent emphasizes the importance of the scalability of interfaces and the special relevance of scalability for partners providing content or products and its less relevance for technology partners (D 9.31). **Market reach** (D 10.107) and **customer access** (D 10.107) are mentioned once only but are assumed to be relevant for the objective of market access, power, and development.

The empirical findings without a theoretical match cannot simply be taken as evidenced, therefore a **move back** according to the **Inferential Pattern Matching Approach** as illustrated in **Figure 63** is undertaken for a more targeted look at the content. This is important for new emerging empirical content, not focused on in the initial literature review.

Figure 63. Move Back According to the Inferential Pattern Matching Approach

Source: Author’s representation

The following patterns are found:

1. The Selection Criteria Access to Resources and Local Knowledge

Indeed, one author of the SLRs mentioned the **access to resources** as a **task-related selection criterion** in the context of **market access, power, and development**: “Task-related selection criteria are associated with the strategic resources and skills that a company requires for its competitive success, and are more concerned with an achievement of **strategic fit** between partners" (Lu, 1998 in Dong & Glaister, 2006, p. 581). **Access to resources** is seen as part of the factor outputs and **local knowledge**, which were mentioned within the fifth theoretical pathway of the application-oriented partner selection process and has therefore not been focused on initially in the ABDUCTION chapter.

2. Confirmation of the Strategic Fit as the Most Important Selection Criterion for Market Access, Power, and Development and Access to Resources

As already evidenced in a prior application of the **Inferential Pattern Matching Approach**, **strategic fit** is the **overarching selection criterion** for the pathways and objectives **market access, power, and development** and **access to resources**. This is again and further evidenced multiple wise, leading to a **further inferential pattern matching**, as this match of patterns is based on the initial match of patterns from the **Inferential Pattern Matching Method** applied in **chapter 6.4.2.2**: first, the above-mentioned citation from Lu (1998 in Dong & Glaister, 2006, p. 581) and second, the mentioning of strategic fit as a major selection criterion by a respondent from the software industry, related to this pathway and objective of **market access, power, and development** (D 1.132).

The fifth pathway of **market access, power, and development** is thus in large parts confirmed for the software industry. The software industry has special characteristics implicating a need to slightly adapt the pathway according to the empirical findings.

6.5.10.3 The Insurance Industry - Pathway and Objective of Market Access, Power, and Development and Related Selection Criteria

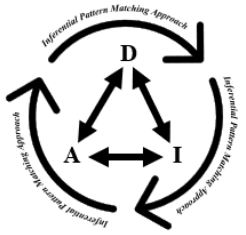
The fifth pathway of **market access, power, and development** can further be attributed to the insurance industry. The empirical objectives **new sales channels** and **remaining relevant for the market** (D 6.120) support this argument. The closely related theoretical objective of **cost reduction** is equally confirmed empirically ("saving implementation costs and operating costs": D 6.13). A respondent from a consulting company further confirms this related objective ("reduce its own costs": D 8.108, "cost optimization": D 8.110).

Interestingly there is a high congruence of the empirical and theoretical selection criteria: **reputation** (D 6.183) and **company size** ("company size, since when have they been on the market?": D 8.182 and "selection criteria depend on the company size": D 6.198).

Market reach (“market reach: how many customers and potential new customers can be brought in?”: D 6.173) is, exactly as for the software industry, confirmed by the insurance industry. For the insurance industry, the **expansion of the service offering** (D 6.13) and the **networking of technology suppliers** (D 6.13; D 6.110) has to be added to the list of objectives. As this citation is made by a consultant having several customers from the insurance industry, empirical evidence is assumed. A specific empirical selection criterion for the insurance industry is “**being on trend in collaborating with start-ups with media attention**” (D 6.202). Empirical evidence is assumed, as this interviewee has major experience in the insurance industry.

A move back to the relevant literature from the SLRs in chapter ABDUCTION in the context of **market access, power, and development** and the comparison of the newly identified empirical objectives according to the **Inferential Pattern Matching Approach** as illustrated in **Figure 64** yield the following results:

Figure 64. Move Back According to the Inferential Pattern Matching Approach



Source: Author’s representation

The corporate objective of **cost reduction** as an independent pathway (fourth pathway) reveals the **local knowledge** as a selection criterion (Dong & Glaister, 2006, p. 591). This has already been confirmed within the prior matches of patterns and has been strongly confirmed for the objective of **market access, power, and development**. As **cost reduction** is a sub-objective of market access, power, and development for the insurance industry, applicability of this selection criterion to this objective is therefore further evidenced (Dong & Glaister, 2006, p. 592). Due to the prior pattern matchings, further evidence is provided for the **strategic fit** as the major selection criterion for market access, power, and development and therefore applies to the **insurance industry** as well.

The insurance industry thus confirms the relevance and correctness of major parts of the fifth pathway of **market access, power, and development**. As this fifth pathway is valid for the software and the insurance industries it can be assumed, though not evidenced, that this pathway might be valid for other industries as well.

6.5.10.4 The Pharma Industry - Pathway and Objective of Access to Resources and Related Selection Criteria

As the basic purpose of a business ecosystem is based on the access to external resources, it has to be differentiated between this general access to resources and specific, scarce resources. The core objective of the pharma industry is the **access to resources** for the purpose of innovation and commercially available products (D 12.59; D 12.62; D 12.87).

The pursuit of the **strategic fit** is key to a successful partner selection when having for objective the access to resources (D 12.33; D 12.87). This result is in part consistent with the result from the SLRs, where the **best fit of the partner is the total weighted average score of all criteria** linked to both, current and future business ecosystem strategies and objectives (Cummings & Holmberg, 2012, pp. 141–152).

The **selection process** is quite industry-specific, nevertheless it follows the theoretical selection process proposed by this study (D 12.41; D 12.33; D 12.34-12.87).

The link between the objective of access to resources and the **selection criterion** strategic fit has already been confirmed in the first **Inferential Pattern Matching Approach** in **chapter 6.4.2.2.** Moving back to the literature of the SLRs in the ABDUCTION chapter regarding the deeper relationship between access to resources and strategic fit reveals that the strategic fit is a partner-related criterion (Cummings & Holmberg, 2012, p. 138). **Figure 65** illustrates this application of the **Inferential Pattern Matching Approach**:

Figure 65. Move Back According to the Inferential Pattern Matching Approach

Source: Author’s representation

Focusing on just a partner-related criterion and ignoring the remaining task-, learning-, and risk-related selection criteria is however not targeted, since task- and learning-related selection criteria focus on the type of resource to be acquired and risk-related selection criteria like the locking out of partners for specific resources seem to be relevant as well (Cummings & Holmberg, 2012, pp. 142–151). It is assumed that an isolated view on purely the strategic fit is not targeted, as task-, learning-, and risk-related selection criteria are relevant as well. It must be acknowledged that the interviewee might define strategic fit differently than the literature does, such as to regard strategic fit as being multi-layered and not only focused on the partner-level. Therefore it seems more effective to target the **best fit of the partner measured by the total weighted average score of all relevant criteria**, as proposed by Cummings and Holmberg (2012, p. 153) than a mere focus on partner-related selection criteria. A move back to the selection criteria mentioned by interviewee 12 indeed confirms that strategic fit is the most important criterion, though, the innovation power, fit of services and having an established, commercially available product which can quickly be incorporated into the business ecosystem and offered to the customers are further selection criteria to be considered (D 12.87). Therefore, it is evidenced that the best fit of the partner is measured by the **total weighted average score of different relevant criteria**.

The **dynamic fit** mentioned by Cummings and Holmberg (2012, p. 153) and conceptualized as an **influencing factor**, is empirically confirmed as the interviewed company changed the approach with increasing international experience: at the beginning the headquarters implemented the partner selection according to the strategic fit, and **with growing experience they changed the approach** and delegated the task to the local team (D 12.33). This is consistent with the **internationalization process described by Johanson and Vahlne** (1977, p. 28 in Cummings & Holmberg, 2012, p. 141). The **dynamic fit** therefore **influences the selection process**. The dynamic fit further **influences the selection criteria**, as the partner is selected according to the criterion of having flexibly available resources (D 12.87).

To conclude, the best fit of the partner for the pathway of access to resources is therefore evaluated according to the total weighted average score of several different selection criteria. The dynamic fit is an influencing factor having an impact on the selection process and the selection criteria.

6.5.10.5 The Household Technology Industry - Pathway and Objective of Strengthening of Customer Positions and Relationships and Related Selection Criteria

The **strengthening of customer positions and relationships** is the eighth pathway and **corporate objective** and parallels with the corporate objective “increase [of] overall customer benefit and comfort” (D 13.98) mentioned by the household technology industry. There is a high theoretical and empirical congruence: The **marketing**- and distribution-specific selection criteria match with the first mentioned selection criterion “**brand fit**” (D 13.62). The theoretical selection criteria of “target market size, […] total population, […] market diversification […and] proximity” (Haskell et al., 2016, p. 497) can be regarded as corresponding to the empirical selection criterion **global reach** (D 13.62) and **customer/market range** (D 13.145). **Proximity** (Haskell et al., 2016, p. 497) further equals the empirical selection criterion local partners for local markets (D 13.139). The **risk diversification** (Haskell et al., 2016, p. 497) is empirically confirmed as well by the criteria partners with stability and security aspects (D 13.145). The **Inferential Pattern Matching Approach** in **Figure 66** is applied to identify further matches of patterns.

Figure 66. Move Back According to the Inferential Pattern Matching Approach

Source: Author’s representation

In contrast to theory, the **strengthening of customer positions and relationships** not only entails marketing- and distribution-relevant criteria, but also includes joint innovation, especially for the reduction of CO_2 (D 13.90) and thus **r&d-collaborations** as the key objective is the increase of overall customer benefit and comfort (D 13.98). This is interesting, as in the ABDUCTION chapter, this type of collaboration was assigned to the seventh pathway: acquisition of capabilities and knowledge.

The r&d-collaboration-related selection criteria **financial resources**, **r&d competencies**, **credibility/reputation**, **acceleration to market, and add to portfolio (pipeline)** (Haskell et al., 2016, p. 500) can be mirrored by the empirical selection criteria: partners with stability (D 13.145), innovation leap (D 13.135), premium partners (D 13.62), customer/market range (D 13.145), and something we cannot make ourselves: complementarity (D 13.135). It becomes clear again, that companies rarely follow one single objective. Usually, several selection criteria in accordance with the respective objectives must be considered for a good partner fit. The pathway and objective of **strengthening of customer positions and relationships** is in large parts empirically confirmed and further entails objectives and selection criteria related to r&d-collaboration.

6.5.10.6 Summary of the Pathways and Working Hypotheses

Three theoretical pathways including four major corporate objectives could be validated by the interviews: market access, power, and development, cost reduction, and access to resources and strengthening of customer positions and relationships. Overall, it can be assumed that the investigated pathways can be generalized and transferred to different industries, depending on their respective objectives, as the **Inferential Pattern Matching Approach** allows for highly objective results. Working hypothesis 18 is therefore validated.

Working Hypothesis 18 Predefined objectives define the pathway for the partner selection approach and the final composition of the business ecosystem. They are transferable to different industries.	✓

The analysis of the pathways in theory and in practice reveal again that different definitions are used for elements which mean the same. Having a same definitionally basis (Jacobides, 2022, pp. 102–111) would facilitate the application of theoretical partner selection approaches in practice and increase the probability for a successful partner selection.

The results of the working hypotheses are summarized in **Table 31**.

Table 31. Summary of Working Hypotheses

Topic	Working Hypotheses	Validation | Partial Validation | Rejection | Development | New Creation
Clear Definitions	**WH 5** There is a lack of clear definitions for business ecosystem objectives and strategies and a lack of clear distinction between business ecosystem types, which makes it difficult to choose targeted partners for the respective type of business ecosystem.	✓
Optimal Number of Actors	**WH 6** The optimal number of actors within business ecosystems must be defined prior to the partner selection to define how broad or narrow the business ecosystem should be.	—
Roles	**WH 7** The role of the company and the type of actors need to be defined prior to the partner selection process.	✓
Double Value Proposition of the Orchestrator	**WH 9** Double value proposition: the orchestrator must be attractive for both, partners and its customers.	✓
Identification of Potential Partners	**WH 8** The identification of potential partners is based on the objectives and made from the managers' network, the same industry, or well-known companies. The identification of small, unknown companies is more based on coincidence than on a structured proceeding. Contact can be made by both, the orchestrator, or the partner.	✓
	WH 8A The identification of potential partners is based on their objectives and made from prior relationships / hearsay, by coincidence, or a market review is made to actively identify potential partners. Contact can be made by both, the orchestrator, or the partner. Small companies usually actively approach bigger companies, as they are unknown, while larger companies are generally addressed by the partners, as they are well-known due to their size.	→
Partner Selection Process Based on Business Ecosystem Objectives	**WH 11** The partner selection process depends on the objectives the business ecosystem is pursuing.	✓
A Criteria Catalog as Part of the Selection Process	**WH 12** The development of general partner-, task-, risk-, and learning-related selection criteria according to the objectives and the further development of specific selection criteria according to these more general selection criteria is more important than having a rigid checklist of selection criteria.	—
	WH 12A A criteria or requirements catalog is not used solely but as part of the partner selection process.	→
Timing	**WH 13** The time horizon of business ecosystems must be determined prior to the partner selection process.	—
	WH 14 The development over time is a criterion which is of major importance and must be especially considered for the general and specific selection criteria in accordance with the company and business ecosystem related objectives.	✓
Availability of Time and Information Determine the Partner Selection Process	**WH 19** The time and information available prior to the partner selection process determine how much companies rely on strategic expediency instead of rational decision-making criteria. This effect depends on the type of business ecosystem and is less pronounced within a DBE.	☆

Partner Selection Process Depends on Type of Business Ecosystem	**WH 20** The partner selection process depends on the type of business ecosystem. Especially the partner selection process for DBEs differs from other types of business ecosystems.
Extension of, or Participation in Existing vs. Creation of New Business Ecosystem	**WH 15** The decision for the extension of, respective participation in an existing, or the creation of a new business ecosystem is dependent on the time available prior to the formation of the business ecosystem.
	WH 16 The partner selection approach for the extension of, respective participation in an existing business ecosystem is different to the creation of a new business ecosystem.
Reevaluation of Partner Fit over Time	**WH 17** The reevaluation of the partner fit over time is an important part of the partner selection process.
A Systematic Partner Selection Approach	**WH 1** Companies do not have a systematic approach for the selection of partners in business ecosystems.
The Definition of Corporate Objectives as the First Step	**WH 4** The definition of the corporate objectives according to one of the four major clusters, strategy-, cost-, resource-, or learning-oriented, is the first step of the partner selection process within business ecosystems. Part of this first step is the identification of missing capabilities, a market analysis, a market entry strategy, and a make-or-buy decision.
	WH 4A The definition of the corporate objectives is the first step of the partner selection process within different types of business ecosystems and platforms and includes the identification of missing capabilities and the make-or-buy decision. The make-or-buy decision then entails a market analysis and a market entry strategy.
The Partner Selection Process Depends on the Objective, Less on the Industry	**WH 21** The correlation of the partner selection process with the underlying objective is higher than with the respective industry.
Clear Strategy and Clear Choices	**WH 10** Having a clear strategy, making clear choices, and using clear terms are important prerequisites for a successful partner selection.
A Systematic and Dynamic Partner Selection Approach	**WH 2** A structured approach including the ▪ corporate objectives (1) ▪ business ecosystem objectives / strategy (2) ▪ the selection process (3) ▪ the selection criteria (4) ▪ as well as the influencing factors (5) is pivotal for the successful partner selection in business ecosystems since a simple list of selection criteria would not take into account the underlying objectives of the company.
	WH 3 The partner selection framework for business ecosystems must be systematic and dynamic at the same time.
Pathway and Composition	**WH 18** Predefined objectives define the pathway for the partner selection approach and the final composition of the business ecosystem. They are transferable to different industries.

Source: Author's representation

6.6 Compilation of the Analytical Framework

The major goal of the application of the **Inferential Pattern Matching Approach** is to avoid subjectivity and gaps in knowledge due to **path dependency** of research data and influence of past experience by the researcher (Sinkovics, 2018, pp. 2–3). The feedback loops between abductive SLRs and deductive interview data further allowed for the **identification of interesting matches of patterns** and thus to **break the theoretical paths identified in the abductive chapter** thereby increasing the knowledge in major parts. This has become evident in all samples and therefore allows for a more realistic representation of the real objects in research (Sinkovics, 2018, pp. 2–3). The goal of **rigorous scientific research** (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377) is hence in large parts evidenced and reveals rich and impressive results: to sum up, this deductive investigation leads to deep contents and interesting relationships among single results. Important parts of theory could be confirmed, despite the relatively low number of interviewees per industry. This can be explained by the fact that this investigation revealed that the correlation of the partner selection process with the underlying corporate objective is higher than with the respective industry. The impact of the industry on the results is thus of minor relevance. Nevertheless, strong correlations of industries with specific objectives were identified: the pathway of market access, power, and development (fifth pathway) is in large parts confirmed by the software and the insurance industry. The pathway of access to resources (tenth pathway) is in large parts confirmed by the pharma industry. The pathway of strengthening of customer positions and relationships (eighth pathway) is in large parts confirmed by the household technology industry.

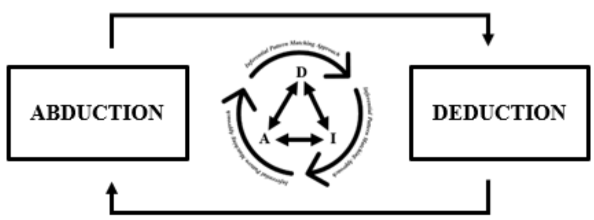
The recurring statements, especially within the most recently analyzed working hypotheses, are a strong indicator for **data saturation** (Charmaz, 2006, p. 189; Glaser & Strauss, 1967, p. 61). It can thus be confirmed that the working hypotheses have led to comprehensive results (Morse, 1995, p. 147) reached multiple wise: through a high number of working hypotheses, the vertical analysis of each topic, the building of different working hypotheses upon each other, and the horizontal analysis of the whole interview data.

Results from the DEDUCTION chapter reveal evidence in important parts with the ABDUCTION chapter: most importantly, the systematic partner selection framework in its macro-structure is empirically entirely confirmed. The working hypotheses, being confirmed, partially confirmed, rejected, or newly created, strongly guided the deductive investigation and helped to fill the gaps from the ABDUCTION chapter to develop the systematic framework for partner selection in business ecosystems. They further derived specific facts ($f_{0'}$, $f_{0''}$, $f_{0'''}$, …)

derived from f_0, which will be further investigated by INDUCTION to explain these facts (Minnameier, 2010, pp. 241-242; Peirce, 1931-58 in Ormerod, 2024, p. 59).

Even though the deductive chapter is focused on the verification of hypotheses, this chapter follows the overall **constructivist-pragmatist research paradigm** (Nonhoff, 2011, p. 91), whereby the researcher is integral part of the investigation and abducts findings from theory and observation without completely relying on it, in order to be able to refocus the analytical lens and keep an open mind to surprises along with the investigation (Timmermans & Tavory, 2012, p. 169 in Grodal et al., 2021, p. 604; Charmaz, 2006, p. 10). This is fully consistent with **rigorous scientific research**, as doubt and belief belong to qualitative research (Locke et al., 2008, p. 907 in Grodal et al., 2021, p. 604). This approach shapes the pathway of the investigation in the way that matches of patterns are iteratively evidenced (Grodal et al., 2021, p. 604). The **Inferential Pattern Matching Approach** thus turns out to be very effective, as it revealed much deeper information and especially relationships among concepts than with independent approaches. Despite its use there are several data representing conjectures not being evidenced, as only the information strongly evidenced by the **Inferential Pattern Matching Approach** among the chapters ABDUCTION and DEDUCTION inform the framework (Grodal et al., 2021, p. 604). The matches of the iteratively gathered empirical and theoretical data (Sinkovics, 2018, p. 3) with a move forth or back among the chapters ABDUCTION and DEDUCTION are represented in **Figure 67**.

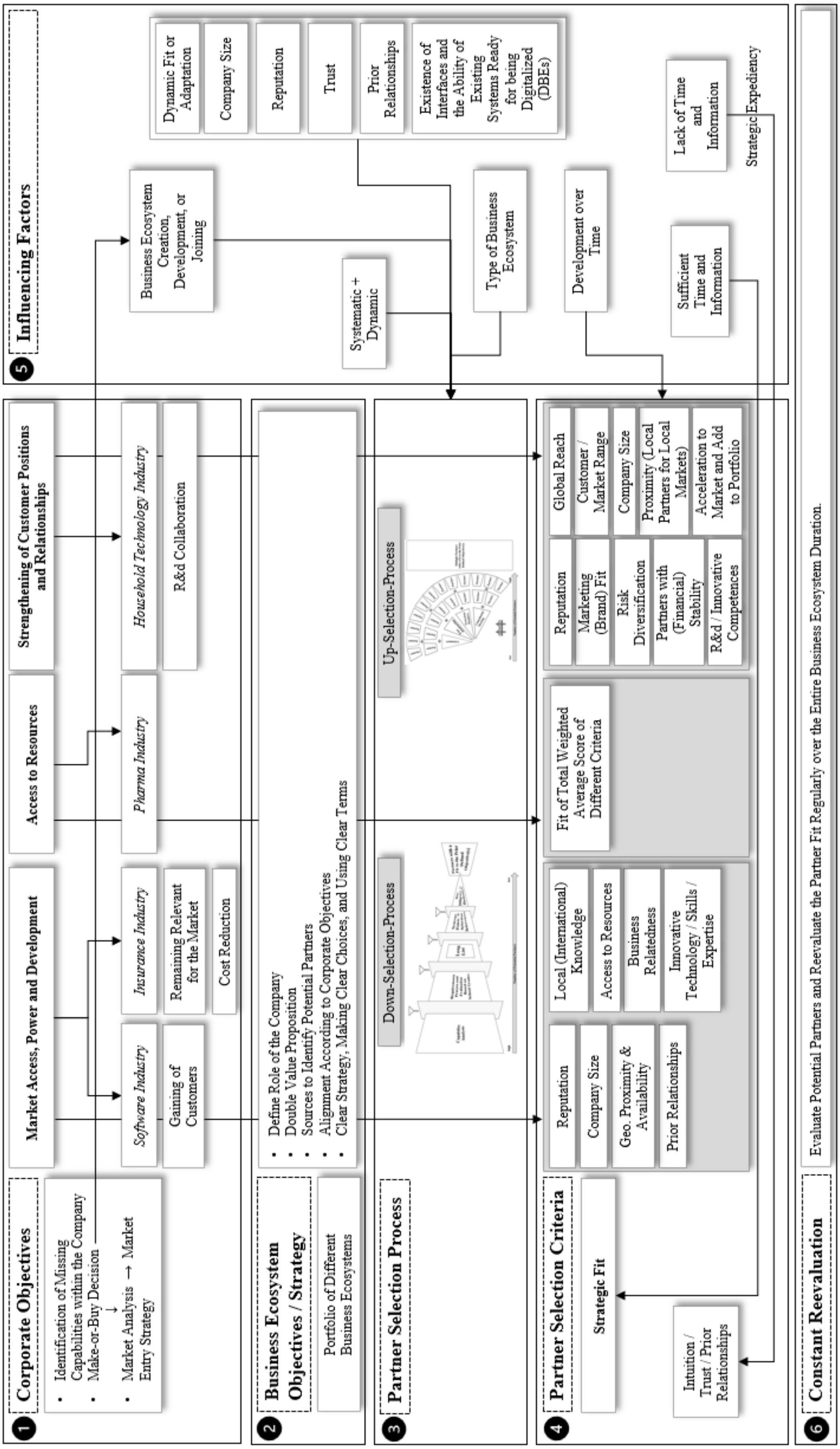
Figure 67. Inferential Pattern Matching Approach among the Chapters ABDUCTION and DEDUCTION



Source: Author's representation

These matches within the partner selection framework are represented in a consolidated analytical framework as illustrated in **Figure 68** and contain the result of the **Inferential Pattern Matching Approach**:

Figure 68. Analytical Framework



Source: Author's representation

This figure illustrates that there remain several white gaps with regard to the question of how companies proceed in the micro-structure and within different business ecosystem types. In pursuit of the building of a **strong theory**, this study follows the idea of Sutton and Staw (1995) to investigate deep causal relationships thereby balancing theoretical and empirical research (p. 378). Consistently, the idea is not to have a list of hypotheses which are evidenced, but a systematic and holistic partner selection framework illustrating the interrelationships among the concepts. This investigation is therefore advanced by a third research part, the INDUCTION, which is embedded in the **Inferential Pattern Matching Framework** thriving for high qualitative research and holisticness. The focus shall not be on the identification of all possible influencing factors or selection criteria, rather emphasis shall be placed on major elements and their interrelationships within the partner selection process. In line with rigorous scientific research (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377), those working hypotheses for which evidence is already transparently found are considered set, further confirmations are not necessary and therefore not actively sought. The other working hypotheses are developed or dropped such as to guide the further research to develop the theory (Grodal et al., 2021, p. 593). In this sense, and as already mentioned, working hypotheses 1 and 16 are dropped, as they are not relevant anymore for the answering of the research question. The **research question** is again redirected according to the new insights from the DEDUCTION chapter (Tecuci et al., 2018, p. 10):

Research Question 4

How do companies systematically select partners in business ecosystems and what are the interrelationships among its major elements?

Table 32 provides an overview of the **9 working hypotheses** which will guide the further investigation and involve only those working hypotheses, which need to be further investigated. **From this point of investigation these are termed hypotheses, as they are not expected to change anymore** (Dewey, 1938, p. 142 in Casula et al., 2021, p. 1709). Information to be relevant to the prior hypotheses already confirmed or not relevant anymore will not be actively searched for but will be compared to the prior results upon their arise.

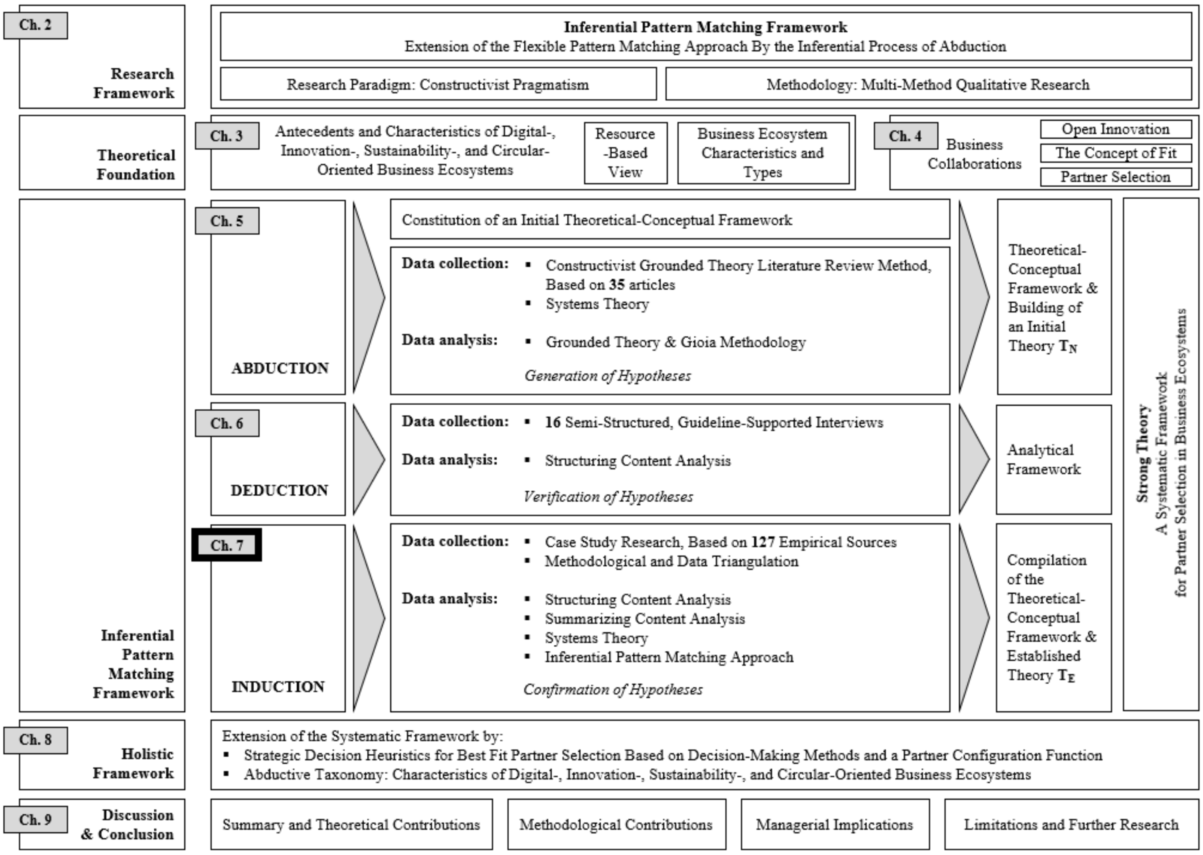
Table 32. Hypotheses Guiding the Further Investigation

No.	Topic	Hypotheses	Partial Validation | Rejection | Development | New Creation
1	**Clear Definitions**	**Hypothesis 5** There is a lack of clear definitions for business ecosystem objectives and strategies and a lack of clear distinction between business ecosystem types, which makes it difficult to choose targeted partners for the respective type of business ecosystem.	✓
2	**Optimal Number of Actors**	**Hypothesis 6** The optimal number of actors within business ecosystems must be defined prior to the partner selection to define how broad or narrow the business ecosystem should be.	—
3	**Identification of Potential Partners**	**Hypothesis 8A** The identification of potential partners is based on their objectives and made from prior relationships / hearsay, by coincidence, or a market review is made to actively identify potential partners. Contact can be made by both, the orchestrator, or the partner. Small companies usually actively approach bigger companies, as they are unknown, while larger companies are generally addressed by the partners, as they are well-known due to their size.	→
4	**A Criteria Catalog as Part of the Selection Process**	**Hypothesis 12A** A criteria or requirements catalog is not used solely but as part of the partner selection process.	→
5	**Timing**	**Hypothesis 13** The time horizon of business ecosystems must be determined prior to the partner selection process.	—
6	**Availability of Time and Information Determine the Partner Selection Process**	**Hypothesis 19** The time and information available prior to the partner selection process determine how much companies rely on strategic expediency instead of rational decision-making criteria. This effect depends on the type of business ecosystem and is less pronounced within a DBE.	☆
7	**Partner Selection Process Depends on Type of Business Ecosystem**	**Hypothesis 20** The partner selection process depends on the type of business ecosystem. Especially the partner selection process for DBEs differs from other types of business ecosystems.	☆
8	**The Definition of Corporate Objectives as the First Step**	**Hypothesis 4A** The definition of the corporate objectives is the first step of the partner selection process within different types of business ecosystems and platforms and includes the identification of missing capabilities and the make-or-buy decision. The make-or-buy decision then entails a market analysis and a market entry strategy.	→
9	**The Partner Selection Process Depends on the Objective, Less on the Industry**	**Hypothesis 21** The correlation of the partner selection process with the underlying objective is higher than with the respective industry.	☆

Source: Author's representation

Figure 69 illustrates the thesis structure leading to chapter 7.

Figure 69. Thesis Structure



Source: Author’s representation

"In induction the study of the hypothesis suggests the experiments which bring to light the very facts to which the hypothesis had pointed. [It] is the concluding step."

Charles Sanders Peirce

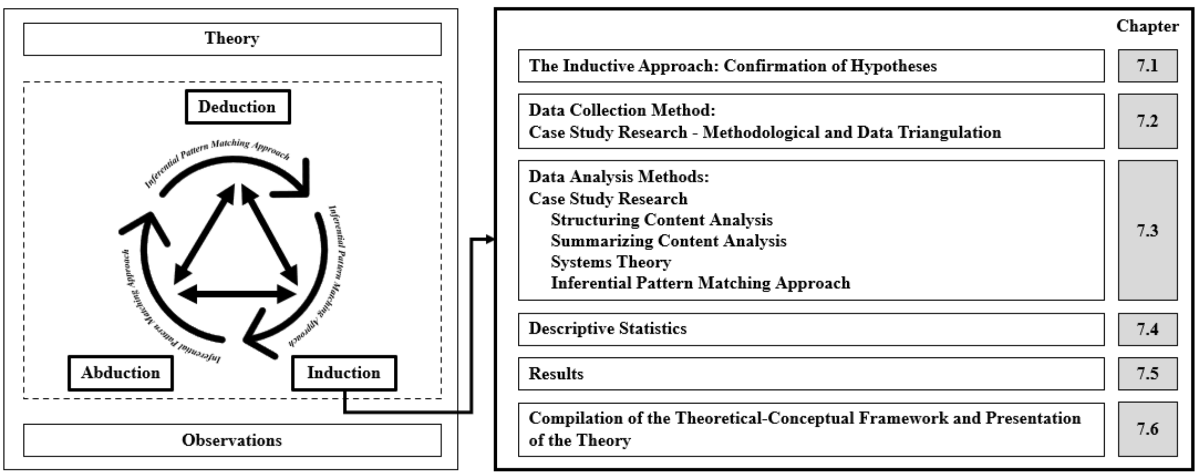
(Peirce EP 2: 106, 1901b in Wible, 2018, p. 144)

7 INDUCTION

7.1 The Inductive Approach: Confirmation of Hypotheses

Similarly to the ABDUCTION chapter, this **INDUCTION** chapter regards empirical data entirely, in its purest form and as combined with phenomena within the SLRs, whereby the **phenomena** are considered **to build the bridges between theory and data** (Bendassolli, 2014, p. 165; Haig, 1995, p. 4; Shepherd & Sutcliffe, 2011, p. 366). For this reason, multiple sources are triangulated to inform this chapter and four data analysis methods under the umbrella of **case study research** are applied for the purpose of achieving theory-building through both, **description and explanation** of causes of relationships between phenomena (van Evera, 1997, pp. 7–8). This chapter shall answer the question of how companies proceed when applying the systematic partner selection framework. The structure of this chapter is as depicted in **Figure 70**:

Figure 70. The Structure of Chapter INDUCTION



Source: Author's representation

Data is collected from multiple sources and accumulated according to **methodological and data triangulation** (Denzin, 1978 in Cox & Hassard, 2005, p. 110). Therefore, the **case study approach** appears to be most suitable for this inductive investigation (Eisenhardt, 1989b, pp. 532, 534, 538). Emphasis is placed on multiple sources containing empirical data, but not being purely empirical, as the focus is on gathering multiple data for providing rich evidence (Eisenhardt, 1989b, p. 538):

First, a further, **more targeted investigation of SLR 1 and SLR 2** from the ABDUCTION chapter is made to uncover **decision-making techniques** suitable for the partner selection framework.

Second, a **new update of the SLRs** from the ABDUCTION chapter is made such as to include data **until December 2023** to uncover potential new insights.

Third, a **further update of the SLRs** from the ABDUCTION chapter is made with another filter towards **sustainability- and circular-** related business ecosystems including all publication years **until December 2023**.

Fourth, the semi-structured, guideline-supported **interviews from the DEDUCTION chapter** are analyzed regarding new insights (Qu & Dumay, 2011, p. 239). This is accomplished through the **inductive categories** which were found during the deductive analysis and the iterative comparison of the abductive and deductive chapters regarding information gaps.

Fifth, **secondary research** is informed by **archival interviews** available at the Chair of International Management and based on final theses written by students.

Sixth, **secondary research** is further accomplished through the gathering of information from **further literature** that has not yet been used within the SLRs and from a secondary interview from the internet.

Data analysis takes place fourth fold:

First, **structuring content analysis** is applied to deductively identify categories among the archival interviews (Mayring, 2014, p. 95, 2020, p. 6; Mayring & Fenzl, 2019, p. 638).

Second, **summarizing content analysis** is applied for the inductive exploration of new categories from the interviews from the DEDUCTION chapter, the archival interviews, and the interview from the internet (Mayring, 2014, p. 79).

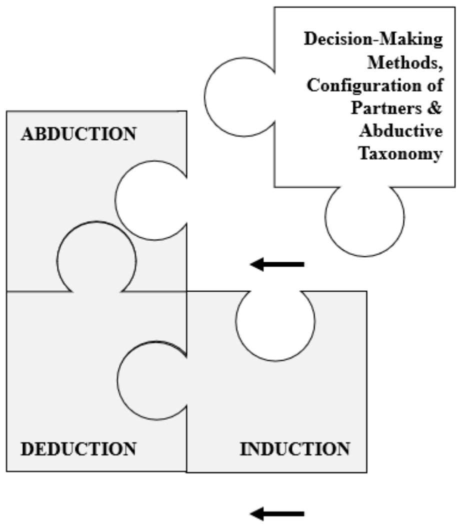
Third, **systems theory** is used to explain the complex occurrences, trends, and patterns observed in real-world systems (Whitney et al., 2015, p. 22).

Fourth, the **Inferential Pattern Matching Approach** is applied to analyze, interpret, and combine the findings from the different data sources (Ogawa & Malen, 1991, pp. 277–283).

These data analysis methods will further complete the systematic partner selection framework and foster the building of a strong theory (Grodal et al., 2021, p. 605; Sutton & Staw, 1995, p. 378; van Evera, 1997, pp. 7–8).

Though, the DEDUCTION chapter closed major gaps of the ABDUCTION chapter, it simultaneously uncovered new insights to be further investigated. The INDUCTION part thus further completes the puzzle as presented in **Figure 71**. Specific phenomena will be consolidated to general conclusions.

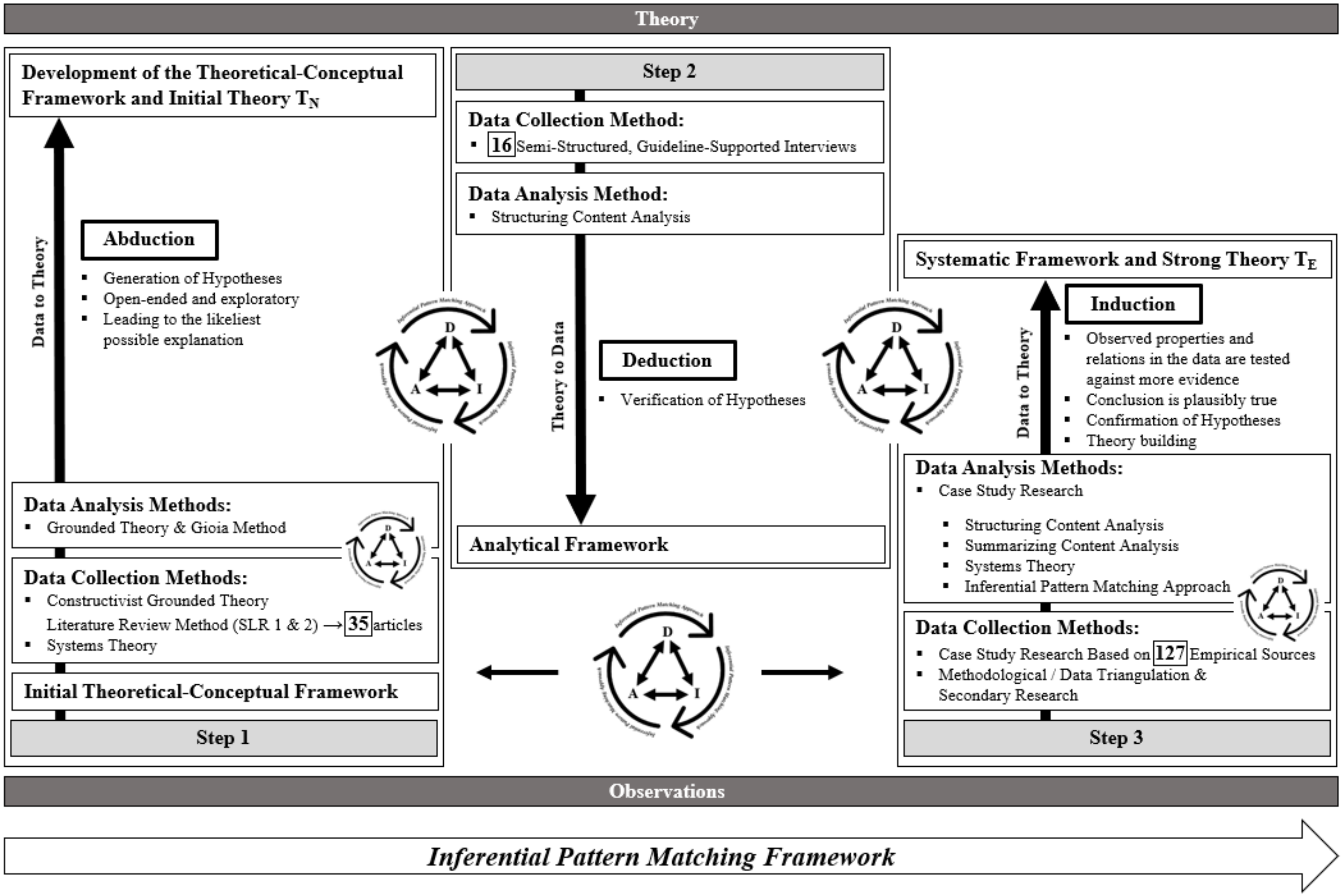
Figure 71. The Inductive Piece of the Puzzle



Source: Author’s representation

The inductive step within the **Inferential Pattern Matching Framework** is presented in **Figure 72**.

Figure 72. The Inductive Approach



Source: Author's representation

7.2 Data Collection Method: Case Study Research – Methodological and Data Triangulation

7.2.1 Triangulation within Case Study Research

The concept of **triangulation** has first been introduced by Campbell and Fiske (1959) in presenting a multi-method approach for increasing validity in quantitative research (pp. 85-90) and has been further developed by Denzin (1978) for qualitative research (Campbell et al., 2020, pp. 125–126). Triangulation underlies the following rationale: "[b]ecause each method reveals different aspects of empirical reality, multiple methods of observations must be employed. This is termed triangulation. I now offer the final methodological rule the principle that multiple methods should be used in every investigation" (Denzin, 1970, p. 26 in Damodaran & Roe, 1998, p. 56).

Similar findings from different literature uncovers phenomena otherwise not associated with each other. This results in theory building with a **strong validity**, a **high generalizability** as well as a **high conceptual level** (Eisenhardt, 1989b, p. 544), limiting bias through good cross-case comparison (Eisenhardt, 1989b, p. 540). While the evidencing of data (Eisenhardt, 1989b, p. 533) and the improvement of accuracy (Jick, 1979, p. 602) is one issue within triangulation, its further strength is the use of multiple data for the **discovering of new aspects** unknown to the researcher; an **explorative** means of filling gaps of knowledge to redirect the study (Dubois & Gadde, 2002, p. 556; Tecuci et al., 2018, p. 10). It can create a more **holistic picture** of the topic under study by **uncovering unique variances** being neglected by a single method, allowing for the emergence of new or deeper dimensions to complete the investigation (Jick, 1979, pp. 603–604).

Triangulation can be distinguished according to four different types: **methodological triangulation** refers to the use of multiple methods, in which triangulation takes place either within a method trough variations of a survey or between different data collection methods. **Data triangulation** is the collection of data from multiple sources or different times. **Investigator triangulation** involves the assessment of different investigators' conclusions of independent data collections and **theory triangulation** investigates multiple theories used to interpret the data (Denzin, 1978 in Cox & Hassard, 2005, p. 110).

7.2.2 Exploratory, Descriptive and Explanatory Case Study

Case study research typically includes methods like archival data, interviews, questionnaires, or observations (Eisenhardt, 1989b, p. 534). The main challenge of case studies is the handling of the various interrelationships among the elements under investigation (Dubois & Gadde, 2002, p. 555). Replication is achieved if two or more cases support a theory, enhancing confidence in the validity of the interrelationships (Eisenhardt, 1989b, p. 542; Yin, 2014, p. 31). According to Eisenhardt and Graebner (2007), the iterative cycling between case data, emerging theory, and extant literature is central to the case study approach and enables **theory building** (p. 25). Case study research is highly objective as the researcher is forced to closely adhere to the data (Eisenhardt & Graebner, 2007, p. 25). The data collection is guided by the **theoretical-conceptual framework**. Tightness or openness of this framework is dependent on the individual investigation. In either case new insights might lead to a change in direction of the study, **redirecting the framework** (Miles & Huberman, 1994, p. 16; Tecuci et al., 2018, p. 10). **Data collection and analysis** is directed according to the **theory in progress** (Eisenhardt & Graebner, 2007, p. 30; Glaser & Strauss, 1967, p. 45; Suddaby, 2006, p. 639).

Yin (2014) regards case study research as an all-encompassing method, comprising data collection and data analysis which are interconnected by **triangulation** (p.13). According to Eisenhardt (1989b), multiple methods inform the collection of observational data (p. 538, Yin, 2014, p. 13). Triangulation of evidence is integral part of it as it builds the framework for theory building from the case study (Eisenhardt, 1989b, pp. 533–534). **Methodological and data triangulation** is applied in combining several different empirical sources from different points in time (Denzin, 1978 in Cox & Hassard, 2005, p. 110). A multiple case study is not necessarily better than a single case study; rather, the focus is on the quality of the case, or cases found. Random selection is not required, nor particularly preferred (Eisenhardt, 1989b, p. 537). Given the small number of cases that are often amenable to study, it is reasonable to select cases like polar types and extreme scenarios where the process of interest can be observed in full transparency. Therefore, the aim is to select cases that have the potential to support or advance the emerging theory (Pettigrew, 1973 in Eisenhardt, 1989b, p. 537). The number of cases is not a guarantee for **data saturation** but increases its likelihood (Dubois & Gadde, 2002, pp. 557–558). Methodological and data triangulation are thus key to provide a rich and holistic data base to enhance the credibility of this investigation (Smith, 2018, p. 1043). Multiple sources inform the case study (Eisenhardt, 1989b, p. 538; Yin, 2014, p. 13), leading to a broad range of issues and thus to more accurate results than with just one single case (Yin, 2014, p. 20).

The **case study method** as a qualitative form of inquiry, is used to **build theory inductively** by leveraging in-depth knowledge of empirical phenomena (Dubois & Gadde, 2002, p. 555; Eisenhardt & Graebner, 2007, p. 25; Maher et al., 2018, p. 5). The case study thus advances the understanding of complex phenomena inductively generated (Ogawa & Malen, 1991, p. 271).

Combining a case study with an inductive investigation is very suitable (Mantere & Ketokivi, 2013, p. 79), as both allow for the descriptive, explanatory, and exploratory investigation of the topic (Yin, 2009, pp. 7–8): a descriptive or confirmatory inductive approach is represented by a multiple case study, which is used for a **generalization** of the topic under investigation with the goal to improve validity and reliability (Yin, 2003 in Anaf et al., 2007, p. 1310; Eisenhardt, 1989b, p. 542). Confirmation and disconfirmation enable the refinement and advancement of the guiding theory (Eisenhardt, 1989b, p. 542). As strong theory-building involves much more than providing data and concepts for generalization (Mantere & Ketokivi, 2013, p. 79; Sutton & Staw, 1995, pp. 373–376), the **explanatory** part of the case study supports the investigation of the causal interrelationships among the elements and the inferences to explanations (Mantere & Ketokivi, 2013, p. 79; Sutton & Staw, 1995, p. 378) such as to provide an overall perspective of the topic under investigation (Eisenhardt, 1989b, p. 547). The further goal of an inductive case study is to collect specific data englobing data sources contributing to revealing unknown aspects for the systematic **exploration** of new insights resulting from the previous hypotheses (Mantere & Ketokivi, 2013, p. 78; Morse & Mitcham, 2002, p. 33) enabling the building of untested conclusions (Mitchell, 2018, p. 105).

An **inductive case study** is thus a simultaneous process of proof of hypotheses and discovery of specific new knowledge (John Stuart Mill in Jacobs, 1991, p. 71): "Induction […] is a process of inference; it proceeds from the known to the unknown" (Mill, 1856, p. 315). The cases may be selected to support emergent theory, to reproduce earlier cases, or to fill theoretical gaps (Eisenhardt, 1989b, p. 537). The variety of this inductive case study approach, involving descriptive, explanatory, and exploratory elements (Yin, 2009, pp. 7–8) favors the building of a strong novel theory (Eisenhardt, 1989b, p. 546; Sutton & Staw, 1995, p. 378).

7.2.3 The Structure of Observational Data Collection

This study collects data based on a **case study involving methodological and data triangulation** for the purpose of retrieving large observational data (Dubois & Gadde, 2002, pp. 557–558) to balance individuality, accuracy, and generalizability such as to build a logically coherent and sound theory (Eisenhardt, 2021, p. 152). In total, this chapter includes five different types of data collection methods, which will be presented in the following:

First, **SLR 1 and SLR 2 are further investigated** regarding **decision-making techniques** which can be applied to the partner selection framework.

Second, an **update of the initial SLRs** is made: as the SLRs took place until June 2022 (SLR 1) and August 2022 (SLR2) it is interesting to see whether an update results into new insights. Therefore, both SLRs were implemented again with the same criteria but **including literature from 2022 and 2023** and lead to **SLR 1B and SLR 2B**. The overall process description of the SLRs is not repeated, as it is, apart from the publication years, identical with the process in the ABDUCTION chapter, using the same inclusion and exclusion criteria. The process of SLR 1B and SLR 2B is demonstrated in **Figure 73** for the purpose of illustrating the number of articles for each single step and the final number of articles.

Figure 73. Process Description of SLR 1B and SLR 2B (Including Literature from 2022 and 2023)

First Step	**Database:** Web of Science **Search domains:** Title OR Abstract OR Author keywords OR Keywords Plus **SLR 1B** **Keywords:** partner AND ecosystem **Publication years:** 2022 & 2023	**SLR 2B** **Keywords:** partner selection AND alliance **Publication years:** 2022 & 2023	**Results** **SLR 1B: n = 457** **SLR 2B: n = 51**
Second Step	**FILTER** **Category:** Management, Business, Economics, Computer Science Information Systems, Computer Science Software Engineering, Computer Science Interdisciplinary Applications	**Research Areas:** Business Economics Computer Science **Document Type:** Article **Language:** English	**Results** **SLR 1B: n = 93** **SLR 2B: n = 31**
Third Step	• Remove duplicate sources, which are already included in SLR 1 or SLR 2:	**SLR 1:** sources until June 2022 **SLR 2:** sources until August 2022	**Results** **SLR 1B: n = 75** **SLR 2B: n = 27**
Fourth Step	• Remove duplicate sources within the new SLRs:	**SLR 1B:** Begeç & Akyuz, 2023 **SLR 2B:** -	**Results** **SLR 1B: n = 74** **SLR 2B: n = 27**
Fifth Step	• Reading of all titles / abstracts • Evaluation of titles / abstract on a scale 1 to 4 (“no fit” to “ideal fit”)	• Publications with ideal fit = ranking 4 • Publications with general fit = ranking 3, if ranking 4 is not available • Discussion of results and final rating	**Results** **SLR 1B: n (No. 4) = 0** **n (No. 3) = 16** **SLR 2B: n (No. 4) = 16**
Sixth Step	• Detailed reading of:	**SLR 1B:** all No. 3 Papers (= with general accordance) **SLR 2B:** all No. 4 Papers (= with ideal fit)	**Results** **SLR 1B: n (No. 4) = 0** **n (No. 3) = 7** **SLR 2B: n (No. 4) = 0** **n (No. 3) = 6**

Source: Author’s representation

Third, a further update of the SLRs is made with another filter towards **sustainability and circular economy** related business ecosystems including all publication years until end of 2023. The following Web of Science Categories were used: Environmental Studies and Green Sustainable Science Technology. The following research areas were applied: Environmental Sciences Ecology. Due to these different inclusion and exclusion criteria compared to the previous SLRs, no duplicates are generated. The process descriptions of the **second literature review update (SLR 1C and SLR 2C)** are illustrated in **Figure 74**. The SLRs were conducted separately to be able to see the influence of each individual modification on the results.

Figure 74. Process Description of SLR 1C and SLR 2C (Including Sustainability and Circular Economy Related Literature with All Publication Years Until End of 2023)

First Step	**Database:** Web of Science **Search domains:** Title OR Abstract OR Author keywords OR Keywords Plus **SLR 1C** **Keywords:** partner AND ecosystem	**SLR 2C** **Keywords:** partner selection AND alliance	**Results** **SLR 1C: n = 2 265** **SLR 2C: n = 571**
Second Step	**FILTER** **Category:** Environmental Studies Green Sustainable Science Technology	**Research Areas:** Environmental Sciences Ecology **Document Type:** Article **Language:** English	**Results** **SLR 1C: n = 131** **SLR 2C: n = 13**
Third Step	• Reading of all titles / abstracts • Evaluation of titles / abstract on a scale 1 to 4 (“no fit” to “ideal fit”)	• Publications with ideal fit = ranking 4 • Publications with general fit = ranking 3, if ranking 4 is not available • Discussion of results and final rating	**Results No. 4-Articles** **SLR 1C: n = 8** **SLR 2C: n = 2**
Fourth Step	• Detailed reading of:	**SLR 1C:** all No. 3 Papers (= with general accordance) **SLR 2C:** all No. 4 Papers (= with ideal fit)	**Results** **SLR 1C: n (No. 4) = 2** **n (No. 3) = 4** **SLR 2C: n (No. 4) = 2** **n (No. 3) = 0**

Source: Author’s representation

Fourth, **data from the interviews** in the DEDUCTION part have led to **inductive categories** which will be further investigated. In the inductive approach, the categories are not created before viewing the material, but are derived directly from the material without referring to previously used theoretical concepts. This type of category formation is referred to as **summarizing content analysis** (Mayring, 2014, p. 79).

Fifth, **secondary archival interview data** is retrieved from the Chair of International Management. Multiple **final theses with similar topics to this investigation**, involving the period Q1/2022-Q3/2023, are compared for the objective of obtaining potentially useful information which can be transferred to this investigation. The archival interviews including business ecosystem type, industry, number of employees, and turnover, are indicated in **table 33**.

Table 33. Archival Interviews

Source of Interview	Topic	Date of Interview	NO. of Interviews Cumulative	NO. of Interviews	Business Ecosystem Type	Company	Job Title	Country	NO.of Employees	Turnover
A	Success factors in designing the innovation management in circular ecosystems	Q1/2023	1	15	BE, IE	Consulting	Partner and Director Corporate Strategy	USA	> 10 000	> 1 bn USD
			2		SE, CE	Private foundation	Project Manager Circular Economy	Switzerland	> 1	> 100 000 CHF
			3		CE	Refurbishment	B2B Operations Strategy & New Business Team	Austria	> 100	> 100 m EUR
			4		IE, SE	E-Mobility	Director Customer Service and Digital Ecosystem	Germany	N/A	N/A
			5		IE, SE, CE	Environmental Services	Member of the management board	France	> 100 000	> 10 bn EUR
			6		IE, SE	Biotechnology research	Euopean Project Coordinator	Belgium	> 100	N/A
			7		IE, SE, CE	Waste to Energy, Renewable energies	Senior Engineer	Switzerland	> 10 000	N/A
			8		IE, SE	Manufacturing of electronic devices	Product Manager Drives	France	> 100 000	> 10 bn EUR
			9		IE, SE	Renewable energies, plant engineering	Director Sustainability, Manager Corporate Development & Strategy	Germany	> 1 000	> 1 bn EUR
			10		IE, CE	Environmental Services	Project Manager for Innovation	France	> 100 000	> 10 bn EUR
			11		IE	Public research	Business Development Manager	Germany	> 10 000	N/A
			12		IE, SE, CE	Packaging technology	Vice President R&D	Israel	> 100	N/A
			13		IE; DBE; CE	Plastic manufacturer	Project management product development	Germany	> 100	> 100 m EUR
			14		IE, SE, CE	Public research	Head of department	Germany	> 10 000	N/A
			15		IE, CE	Environmental Services	Head of department corporate development	Germany	> 10	> 100 m EUR
B	Strategies for selecting actors in sustainability ecosystems for their contribution to the orchestrator's sustainability strategy	Q2/2022	1	8	SE, CE	Pharma industry	Groupmanager Sustainability	Germany	> 10 000	> 100 m EUR
			2		SE, CE	Consulting	Strategy and Transaction Consulting- Value Creation	Germany	> 100 000	> 10 bn USD
			3		IE, SE	Automotive	Former Vice President Executive	Germany	N/A	N/A
			4		SE	Former Strategy and Transaction Consulting	Private Equity and Strategy Development	Germany	N/A	N/A
			5		IE, SE	Innovation management Pharma industry	Head of Advanced Technology	Germany	> 10 000	> 100 m EUR
						Innovation management Pharma industry	Head of Innovation	Germany	> 10 000	> 100 m EUR
			6		IE, DBE	Innovation management Pharma industry	Global Vice President Digitalization of new business models	Germany	> 10 000	> 100 m EUR
			7		SE	Lamp Industry	Supply Chain Management	Germany	N/A	N/A
			8		SE	Consulting, Investment company	Finance Investor	Germany	> 10 000	> 1 bn EUR
C	Success factors from the perspective of the ecosystem orchestrator in the selection of innovation ecosystem actors for the development of digital innovations	Q1/2022	1	7	IE, SE	Bank	Innovation & Ecosystem Manager	Germany	One of the largest German banks	
			2		IE, SE	E-bikes	Director Corporate Strategy Development	Germany	One of the largest German Groups	
			3		IE, SE	Consulting	Senior Manager Ecosystem Strategy	Germany	One of the largest German Consulting companies	
			4		IE, SE	Consulting for SME Digital Transformation & law	Innovation Culture & Ecosystem Manager	Germany	N/A	
			5		IE, SE	Software	Senior Innovation & Technology Architect	Germany	One of Germans largest Software companies	
			6		IE, SE	Technology and Strategy Consulting	Strategy Consultant & CCO	Germany	One of worlds largest Consulting companies	
			7		IE, SE	Bank and Institute	Research Assistant and Strategy Development Consultant	Germany	N/A	

Source of Interview	Topic	Date of Interview	NO. of Interviews per Source	NO. of Interviews	Business Ecosystem Type	Company	Job Title	Country	NO.of Employees	Turnover
D	Needed Capabilities for the Coordination of Digital Ecosystems	Q1/2022	1	4	DBE	Consulting	Expert technology industry	Germany	> 100	N/A
			2		DBE	Consulting	Expert finance and insurance industry	Germany	> 10	> 1 m EUR
			3		DBE	Consulting	Expert technology industry	Germany	> 100	N/A
			4		DBE	Consulting	Expert Real estate- and financial services industry	Germany	> 100	N/A
E	Contribution to the success of artificial intelligence in digital business ecosystems	Q3/2023	1	1	DBE	Consulting for brand marketing and AI	CEO & Founder	USA	> 100	> 1 m USD
F	Investigating success-determining characteristics of orchestrators in the context of digital business ecosystems	Q1/2022	1	6	DBE	Automotive Industry	Head of Corporate Strategy	Germany	> 100 000	> 10 bn EUR
			2		DBE	Automotive Industry	Manager Digitalization and Ecosystems	Germany	> 100 000	> 10 bn EUR
			3		DBE	Automotive Industry	Director Ecosystems	Germany	> 100 000	> 10 bn EUR
			4		DBE	Automotive Industry	Start-up Scouting	Germany	> 100 000	> 10 bn EUR
			5		DBE	Automotive Industry	Ecosystems	Germany	> 100 000	> 10 bn EUR
			6		DBE	Automotive Industry	Innovation Lab	Germany	> 100 000	> 10 bn EUR
G	Digital strategies of established companies for the formation of digital innovation ecosystems	Q3/2022	1	5	DBE / IE	Automotive Industry	Head of Strategy and Innovation	N/A	N/A	N/A
			2		DBE / IE	Consulting	Global Head Digital, Innovation and R&D	N/A	N/A	N/A
			3		DBE / IE	Industrial company	Head of Digital Ecosystem	Germany	> 10 000	> 10 bn EUR
			4		DBE / IE	Industrial company	Open Innovation Manager	Switzerland	N/A	> 10 bn EUR
			5		DBE / IE	Automotive Industry	Lead of Innovation Lab	Germany	> 100 000	> 100 m EUR
Total Number of Interviews				**46**						

Source: Author’s representation

Sixth, apart from the SLRs, **an interview retrieved from the internet**, as well as **further journals** with similar topics are investigated to identify observational patterns from different perspectives. These are illustrated in the following **Table 34**:

Table 34. Interview Retrieved from the Internet and Further Literature

Author	Year	Interview / Journal	Journal Ranking SJR	Journal Impact Factor (2022)
Kawohl	2022	Interview	n/a	n/a
Ahuja	2009	Strategic Management Journal	Q1	8.3
Bettenmann et al.	2002	MIT Sloan Management Review	Q1	4.2
Brown	2021	Journal of Cleaner Production	Q1	11.1
Caliccio Berardi	2021	Journal of Cleaner Production	Q1	11.1
Calipha & Brock	2019	Journal of Intercultural Management and Ethics	-	-
Christmann et al.	2024	Business & Information Systems Engineering	Q1	7.9
Gao et al.	2023	Sustainability	Q1	3.9
Geum et al.	2013	Technovation	Q1	12.5
Gneiting	2018	ATZ Extra (ATZextra), Springer; Springer Fachmedien Wiesbaden	n/a	n/a
Helfat & Raubitschek	2018	Research Policy	Q1	7.2
Heubeck & Meckl	2022	European Journal of Innovation Management	Q1	5.1
Hora et al.	2018	Software Quality Journal	Q1	1.9
Konietzko	2020	Journal of Cleaner Production	Q1	11.1
Linde et al.	2021	Technological Forecasting and Social Change	Q1	12
Lütjen et al.	2019	Journal of Business Research	Q1	11.3
Schreieck et al.	2021	Journal of Information Technology	Q1	5.6
Sytch et al.	2012	Organization Science	Q1	4.1
Tate	2019	Resources, Conservation And Recycling	Q1	13.2
Total Number of Sources: 19				

Source: Author's representation

In sum, the **empirical reference list** of this INDUCTION part is **extensive**, including twenty-five articles for the further investigation of the SLRs, thirteen articles in the updated SLRs including all publication years until December 2023, eight articles in the updated SLRs regarding sustainability and circular economy-related literature including all publication years until December 2023, forty-six archival interviews from seven final theses from the Chair of International Management, one expert interview and eighteen sources of further literature. **In total, 127 sources** of observational data support this **inductive investigation**, thereof **63 interviews** and **64 articles.** The different data collection methods used within this case study approach are summarized in the following **Table 35**.

Table 35. Data Collection Methods Applied within the Case Study Approach

No.	Type of Data Source	Number of Sources
1.	**Further Investigation of the SLRs:** SLR 1 and SLR 2 are Further Investigated Regarding Decision-Making Techniques	**25**
2.	**Update of the Initial SLRs:** SLR 1B and SLR 2B Including December 2023 SLR 1C and SLR 2C Including Sustainability and Circular Economy related Literature Until End of 2023	**13** **8**
3.	**Data from Targeted Interviews from the DEDUCTION part** (Inductive Categories)	**16**
4.	**Secondary Research I:** Data from Archival Interviews: Final Theses Edited at the Chair of International Management	**46**
5.	**Secondary Research II:** Interview Retrieved from the Internet Data from Further Literature	**1** **18**
	Total Number of Data Sources:	**127**

Source: Author's representation

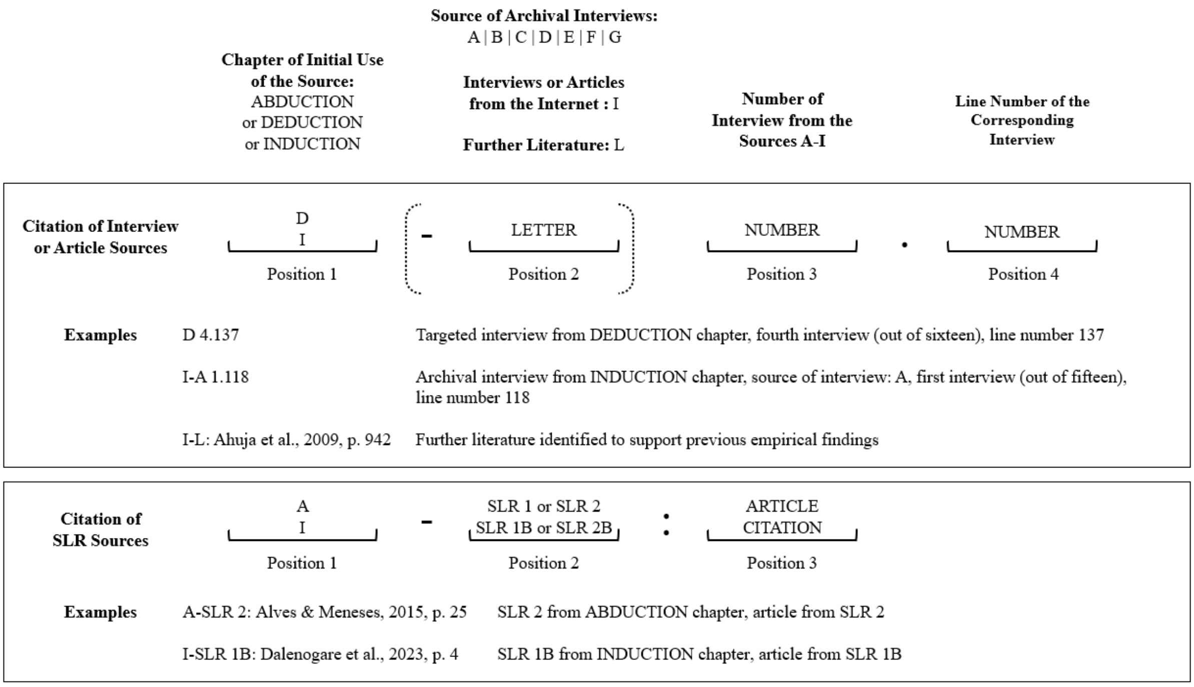
Due to the multiple empirical sources, a citation structure is necessary to facilitate the distinction of the different types of sources among the chapters ABDUCTION, DEDUCTION, and INDUCTION. The **citation structure** of this thesis is as follows and summarized with examples given in **Figure 75**:

1. The first position is a letter, an A, D, or I, which represents the chapter, ABDUCTION, DEDUCTION, or INDUCTION, in which the source was initially used: for instance, SLR 1 and SLR 2 were initially investigated in chapter ABDUCTION and are therefore marked with an A. The targeted interviews from the DEDUCTION chapter receive a D. All other sources appear for the first time in this INDUCTION chapter and receive an I for identification.
2. The second position indicates the type of source, if there is more than one source: SLR, interview, or further literature. SLR 1 and SLR 2 are the initial interviews from the ABDUCTION chapter, SLR 1B and SLR 2B, as well as SLR 1 C and SLR 2C are the updated interviews from this INDUCTION chapter. The letters A-G are related to one of the seven archival interviews retrieved from the final theses from the Chair of International Management. The letter I represents an interview retrieved from the internet. The letter L represents further scientific literature.

3. The number in the second or third position indicates the number of the interview: For instance, final thesis A contains 15 different interviews, which are numbered consecutively.
4. The last number illustrates the line number of the corresponding interview, which always marks the beginning of a section from which the content is taken.

Providing a **consistent and transparent citation structure** is important given that several different types of sources are combined with each other, that need clearly to be identified to guarantee **rigorous scientific research** (Grodal et al., 2021, pp. 591-593; Morse et al., 2002, p. 14; Prager et al., 2019, p. 377). This citation structure therefore helps to comprehend from which of the chapters, ABDUCTION, DEDUCTION, or INDUCTION, stem the citations to highlight the patterns generated by the **Inferential Pattern Matching Approach**.

Figure 75. Citation Structure



Source: Author's representation

7.3 Data Analysis Methods within Case Study Research: Structuring Content Analysis, Summarizing Content Analysis, Systems Theory, and the Inferential Pattern Matching Approach

In case study research, the boundaries between data collection and data analysis are not sharp, they are rather interwoven: the bridging of different methods among case study research allows for high flexibility and the **exploration of contextual holism and causal links** for the investigation of a deep meaning of the research topic (Luck et al., 2006 in Anaf et al., 2007, p. 1310; Sutton & Staw, 1995, p. 378; Mantere & Ketokivi, 2013, p. 79).

The **data analysis part** comprises the following four approaches:

First, **structuring content analysis** is applied to identify categories among the archival interviews based on the criteria and hypotheses from the DEDUCTION chapter (Mayring, 2014, p. 95, 2020, p. 6; Mayring & Fenzl, 2019, p. 638).

Second, **summarizing content analysis** is applied for the exploration of new categories from the semi-structured, targeted interviews from the DEDUCTION chapter, the archival interviews and the interview from the internet (Mayring, 2014, p. 79).

Third, **systems theory** is applied to grasp information from the further literature and interviews from the internet as well as from the interviews retrieved from the final theses written at the Chair of International Management: the topics investigated treat topics from a different perspective than this study does, so that key relationships, though being related to slightly different topics, are transferred to this investigation, as they provide meaningful insights (Besio & Pronzini, 2011, p. 22; Boulding, 1956, p. 199; Johnson et al., 1964, p. 369).

Fourth, the **Inferential Pattern Matching Approach** is applied to connect the findings: literature regarding case study research remains opaque on how to **analyze, interpret, and combine the findings** from the different data sources (Ogawa & Malen, 1991, pp. 277–283). Several triangulation types exist (Farquhar et al., 2020, pp. 160–165), but at the end, being transparent on how the analysis is done and how the findings are obtained is more important than relying on a specific method (Ogawa & Malen, 1991, p. 269). Similar to the **iterative triangulation**, in which literature review and observational data are triangulated with intuition (Lewis, 1998, p. 455), this study employs the **Inferential Pattern Matching Approach** to connect and interpret the findings, as this process iteratively evolves and is based on a theoretical sampling process between data collection, data analysis, and theory building (Glaser & Strauss, 1967, p. 45) within this case study research.

7.4 Descriptive Statistics

This chapter sheds light on the general outcomes of the two updates of the systematic literature reviews: SLR 1B and SLR 2B, as well as SLR 1C and SLR 2C.

SLR 1B and SLR 2B indicate no articles with ideal fit, represented by the No. 4-articles, but only No. 3-articles with a general fit. Initially, the article from Esmaelnezhad et al. (2023) appeared to perfectly fit, but upon closer inspection, it was discovered that the study focuses on key success factors which lead to international partner selection in international collaborations, but provided no insights on how to select partners. The literature reviews from the ABDUCTION chapter can therefore not be updated by SLR 1B and SLR 2B, as there are no articles with an ideal fit. However, there is a general similarity of some articles with this investigation, indicated by a final result of seven No. 3- articles for SLR 1B and six No.3-articles for SLR 2B; thus, in total 13 articles which can potentially be used to contribute to parts of the inductive analysis, as they contain information regarding the partner selection process by applying the **systems theory**. The following **Table 36** illustrates the authors, publication years, journals, and respective journal rankings of SLR 1B and SLR 2B.

Table 36. No. 3-Articles of SLR 1B and SLR 2B

		Author	**Year**	**Journal**	**Journal Ranking SJR**	**Journal Impact Factor (2022)**
No. 3-Articles	**SLR 1B**	Amir & Prabawani	2023	Cogent Business & Management	Q2	3
		Benramdane et al.	2023	Information Systems Frontiers	Q1	5.9
		Dalenogare et al.	2023	Technovation	Q1	12.5
		Ferreira et al.	2023	Journal of Business Research	Q1	11.3
		Iglesias et al.	2023	Industrial Marketing Management	Q1	10.3
		Lingens et al.	2023	Journal of Engineering and Technology Management	Q1	4.8
		Poblete et al.	2022	Industrial Marketing Management	Q1	10.3
	SLR 2B	Emmanuel et al.	2023	Journal of Social Entrepreneurship	Q1	3
		Esmaelnezhad et al.	2023	Journal of Business Research	Q1	11.3
		Gaonkar & Mele	2023	Journal of Economic Behavior & Organization	Q1	2.2
		Howard et al.	2023	Journal of Management	Q1	13.5
		Smiljic et al.	2023	R&D Management	Q1	6.3
		Su et al.	2023	Computers & Industrial Engineering	Q1	7.9

Source: Author’s representation

Except for the article from Amir and Prabawani (2023), which is ranked Q2 according to Scimago Journal Ranking, all other articles are ranked Q1, which underlines the high quality of the articles. The journals Industrial Marketing Management and Journal of Business Research are each represented twice. The non-availability of No. 4- articles might have one major reason: the investigation until this point has shown that partner selection in business ecosystems is highly complex, involving several different factors and interrelationships. Depicting this complexity in depth within a journal article is not trivial, as they are usually quite focused on one single, very specific topic. The relatively high number of No. 3- articles from SLR 1B and SLR 2B support this argument in the sense that they focus on one or two specific factors in depth instead of presenting holisticness. For the further investigation, this has the great advantage that further relevant pieces of the puzzle can be identified, or investigated more in depth, such as to advance this investigation for the goal of achieving holisticness, in-depth knowledge and an understanding of the underlying relationships.

Interestingly, the **second literature review update (SLR 1C and SLR 2C)** yielded four articles with an ideal fit, thereof two articles treating partner selection regarding business ecosystems and two related to strategic alliances. Four articles including partner selection as a major topic are expected to provide relevant information, but must be ranked as No. 3-articles, as partner selection is not their focused topic, but only a major part of it. Even though No. 3-articles have no ideal fit with the topic, their contribution to single details is expected to be important. That is why these are included in the investigation. Authors, publication years, journals, and respective journal rankings of these articles are listed in **Table 37**.

Table 37. No. 4- and No. 3- Articles of SLR 1C and SLR 2C

Classifi cation	SLR	Author	Year	Journal	Journal Ranking SJR	Journal Impact Factor (2022)
No. 4- Articles	SLR 1C	Wei et al.	2020	Journal of Cleaner Production	Q1	11.1
		Bang et al.	2021	Sustainability	Q1	3.9
	SLR 2C	Dzhengiz	2018	Sustainability	Q1	3.9
		Chang et al.	2019	Sustainability	Q1	3.9
No. 3- Articles	SLR 1C	Havinga et al.	2023	Journal of Cleaner Production	Q1	11.1
		Acebo et al.	2021	Business Strategy and the Environment	Q1	13.4
		van de Wetering et al.	2017	Current Opinion in Environmental Sustainability	Q1	7.2
		Trevisan et al.	2022	Sustainable Production and Consumption	Q1	12.1

Source: Author's representation

Partner selection with regard to sustainability- or circular-oriented business ecosystems appears to be a highly relevant topic, with literature emerging within the last five years (Bang et al., 2021, p. 1; Chang et al., 2019, p. 1; Dzhengiz, 2018, p. 1; Wei et al., 2020, p. 1). The journal Sustainability is overrepresented with 37,5% of the total number of journals and 75% of the No. 4- articles. Partner selection within sustainability- or circular-oriented business ecosystems, or alliances are thus majorly published within the Sustainability journal. Partner selection regarding to sustainability- or circular-oriented business ecosystems is investigated as a major part from a general business ecosystem governance, performance, or capabilities lens, with four No. 3-articles (Acebo et al., 2021, p. 2671; Havinga et al., 2023, p. 3; Trevisan et al., 2022, p. 286; van de Wetering et al., 2017, p. 71). There has been an ongoing interest to investigate partner selection within business ecosystems, the masses are however concentrating on investigating the complex business ecosystem configuration with the partner selection as a major part of it. This illustrates that there is an ongoing interest for this topic and a need for an in-depth investigation of a systematic and holistic partner selection framework for business ecosystems.

7.5 Results

7.5.1 Corporate Objectives and Strategy

Since the topics are very intertwined, orientation towards the previous structure is only possible to a limited extent so that this chapter follows its own structure based on the new insights. The identification of **missing capabilities** (A-SLR 1: Beelen et al., 2022, p. 14) and the closely related **make-or-buy decision** (A-SLR 1: Jacobides, 2022, p. 103; Olsson & Bosch, 2020, p. 19) are inductively confirmed as the first step of the partner selection process and are followed by a **market analysis** and **market entry strategy** (D 15.75; D 2.70; D 8.70; I-B 3.12; I-B 6.129; I-C 3.151; I-C 6.121; I-G 1.245; I-G 4.283), representing a classic ideation process (I-I 1.102: Kawohl, 2022) under the umbrella of the overarching aim of creating a holistic customer experience (D-I 13.103; I-I 1.38: Kawohl, 2022). The next step is the definition of a **strategy or purpose**. Companies must define where they want to go, otherwise this leads to detached microsystems which do not generate added value (I-G 1.245; I-G 3.248; I-G 4.283; I-G 4.341; I-G 5.539). These findings support hypothesis 4A.

Hypothesis 4A

The definition of the corporate objectives is the first step of the partner selection process within different types of business ecosystems and platforms and includes the identification of missing capabilities and the make-or-buy decision. The make-or-buy decision then entails a market analysis and a market entry strategy.

7.5.2 Influencing Factors and Their Relationships

7.5.2.1 Consider the Lock-In Effect of a Business Ecosystem

The interviews from the DEDUCTION part were not only used for the deductive investigation, but also revealed categories **inductively** formed using the **summarizing content analysis** (Mayring, 2014, p. 79), such as the inductive category of the **lock-in-effect**. A business ecosystem inevitably leads to a lock-in effect due to its closely interwovenness with partners: a problem within one company can become a problem for its partners in a business ecosystem, especially when they approach customers jointly (D 7.218; D 8.38; D 13.149). The power of **large tech companies** is disproportionally larger than that of most companies, especially in terms of platforms as a service, so that a **dependency** on those kinds of companies can lead to a lock-in-effect as well (D 7.228). Customer needs, in turn, are more holistically represented than with an individual service or product so that thanks to convenience the customer does not have to leave the business ecosystem. The business ecosystem therefore not only leads to **lock-in effects** for **partners**, but also for **customers** (I-I 1.24: Kawohl, 2022). The lock-in-effect, in turn, might impact the **strategic fit** of partners, as they can also contain a **strategic misfit** in the sense that strategies of business ecosystem partners change so that the company's own strategy no longer fits (D 8.175). This must be taken into account when deciding for a business ecosystem. A move back to the ABDUCTION literature according to **Figure 76** reveals that the lock-in effect is positive in strengthening a company's competitive position. Further, the lock-in effect equally affects customers and partners (A-SLR 2: Holmberg & Cummings, 2009, p. 174).

Figure 76. Move Back According to the Inferential Pattern Matching Approach

Source: Author’s representation

As potential partners might be locked in within other business ecosystem partners with a best strategic fit, they might not be available for other business ecosystems. Though this effect is more pronounced in strategic alliances than in business ecosystems with loose structures, it has to be considered that companies are not able to handle an endless number of different business ecosystems so that this might affect the strategic fit of the partners.

7.5.2.2 Time Horizon and Reevaluation of Partner Fit

The **long-term orientation and sustainable growth of existing business ecosystems** was confirmed in the DEDUCTION chapter (D 4.137). This long-term orientation is inductively supported and particularly relevant for sustainability or digital objectives. It is therefore easier and also necessary to forgo short-term returns, the so-called low hanging fruits, because social and economic pressure force companies to pursue long-term innovation and strategic sustainability goals (I-B 2.241; I-SLR 1B: Dalenogare et al., 2023, p. 6; I-SLR 1B: Amir & Prabawani, 2023, p. 14; I-I 1.92: Kawohl, 2022). This applies equally to sustainability goals, such as reducing CO_2, as well as to the reduction of production waste within circular-oriented business ecosystems (I-A 14.204). Instead of one-off innovations, product recycling is medium to long-term oriented, as the principle of circularity already implies (I-L: Calicchio Berardi & Peregrino de Brito, 2021, p. 4). The long-term orientation is confirmed for DBEs as well (I-F 1.230; I-F 2.79; I-G 3.616; I-G 5.539). There is thus no relevance for the time horizon to be determined prior to the partner selection process, as the focus of business ecosystems is clearly on long-term collaboration. Hypothesis 13 remains rejected.

Hypothesis 13

The time horizon of business ecosystems must be determined prior to the partner selection process.

⊖

As it has been confirmed again that generally business ecosystems are long-term oriented (I-B 2.241; I-A 14.204; I-F 1.230; I-F 2.79; I-G 4.385; I-G 5.539), no evidence can be found for differences in the selection process of existing business ecosystems compared to the creation of new business ecosystems. Hypothesis 16 remains rejected.

Hypothesis 16

The partner selection approach for the extension of, respective participation in an existing business ecosystem is different to the creation of a new business ecosystem.

⊖

The **time available for the partner selection process**, however, determines the **number and quality of partners** (I-A 9.292; I-A 9.327). As already confirmed by the **Inferential Pattern Matching Approach**, the process of taking decisions under time pressure is called **strategic expediency** and involves relying on **intuition**, **trust**, and **prior relationships** (A-SLR 2: Bierly & Gallagher, 2007, p. 135; A-SLR2: Bierly & Gallagher, 2007 in Alves & Meneses, 2015, p. 25; D 5.98; D 6.60).

The long-term orientation of business ecosystems is the reason why companies should never drive into a standard solution where they cannot get out and should therefore flexibly react to market changes (I-F 2.163) and to additional types of business ecosystems (I-F 2.84). The partner selection process is described as an iterative adaptation process (I-D 3.123), as a business ecosystem is an ongoing endeavor, which is never being finished (I-C 4.44). A continuous improvement of partner selection is **constantly reevaluated as development progresses** (D 1.101; D 4.128; D 5.199; D 16.70; I-D 4.139; I-G 3.633; I-G 4.341). Hypothesis 17 is thus further supported for all types of business ecosystems.

Hypothesis 17

The reevaluation of the partner fit over time is an important part of the partner selection process.

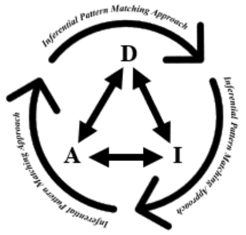
✓

7.5.2.3 Fair Distribution of Values and Sharing of Risks

The building of **inductive categories** from the targeted interviews of the DEDUCTION chapter according to the **summarizing content analysis** (Mayring, 2014, p. 79) further reveals the **fair distribution of values or work contribution** as a major element in the partner selection process (D 1.92), which means that no actor shall be disadvantaged when joining the business ecosystem. This is confirmed by observations from the archival interviews, the updated SLRs, and an interview from the internet (I-B 1.376; I-B 3.4; I-A 1.150; I-E 1.341; I-F 5.68; I-G 1.281; I-G 2.195; I-G 3.218; I-G 4.341; I-SLR 2B: Zhou et al., 2020 in Su et al., 2023, p. 2; I-I 1.112: Kawohl, 2022). The fair distribution of values includes the encounter at eye level, the profit, respectively value sharing, or the clarification of mutual requirements and a mutual benefit; as only in case of reciprocity the business ecosystem can be successful in the long term (I-B 2.233; I-B 5.318; I-B 2.74; I-A 1.150; I-B 6.129; I-E 1.341; I-SLR 2B: Jiang et al., 2021 in Su et al., 2023, p. 2 ; I-SLR 1B: Dalenogare et al., 2023, p. 5). At the beginning it has to be clarified how much everyone will contribute: this is often referred to as payment or price even though the contribution is non-monetary, but it costs the company resources to join a business ecosystem (I-A 10.312; I-B 3.4) and indicates how much they get for what they invest (I-D 4.97). This goes along with supporting **incentives**, enabling that the right partners can be found to support the business ecosystem (I-A 1.118). **Prior relationships** in form of a history of cooperation positively influence the fair value distribution (A-SLR 2: Alves & Meneses, 2015, pp. 25-26; I-SLR 2B: Su et al., 2023, p. 7).

The fair distribution of values appears to be relevant for all types of business ecosystems (I-B 6.129; I-A 1.150; I-D 4.97; I-G 1.281; I-SLR 1B: Dalenogare et al., 2023, p. 4), but in particular for DBEs, as for instance customers provide a disproportionate amount of data, while the big players have a disproportionate higher value extraction and realization of the benefits (I-E 1.341). A move back to the ABDUCTION and DEDUCTION chapters according to **Figure 77** supports this argument: the fair value distribution is of high relevance for **profit sharing**, especially among software developing companies within a DBE (A-SLR 2: Fahimullah et al., 2019, p. 42868; D 11.168).

Figure 77. Move Back According to the Inferential Pattern Matching Approach



Source: Author’s representation

In general, a fair distribution of values is relevant, though it is usually not the price, which is decisive for the selection of partners, but rather their fit (I-B 4.152). The parties must therefore commit to **shared goals** (A-SLR 2: Holmberg & Cummings, 2009, pp. 168, 173; I-SLR 1C: Konietzko et al., 2020 in Trevisan et al., 2022, p. 293) and a **mutual value proposition** (A-SLR 2: Holmberg & Cummings, 2009, pp. 173-174; I-G 4.341; I-SLR 1B: Tanskanen, 2015 in Dalenogare et al., 2023, p. 2; I-SLR 1B: Jacobides et al., 2018 in Lingens et al., 2023, p. 6). A fair distribution of values is thus of major importance to be considered when selecting partners.

7.5.2.4 Double Value Proposition

Value propositions are defined within agile settings with iterative cycling so that customer and partner focus cannot be de-coupled within product development, for instance: if the value proposition changes due to a customer feedback, this has an impact on contributions of and incentives for the partners, which might in extreme cases question the suitability of a partner for future developments (I-SLR 1B: Lingens et al., 2023, p. 7; I-SLR 2B: Smiljic et al., 2023, p. 266). Added value is iteratively generated with the partners for the customer. **The double value propositio**n thus strongly impacts the priorly mentioned **lock-in-effect** of partners (D 7.218; D 7.228) and customers (I-I 1.24: Kawohl, 2022). For this reason, this INDUCTION chapter further supports the need of a double value proposition, as already indicated in the chapter ABDUCTION (A-SLR 1: Jacobides, 2022, 112; 116) and DEDUCTION (D 8.38; D 2.40; D 5.32; D 12.13). Hypothesis 9 is again evidenced.

Hypothesis 9 Double value proposition: the orchestrator must be attractive for both, partners and its customers.	✓

7.5.2.5 Degree of Openness

A major correlation of the fair distribution of values exists to the **degree of openness**, as commitment from all sides can only be expected when everyone contributes to the value creation (I-B 4.67; I-A 4.632; I-A 4.647; I-F 5.68). Openness is highly influenced by competitor involvement, as with competitors the openness will be limited (I-A 7.247; I-A 9.199). Further, the mindset of the company plays a role: there is often the not-invented-here-syndrome that has to be overcome, especially for DBEs (I-B 6.47). According to the answers from different backgrounds, it can be assumed that openness applies to all types of business ecosystems but is particularly relevant for circular-oriented business ecosystems (I-A 1.133) to enable innovations: “I have to understand that sometimes it can be better and unlock more potential if I open myself up. The greatest threat to future success is past success” (I-I 1.88: Kawohl, 2022). The openness of a business ecosystem can be expressed in three different levels:

First, a **closed system** with a handful of carefully selected partners, supported with incentives and excluding competitors: in that special case the interviewee’s company wants to advance its competitive position for plastic recycling (I-A 1.137).

Second, a **national or regional model**, i.e. a solution is developed for Germany. In that case the number of partners is higher and it involves coopetition and several recycling partners. This is positively influenced by the legislators and regulators as they can create the conditions for this to work (I-A 1.143).

Third, an **international business ecosystem** with different partners (I-A 1.148). Overall, the partner selection process is strongly influenced by the openness of the business ecosystem, the level of democracy, the data sharing policy and the sharing of the generated value (I-A 1.150).

Openness and Number of Actors

The **openness of a business ecosystem** is therefore closely related to the **number of actors**, as illustrated in hypothesis 6, which in turn appears to be more relevant for the partner selection process than expected within the ABDUCTION and DEDUCTION chapters: open innovation requires as much partners as possible, so that many solutions are offered from which the company can choose the best one. For specific strategic topics, which are long-term oriented, the number of partners might be reduced and better manageable (I-B 5.86). The number of partners increases the broadness of access to innovation with other partners (I-SLR 1B: Amir & Prabawani, 2023, p. 17). Circular-oriented business ecosystems focus on a small number of actors, but more intense interdependencies which are long-term oriented (I-SLR 1C: Havinga et al., 2023, p. 12). Certainly, it does not depend on one partner more or less, but a close to optimal number of partners needs to be defined. The hypothesis 6, which was rejected in the DEDUCTION chapter, is now finally confirmed.

Hypothesis 6 The optimal number of actors within business ecosystems must be defined prior to the partner selection to define how broad or narrow the business ecosystem should be.	✓

Openness and Intellectual Property

The sharing or keeping separate of **intellectual property (IP)**, which is also **very closely related to the openness,** is a topic which is controversially discussed by the interviewees and is in strong correlation with the fair distribution of values: one point of view of one interviewee is that IP is shared (I-A 4.632; I-A 4.647). The other point of view, which is represented by several interviewees, is that intellectual property cannot be shared, as it is the competitive advantage of the company so that collaborations regarding r&d do not take place in their eyes (I-B 8.268; I-A 1.385; I-A 6.168; I-G 5.570). Rather each company contributes a complementary component to the business ecosystem (I-SLR 1B: Lingens et al., 2023, p. 6) that remains IP owned by the respective company (I-L: Tate et al., 2019, p. 124) and therefore the **management of the interfaces** plays a major role (I-A 4.126; I-A 1.385). For this reason, openness of business ecosystems is to some kind limited due to this IP aspect (I-A 6.168; I-G 5.570). The general rule seems to be the **clear separation of costs and IP from joint gains** (I-A 5.124; I-L: Tate et al., 2019, p. 124). This is of special relevance when willing to collaborate with **large companies** or **public research institutions**, as this legal hurdle delays the overall selection process significantly (I-A 14.191). The IP topic seems to be relevant to different types of business ecosystems: DBEs, innovation-, sustainability-, and circular-oriented business ecosystems (I-B 6.40; I-A 1.385; I-A 6.168; I-G 5.570; I-L: Tate et al., 2019, p. 124).

Further to IP, regulatory issues need to be considered when defining how broad or narrow a business ecosystem should be. Especially the medical industry is subject to strict regulations (I-B 6.48), so that **industry-specific issues have an impact on the openness of a business ecosystem**. A certain degree of openness is necessary for open innovation activities so that there must be a certain willingness to take risks. Risks can be reduced by signing a **non-disclosure agreement** with the partners, which is a common procedure (I-G 4.736; I-G 4.761). Overall, there are business ecosystem types which are not dedicated to be open, such as innovation ecosystems in which a handful of carefully selected, complementary partners collaborate. Platform ecosystems are usually open and involve many actors (I-G 1.694).

Openness and Mutual Trust

Apart from IP and industry-specific criteria, openness requires a certain degree of **mutual trust** (I-A 1.310; I-A 2.60; I-A 2.363; I-A 6.220; I-A 8.514; I-A 9.247; I-A 12.228; I-B 1.390; I-B 5.189; I-G 3.648) and reliability (I-SLR 1C: Trevisan et al., 2022, p. 293). Trust is thus elementary (I-C 2.360; I-C 3.218; I-C 4.335; I-C 6.164; I-C 7.303; I-G 3.648) and determines the **level of data and information sharing** and therefore the **degree of openness** (I-B 1.460; I-C 5.120; I-C 7.175). The high number of interviewees and different industries implies that trust is relevant for all types of business ecosystems. In the **banking sector in Germany**, the basis of trust is simplified by BaFin regulations, which apply to the banking sector and in case other partners are already working with the potential partners, so that a certain basis of trust already exists (I-C 1.295). Trust is particularly relevant for DBEs with regard to data sharing, data generation and Artificial Intelligence (AI) interaction, as actors cannot be sure what will happen with their data (I-SLR 1B: Dalenogare et al., 2022 in Dalenogare et al., 2023, p. 5). The use of blockchain could solve the trust issue in relation to AI to some extent (I-E 1.312).

Trust is further the necessary condition for the **fair distribution of values** (I-B 4.67; I-B 4.145). It can be strengthened and built using tools like due diligence or joint development projects (I-B 2.418). The relevance of **prior relationships referring to trust** is shared by two interviewees stating that trust is not there from the beginning but developed the longer companies collaborate with each other (I-B 3.307; I-B 5.522). Overall, trust is playing a significant role in the establishment of partnerships (I-SLR 2B: Welter, 2012 in Emmanuel et al., 2023, p. 2).

Interconnection of Fair Distribution of Values and Risks, Degree of Openness, Mutual Trust and Prior Relationships

An inferentially based move back to the ABDUCTION chapter according to **Figure 78** reveals that the topic of **fair distribution of values and risks** has been investigated in parts but seems to be largely ignored by the literature: only one author from the SLRs, who focused on software ecosystems, investigated this topic in depth (A-SLR 2: Fahimullah et al., 2019, p. 42859).

Figure 78. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

In the abductive part, the fair distribution of values has been identified as especially relevant for DBEs (A-SLR 2: Fahimullah et al., 2019, pp. 42860–42861). In contrast to the ABDUCTION chapter, the investigation of the archival interviews reveals that this topic is relevant to all types of business ecosystems, as the statements stem from different interviewees belonging to DBEs (I-B 6.33); innovation-, sustainability- (I-B 1.376; I-B 2.74; I-B 3.4; I-B 4.67; I-B 5.318), and circular-oriented business ecosystems (I-A 1.118; I-A 10.312). A closer look at the literature from the SLRs in the ABDUCTION chapter reveals that this topic has been investigated peripherally by the other authors (A-SLR 2: Alves & Meneses, 2015, p. 25; A-SLR 2: Medcof, 1997, p. 726) and that the fair distribution of values refers to **benefits** as well as to **risks** (A-SLR 2: Cummings & Holmberg, 2012, p. 150). Consistent with the recent findings, the literature from the SLRs confirms that in order to maximize profit, companies choose an **optimal level of openness** for **value and risk sharing**, which is determined by the nature of the projects and thus the **corporate objective** (I-B 6.48; A-SLR 2: Amir et al., 2003 in Fahimullah et al., 2019, p. 42861).

The same impression results from a move back to the interviews in the DEDUCTION chapter: the topic of fair distribution of values has largely been ignored; only one respondent mentioned it in passing, but without referring to the optimal level of openness (D 1.92). The IP has only been mentioned once in connection with software products being offered as a rental instead of an economic ownership, the latter one remaining with the manufacturer (D 4.177).

The overall result is impressive, as only this third, INDUCTION chapter using **summarizing content analysis** revealed the relevance of this topic of fair distribution of values and sharing of risks, which, in addition, has a very high priority for the partner selection process for all types of business ecosystems. This confirms the **Inferential Pattern Matching Approach** as a **rigorous scientific research method** (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377). The new results reveal the importance of the fair identification and distribution of values and with this the **degree of openness** and **mutual trust**, the latter is in turn influenced by **prior relationships (**D-5.98; I-B 3.307; I-B 5.522).

7.5.2.6 Long-Term Commitment

The openness of business ecosystems versus traditional collaborations not only has advantages, but also presents the major challenge of the **long-term commitment of the partners**. Evaluating the long-term real interest of partners is a crucial part of the partner selection process, as companies are always initially enthusiastic about, for instance, digital and sustainable innovation, but the long-term commitment can be affected if the partner's business goals change (I-A 7.317; I-A 13.137). Ensuring that every actor is willing to provide best commitment to achieve the prior defined targets is therefore relevant (I-B 2.223). Due to the long-term orientation and further development of business ecosystems, this aspect appears to be central to the partner selection process. An **Inferential Pattern Matching Approach**-move back to the previous chapters according to **Figure 79** reveals that this commitment is clearly more important than identified by the ABDUCTION (A-SLR 2: Medcof, 1997, pp. 727–728) and DEDUCTION chapters (D 10.46). The relevance of this topic has not been evident because in most cases commitment is mentioned in connection with a **fair distribution of values and risks (**I-A 4.632; A-SLR 2: Liou et al., 2011, p. 3520; A-SLR 2: Chen et al., 2010, p. 280).

Figure 79. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

A deeper view to the literature from the SLRs in the ABDUCTION chapter reveals that the **commitment** seems to play a major role, particularly for a multiple partner selection in long-term collaborations, so that the strength of commitment of each partner needs to be evaluated individually. A high need of commitment correlates with the importance of the partner for the collaboration (A-SLR 2: Medcof, 1997, p. 725) and is particularly relevant for exploitative collaborations (A-SLR 1: Visscher et al., 2021, p. 626). The importance of long-term-commitment is confirmed deductively as well (D 5.125; D 10.46) and therefore needs to be integrated into the partner selection process for each single partner (I-A 13.157).

The **sharing of the same values** goes along with the long-term commitment. Having a shared vision and strategy and the giving of same urgencies is relevant to all types of business ecosystems (I-A 8.228; I-A 8.478; I-A 9.191; I-A 13.163; I-A 13.172; I-A 13.193; I-B 4.58; I-SLR 1B: Gupta, S. et al., 2019 in Iglesias et al., 2023, p. 4). Regarding sustainability- or circular-oriented business ecosystems, the commitment and shared vision further involves a real interest in sustainability and not **greenwashing** activities for reputation reasons, such as certificate trading for emission limits (I-B 2.19; I-B 2.128; I-A 4.233; I-A 6.333; I-A 13.159; I-A 13.382; I-B 5.398; I-SLR 1B: Iglesias et al., 2023, p. 2). Greenwashing can be definitely a criterion to avoid selecting a partner, especially in sustainability-oriented business ecosystems, even if all other criteria fit (I-B 5.410; I-SLR 2C: Dzhengiz, 2018, pp. 19–20). Sustainability-oriented business ecosystems more and more develop to circular ecosystems, in which the recyclability of sustainable products is important (I-A 4.233). **Trust** and **long-term commitment** become essential when interdependency increases, especially with data flows among their business systems (I-SLR 1B: Dalenogare et al., 2022 in Dalenogare et al., 2023, p. 12). Lower degrees of commitment are required for less integrated business ecosystems, such as platforms (I-SLR 1B: Dalenogare et al., 2023, p. 12), so that there is a relationship between the long-term commitment and the **openness** of a business ecosystem.

The **long-term commitment** is closely related to **resource dependency** (Holm et al., 1999 in Jiang et al., 2023, p. 21) and can be seen as a kind of **risk management**, to thrive for business success, expanding to new markets (I-SLR 1B: Dalenogare et al., 2023, p. 11), and to avoid partners which are not collaborating as expected or not transparently (I-A 10.334). It is further advised to **have at least one alternative candidate** if the interest of the first partner decreases (I-A 13.292).

7.5.2.7 Complementarity

The resource complementarity of partners is of particular importance when selecting partners, but seems to be the overall logic, as the purpose of business ecosystems is to combine complementary capabilities and resources for **cost saving reasons** (I-SLR 1C: Baum et al., 2010 and Geum et al., 2013 in Wei et al., 2020, p. 13) and **the creation of value** (I-C 1.270; I-

C 2.351; I-C 3.214; I-C 4.329; I-C 5.116; I-C 6.154; I-SLR 1B: Ayala et al., 2021 in Dalenogare et al., 2023, p. 2).

Innovativeness arises from the **heterogeneity of the actors**, especially within sustainability- (I-SLR 1C: van de Wetering et al., 2017, p. 76; I-SLR 1C: Acebo et al., 2021, p. 2682) and circular-oriented innovation (I-SLR 1C: Trevisan et al., 2022, p. 293; I-L: Tate et al., 2019, p. 124). An **Inferential Pattern Matching Approach**-move back to the previous chapters according to **Figure 80** confirms the strong relationships between the objective for innovation and the need for partner heterogeneity (A-SLR 1: Visscher et al., 2021, p. 621; D 7.4).

Figure 80. Move Back According to the Inferential Pattern Matching Approach

Source: Author’s representation

For example, modern business ecosystems provide user data, which not only serve at selling theft protection through an insurance company, but also to generate health data for the health insurance company. The integration of completely different actors leads to a dynamic and innovative business model that unites companies of different sizes and processes (I-C 2.159). Typically, this also includes venture capital and corporate venture capital investments. These structures are very intertwined and can therefore hardly be viewed in isolation (I-C 1.6; I-C 1.49; I-C 3.40). Banks, for example, are also discovering new trends in sustainability (I-C 1.41). The importance of data protection also comes into play here. Particularly in very heterogeneous business ecosystems, it is important that data does not reach third parties. **Data protection** is an essential part of **risk management** within business ecosystems (I-C 2.231).

Complementarity refers to a **heterogeneity of resources** with a simultaneous accordance among partners referring to their goals and the **sharing of the same values** to achieve **culture fit** (I-SLR 2B: Gnyawali & Park, 2009 and Bouncken & Fredrich, 2012 in Smiljic et al., 2023, p. 262; I-SLR 1C: Wei et al., 2020, p. 13). It is of particular relevance for **innovation activities in general** (I-SLR 1C: King et al., 2003 in Wei et al., 2020, p. 13) and sustainability-oriented activities in particular: sustainability partners with a similar mindset and heterogeneous resources are selected. The **culture fit** as part of the complementarity is a major influencing factor for the partner selection (A-SLR 2: Holmberg & Cummings, 2009, p. 181; I-SLR 2C: Dzhengiz, 2018, p. 18) as the similarity of the partners increases the likelihood for collaboration (I-L: Ahuja et al., 2009, p. 942).

Complementarity is further particularly relevant for **international business ecosystems** in the biopharmaceutical industry. These are positively influenced by selecting partners with complementary resources and a willingness to share these resources (I-SLR 2B: Esmaelnezhad et al., 2023, p. 13; I-SLR 1B: Ferreira et al., 2023, p. 5).

7.5.2.8 The Right Contact Person Within the Partner Companies

Confirmatory evidence for the identification of the **right contact person within the partner companies** (D 11.73; D 11.60) as an influencing factor, as demonstrated in the DEDUCTION chapter, is found by the archival interviews as well: "So it's usually the case that there is of course someone from our side, but also from the relevant partners, who takes the lead. For us, for example, in this context, that's me. I then have my contact person at the partner, […] and everyone as a project manager in their own company then regulates everything themselves on site" (I-A 13.214). This implies that there is always a **face-to-face-strategy**. Having not the right contact person therefore **harms the effective partner selection process**. Large companies often have dedicated departments acting as intermediaries between the own company, especially towards R&D and IT, and foreign players, as for instance start-ups or universities. They coordinate all business ecosystem activities to avoid redundancies and supervise the communication process (I-F 4.6; I-C 1.124; I-C 3.175). This contact person must have the appropriate **dynamic capabilities** to manage this network of different partners (I-C 3.175). Moving back to the DEDUCTION chapter according to the **Inferential Pattern Matching Approach (Figure 81)** reveals that these are guaranteed by the management level having such dynamic capabilities (D 11.73).

Figure 81. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

The importance of having dedicated persons or departments being responsible for bundling the business ecosystem activities is evidenced for all types of business ecosystems, as confirmed from their different perspectives (D 11.73; D 11.60; I-A 13.214; I-C 1.124; I-F 4.6).

7.5.2.9 Company Size

The company size has been identified as a major **influencing factor** for the selection of partners (A-SLR 2: Castro et al., 2014, p. 424; A-SLR 2: Chand & Katou, 2012, p. 169; A-SLR 2: Mindruta et al., 2016, p. 218; D 3.81, D 6.95, D 8.88, D 15.75; D 16.45), but also as a **selection criterion** (D 3.136) and in the context of long-term experience within the framework of the application-oriented pathway of market access, power, and development (A-SLR 2: Dong & Glaister, 2006, pp. 594–595). Company size as a major element to be considered is thus confirmed among the three chapters: the company size as an influencing factor for the partner selection process and especially for the partner selection criteria (I-B 5.295) is strongly confirmed by archival interviews (I-B 5.59; I-B 5.74; I-B 5.282; I-B 1.344), as companies need **enough manpower** who can talk to partners and who can develop the strategy further (I-G 4.306; D 1.146). Others moderate its influence (I-B 2.381; I-B 3.204; I-B 6.204; I-C 2.391; I-C 3.229; I-C 4.379; I-C 5.154), as a lot of impact can be generated with relatively little manpower and relatively little financial backing (I-C 6.213).

A deeper analysis of the statements reveals that the company size seems to have a much greater importance than most of the interviewees are aware of: in general, large companies are perceived as cumbersome leading to many legal hurdles and especially less openness due to **IP protection** (I-A 14.191), which might lead to a **more time-consuming selection process** than with small companies (I-A 14.196). Start-ups are perceived as agile, leading to more explorative ideas (I-B 5.50; B 4.99), some being more open for knowledge sharing (I-B 2.308), others not at all (I-A 10.198). The lack of knowledge sharing often leads to start-ups being bought out rather than cooperating with them in a business ecosystem for innovative or sustainability r&d projects (I-B 8.268). Usually, start-ups provide particular missing technologies and to gain speed, while customer access and scaling is enabled through large companies (G 1.440).

Larger companies in turn have a significant influence on policies due to their weighting (I-B 1.350). They usually have more systematic partner selection processes, which is not necessarily an advantage over smaller companies, as the majority of partners is identified by coincidence and especially in the circular environment everyone knows everyone (I-A 7.282; D 6.60; A-SLR 1: Visscher et al., 2021, p. 626). Interestingly, small companies are more willing to provide **financial resources for sustainability projects** than large ones, as the latter ones do not want to jeopardize their overall competitiveness for green projects (I-B 8.131; I-A 14.186). The collaboration of large companies with start-ups and **universities** is especially relevant for circular projects (I-A 10.186).

Especially for innovation and sustainability-oriented business ecosystems, for instance in an exploratory environment, a wide variety of company types and sizes is necessary (I-B 2.304). Different company sizes are further related to differences in the **cultural fit** (I-B 5.140; I-B 5.166). The company size is very much related to **market presence**, **customer base**, and also **reputation**, because the more larger companies work with a start-up, the more it is an award for the start-ups (I-C 1.389). Company size therefore has an impact **depending on the objective of the business ecosystem** (I-B 5.356; I-C 1.389): if the partner is the one who contributes the customers, the size of the company is highly relevant because it is its value add. The size is further relevant when it correlates with the **bargaining power** (Adner, 2017, p. 48): companies with higher bargaining power are expected to earn a higher value share than companies with lower bargaining power (I-SLR 2B: Gaonkar & Mele, 2023, p. 86). This is consistent with the prior findings from the DEDUCTION chapter: the bargaining power coincides with reputation, company size, and experience (D 3.136).

For other, special skills, like for instance niche technologies, the size of the company is completely irrelevant, as the only thing that matters is the right product, or the right skills (I-C 7.335).

7.5.2.10 The Players and Their Roles

The DEDUCTION chapter highlighted that it is important to carefully assign the roles (D 2.40). A company can have both roles, orchestrator and actor, depending on their core value (I-C 4.6). Often, the orchestrator provides the customer base so that the other partners get access to its customers (I-B 6.91).

Universities provide know-how on how to innovate (I-A 1.162) for instance on circular economy and recycling (I-A 8.372). This involves universities from different countries, which are more implicated in sustainability topics (I-A 12.105). Cooperation with **associations** is made to draft laws (I-A 8.372).

Legislators and regulators define the legal framework, or they can act as neutral orchestrators and have a social interest to solve a specific problem (I-A 1.162; I-A 1.201; I-A 2.66). Public authorities might also provide financial support, which decreases risks especially for small companies (I-A 1.201; I-A 2.112) and often determines if projects are pursued (I-A 10.219). This is of particular relevance to sustainability innovation ecosystems, in which financial support is essential for engagement in sustainable innovation due to significant upfront costs and high output uncertainty (I-L: Yang et al., 2022 and Bi et al., 2017 in Gao et al., 2023, p. 2). The European Union is very much engaged in and promotes circular economy programs (I-A 12.283). Acebo et al. (2021) emphasize the importance of the support of **public institutions** for sustainability goals as well (I-SLR 1C: p. 2682).

Start-ups provide explorative know-how on innovation or sustainability topics (I-A 10.186; I-B 4.99). Often **customers** are forgotten, but they are essential to develop products according to their needs (I-A 1.106; I-A 6.230; I-D 4.19) so that the three main groups for a successful business ecosystem are the company itself, its partners, and its customers (I-C 3.65). Customers often serve as data sources to enable innovation in hardware or digital solutions (I-C 2.90). **Insurances** can be partners for instance for manufacturers of hardware, so that the insurance is sold as an additional service to the customer (I-C 2.90). As financial resources often come from industry, it is more probable that they are the orchestrator and not universities or **Non-Governmental Organizations** (I-B 5.110). Latter ones are typically involved for Environmental, Social, and Corporate Governance (ESG) topics (I-B 2.304). **Suppliers** are often part of sustainability-oriented business ecosystems and platforms (I-B 2.81; I-B 4.263; I-B 5.64; I-D 1.19). **Neutral experts** are institutes for pensions and financial planning. These are professors or sometimes rating agencies who bring a neutral expert view from the industry and primarily contribute lectures and content (I-D 2.73). DBEs and especially platforms might further include **competitors** (I-B 6.29) through **coopetition** and **data suppliers**, such as credit agencies or self-generated data and other data suppliers who have valuable information from the industry (I-D 2.73). There are topics which can only successfully be achieved when competitors are included, as for instance in the mobility transition or sustainable mobility (I-G 5.480). If the goal is to create a competitive advantage, then the business ecosystem should rather not be supplemented by competitors, but with partners with whom companies eventually have an exclusivity (I-G 5.480).

There are typically four roles in circular ecosystems: producer, consumer, scavenger, and decomposer (I-L: Tate et al., 2019, p. 126; I-SLR 1C: Trevisan et al., 2022, p. 293) and typically do not involve large traditional companies, but rather start-ups, or other intrinsically motivated innovators (I-L: Tate et al., 2019, p. 126). Compared to traditional business ecosystems, actors in circular ecosystems play unique roles with regard to the circularity of resources (I-SLR 1C: Trevisan et al., 2022, p. 294).

In the classic platform model, there is the **platform operator**, as well as **suppliers and buyers, product partner, and service partner** (I-D 3.56; I-D 4.16).

The actors have different tasks, which is why the **role of the actor** needs to be defined prior to the selection process. Even more so since the selection process varies depending on the actor. The orchestrator role is for instance preferred by those who want to build a software solution on solid hardware and need complete access to the data in order to create a data-driven business model (I-C 2.139). Hypothesis 7 is again supported.

Hypothesis 7 The role of the company and the type of actors need to be defined prior to the partner selection process.	✓

Selecting appropriate partners is not only an orchestrator's task; ultimately, it is important for each individual company, regardless of its role, to select the right partners, as companies are usually involved in a variety of business ecosystems and therefore have to strategically decide in which business ecosystems they want to participate in (I-SLR 2B: Smiljic et al., 2023, p. 260).

The types of collaborations include **loose connections** to identify potentially new strategic ideas, especially regarding sustainability (I-C 1.41), or **closer collaborations** for concrete strategic projects (I-B 5.241; I-A 13.353). When targeting **complete solutions** or **reputation**, good universities are favored (I-B 5.241). Very close collaborations entail a focus on a small number of actors with a **detailed selection** according to a **predefined requirements catalog** (I-B 5.232). Archival interviews confirm the findings from the prior chapters, that a mere criteria catalog is not targeted, as the requirements and benefits are different for each partnership (I-B 2.108). However, **criteria catalogs with specific requirements** are integral part of the selection process (D 11.146). These **criteria** depend on the **corporate objectives** (I-B 1.334; I-C 3.204; I-C 7.249) and the **targeted partner type**, as for instance the criteria for a start-up are different than for other types of companies (I-B 5.295). Selection criteria are hence influenced by the company size. Hypothesis 12A is now confirmed, as a checklist of specific selection criteria is integral part of the selection process.

Hypothesis 12A A criteria or requirements catalog is not used solely but as part of the partner selection process.	✓

Overall, it shows that a business ecosystem does not only consist of the classic business ecosystem partnerships, but also represents **highly complex multi-business ecosystem structures** that combine a wide variety of industries in multiple constellations.

7.5.2.11 Reputation

Reputation is often mentioned in connection with the **company size**. While larger companies, or companies with higher reputation are actively contacted by partners and do not need to search for them (D 3.81; D 6.95; D 8.88, D 15.75; D 16.45), reputation is not expected from start-ups because they inevitably cannot have the reputation of a large company. But if a founder has made a name for himself or a start-up has worked with well-known companies, this is overall very beneficial for a collaboration (I-C 1.280). In general, reputation is seen as a **highly relevant criterion** when selecting partners (I-C 2.355; I-C 4.333; I-C 5.118; I-C 6.160; I-C 7.294).

7.5.2.12 Financial Stability

The **financial stability** is a closely related topic, as solvency is an important indicator for **long-term commitment** (I-B 1.396; I-B 5.348; I-B 6.157; I-I 1.110: Kawohl, 2022). Financial stability is not necessarily expected of start-ups, as they often receive financial support from larger partners (I-B 5.343), so that the financial situation of partners is not of high interest as long as their solvency is guaranteed (I-C 2.384; I-C 3.224; I-C 7.318), but it is expected from the orchestrator, as the **initial investment** for creating a business ecosystem and especially of a DBE must not be underestimated (D 6.243); as well as the availability of **manpower for the maintenance and development** of a DBE or platform (D 1.146). There is thus a high correlation of financial stability with the **company size**. In terms of the importance of the **selection criteria**, financial stability is a highly important criterion for the biopharmaceutical industry (I-SLR 2C: Chang et al., 2019, p. 2). For other industries it has a medium importance (I-C 4.359; I-C 5.144; I-C 6.191).

7.5.2.13 Location of the Partners

The location of the partners is not of relevance for DBEs (I-B 6.209; I-B 1.320), but for collaborations that are subject to regional supply relationships, as it is clearly the case for circular ecosystems (I-B 1.320; I-B 8.356), local conditions for the automotive industry (I-B 3.35; I-B 3.212), or political conditions (I-B 4.198). The latter one also has an impact on **reputation** (I-B 5.463; A-SLR 2: Franco & Haase, 2015, p. 178). Local knowledge is relevant for the objective of market access, power, and development (A-SLR 2: Dong & Glaister, 2006, pp. 591–593), the strengthening of customer positions and relationships (A-SLR 2: Davidson, 1982 in Haskell et al., 2016, p. 489), and the access to or expansion of international markets (A-SLR 2: Hitt et al., 2000, p. 449). The location of the partners and their reputation is thus inferentially confirmed as a relevant influencing factor for several different business ecosystem types.

7.5.2.14 Speed to Market and Maturity of Partners

The framework conditions have changed due to digital transformation, changing customer requirements, crises, and new competitors, so that companies need to keep pace with the speed of change (I-G 2.76). Having dedicated **dynamic capabilities**, **trust** and **digital infrastructures** within all partners is a prerequisite for speed (I-B 5.424; I-B 5.189). **Speed**, in turn is correlated with the **maturity of the actors**. When companies take the decision to collaborate with partners, it is because of a lack of capabilities or the need of a speed to market (I-G 2.76; I-G 1.245; A-SLR 2: Holmberg & Cummings, 2009, p. 167; I-SLR 1B: Amir & Prabawani, 2023, p. 13). This is particularly relevant when thriving for a first-mover-position, for instance for promoting sustainability innovations. In this case, it is necessary that the partner has some kind of maturity and with this the capability to implement innovation (I-SLR 1B: Han et al., 2022 in Amir & Prabawani, 2023, p. 3; I-G 1.460; I-I 1.96: Kawohl, 2022).

7.5.2.15 Further Influencing Factors

The following further influencing factors have been identified from the INDUCTION chapter only and are not inferentially confirmed by the chapters ABDUCTION and DEDUCTION, as no pattern matches were found. Nevertheless, these have been included for the sake of completeness.

Cost-Quality Trade-off in International Business Ecosystems

Partners from more developed countries are selected when a high quality is needed and from less developed countries when thriving for lower assembly costs. This is however dependent on the industry. In the automotive industry, for instance, price competitiveness might outweigh the quality argument (I-SLR 1C: Bang et al., 2021, pp. 4 & 9).

A Functioning Innovation Management

The analysis of different interviews reveals that the partner selection in business ecosystems is complex and associated with a lot of effort, as well as a good and systematic structure. A business ecosystem is one tool among others and requires a functional innovation management. The latter one is a relevant factor for successful partner selection in business ecosystems (I-G 1.300; I-G 1.267). A business ecosystem is best suited when components from different partners are needed. Otherwise, other collaboration types than a business ecosystem are more suitable (I-C 6.121; I-G 1.300). A functioning innovation management is therefore the basic requirement to construct a successful business ecosystem (I-G 1.300).

One-Partner-Strategy

Due to limited financial and employee resources, companies follow a **one-partner-strategy**: one strategic partner is dedicated for one topic and not more collaborations are followed in parallel. Due to this **resource and path dependence** the business ecosystem will fail as a whole if one partner leaves the business ecosystem (I-SLR 1B: Lingens et al., 2023, p. 6). A shift to another partner is only made in case of an unsuccessful prior collaboration (I-G 4.655; I-G 1.560). This naturally creates dependency (I-G 4.706; I-SLR 1B: Lingens et al., 2023, p. 6). For this reason, the orchestrator must right from the beginning consider **sufficient incentives and motivation** (I-SLR 1B: Jacobides et al., 2018 in Lingens et al., 2023, p. 6). Incentives can be demonstrated by the return on investment of the business ecosystem, such as to highlight certainty of the future success of the business ecosystem. The provision of credible incentives depends very much on the **uncertainty** of the future business ecosystem (I-SLR 1B: Dattée et al., 2018 & Lingens et al., 2021 in Lingens et al., 2023, p. 6). Like traditional supplier-relationships companies should **keep alternative partners in mind** (I-G 5.514). However, exchanging partners is a hurdle due to high levels of co-specialization: the business ecosystem is shaped by the partners and dynamically changed accordingly (I-SLR 1B: Lingens et al., 2023, p. 12).

Sustainability

Sustainability orientation is becoming an increasingly important topic, particularly in manufacturing, but in several other industries as well. Though it is not the most important criterion, it needs to be considered in partner selection independently of the type of business ecosystem. Green practices are expected throughout the whole lifecycle of product offerings and must thus be integral part of the partner selection process (I-SLR 1C: Zhou et al., 2018 and Allaoui et al., 2019 in Wei et al., 2020, p. 13).

7.5.3 Interfaces and Digital Infrastructure

The importance of the **existence of digital interfaces** (D 11.168; D 12.99; D 2.146; D 9.38; Beelen et al., 2022, p. 2) has already been strongly confirmed by the **Inferential Pattern Matching Approach** in the previous chapters, but only for DBEs. The inductive analysis of archival interviews confirms the importance of digital interfaces for DBEs (I-F 2.14), but for innovation-, sustainability-, and circular-oriented business ecosystems as well (I-B 3.189; I-SLR 1C: Wei et al., 2020, p. 10). **Digital connection of partners through interfaces and information sharing** are thus central topics within business ecosystems (Teece, 2018b, p. 1384). These have to be considered early in the partner selection process, because they are crucial for the later functioning and leveraging of synergies within the business ecosystem (I-A 1.385; I-B 3.189; I-C 4.142). Digital interfaces are a tool for joint communication and the sharing of information (I-A 2.72; I-B 5.424). The requirements for digital interfaces are different according to industries and companies, but a minimum of basic digital interfaces is necessary for all types of business ecosystems (I-B 4.180; I-B 2.367; I-B 8.375; I-C 6.121). The focus for other types of business ecosystems than DBEs is not so much on digital innovation, but on a **basic digital infrastructure** enabling interfaces for communication and data sharing (I-B 6.184). If a company does not have its own digital infrastructure, it needs partners or platforms providing this digital infrastructure (I-B 2.278; I-B 5.50; I-I 1.110: Kawohl, 2022). This in turn means that every member of the business ecosystem needs to have the **capability to use the digital infrastructure** (I-B 5.424). These digital interfaces must provide a basis set of services and integration options, being modular such as to build it easily and quickly up so that additional partners can be added with little integration effort (I-F 2.47). Focus must be on the right interfaces with the partners and interfaces enabling quick interaction (I-F 2.129; I-B 5.424), efficient communication (I-F 3.232; I-B 5.424) and to enable a lean, cost-effective architecture (I-D 4.53). Modular, microservice-oriented API have been used for digitalization projects for several years (I-B 8.375; I-C 4.142; I-D 4.53). There are DBEs providing such digital infrastructures, so that only one interface is used as a standard, reducing the effort (I-F 3.57) and personnel intensity for all partners (I-B 6.105). What is crucial, however, is that the infrastructure fits together and is dynamically adjusted to change (I-L: Hora et al., 2018, pp. 162–163). Especially for very complex business ecosystems, for which pure APIs are often no longer sufficient, platforms provide digital architecture support. Depending on the own digital capabilities and requirements of the business ecosystem, or mature digital solutions already existent in the market, partners with digital know-how have eventually to be added to the business ecosystem (I-G 4.185). That is why independent of DBEs all kinds of business ecosystems need a digital infrastructure, so that business ecosystems, regardless of their objective, cannot be treated in isolation to DBEs or platforms (Cobben et al., 2022, p. 140; Teece, 2018b, p. 1383). The latter ones are rather part of other types of business ecosystems, such as for instance innovation ecosystems (Cobben et al., 2022, p. 140). In circular ecosystems the interfaces are necessary for accessing the resources and capabilities for being able to implement circular objectives (I-SLR 1C: Parida et al., 2019 in Havinga et al., 2023, p. 4).

Apart from digital interfaces product interfaces enable the compiling of product solutions (I-A 8.350). **Content related interfaces** refer to what has been mentioned within the DEDUCTION chapter: **speaking the same language** (D 11.168), which means that definitions and processes are different depending on the industry, so that the content interfaces need to be aligned (I-A 5.106) and the partner should have a general understanding about the partners' industries (I-B 5.283). This is also referred to as the **knowledge matching degree**: communication, knowledge exchange, and corporate learning are increased when corporate knowledge is matched. This is particularly relevant for **international collaborations** (I-SLR 2B: Esmaelnezhad et al., 2023, p. 13).

7.5.4 Interwovenness of Innovation, Digital and Sustainability

The innovation, digital and sustainability topics are closely interwoven, which is why they cannot be viewed in isolation (Cobben et al., 2022, p. 140; Teece, 2018b, p. 1383). Circular ecosystems need DBEs for the digital connection, for instance data is generated on CO_2 savings (I-A 4.126; I-B 8.123). Innovation- and sustainability- oriented business ecosystems are closely related to each other (I-B 8.268; I-B 2.308; I-B 4.84; I-B 5.441; I-G 1.245), which is a further confirmation why sustainability-oriented business ecosystems are defined as sustainability innovation ecosystems (Zeng et al., 2024, pp. 69–70). Sustainability innovation ecosystems and DBEs are both part of innovation ecosystems (Cobben et al., 2022, p. 140). Independent of the business ecosystem definition, companies often use an integrated type of business ecosystem including digital, platform, innovation, and / or circular ecosystem elements (I-A 11.128; I-A 10.198; I-A 13.33): "We have come to the realization that digitalization can be a very important driver here, because ultimately data on products is what enables us to create a circular economy" (I-A 13.57).

The complexity of the global and networked business ecosystem structures, moving more and more towards solution providers, requires an **appropriate digital support** (I-B 5.30; I-G 2.76; I-SLR 1C: van de Wetering et al., 2017, p. 76). Partners need the capabilities to communicate via the digital interfaces (I-B 5.424). For many companies the focus is typically on user-based innovations by incorporating user data into new product innovations. Furthermore, attention is paid to the recyclability of the product in order to bring it back into the cycle. A better understanding of user behavior, generated via user data, helps to gain better insights (I-C 2.144). The combination of digital and sustainability transitions, which fuel each other particularly in the circular economy, is known as the **twin transformation** strategy (I-L: Christmann et al., 2024, p. 4), a process that a company cannot achieve alone (I-I 1.78: Kawohl, 2022). This confirms the interwovenness among digitalization, sustainability, and innovation topics.

7.5.5 Partner Identification

7.5.5.1 Sensing, Seizing and Reconfiguration Capabilities

The identification of potential partners strongly depends on the core strategy (I-B 3.12; I-G 2.104; I-G 4.283; I-G 5.539) and the targeted market, which can be large or a niche. In the latter one the number of available partners is limited. This is particularly the case in B2B markets within DBEs. An exchange of partners is thus extremely difficult, involves a large amount of effort and often means making a lot of compromise (I-D 2.114). One of the framework conditions for the selection of partners are **sensing and seizing capabilities**, which are the **ability to identify new opportunities and select appropriate partners** accordingly for the business ecosystem (I-L: Linde et al., 2021, pp. 6–7). This is a management task which requires the right experience (I-D 1.112; I-D 3.208), the knowledge how such business ecosystems work, and a lot of learning by doing to define and identify the right partners according to the company's strategy (I-D 1.112). Due to the high dynamic and complexity, dynamic capabilities are of particular relevance (I-D 1.112). This is consistent with observations from further relevant literature (I-L: Schreieck et al., 2021, pp. 374, 380). The sensing and seizing capabilities involve market knowledge (I-D 2.155), knowledge about the different actor types and about different technologies to decide about the depth of value creation in the framework of make-or-buy (I-D 3.181; I-L: Linde et al., 2021, pp. 6–7). In sum, the sensing and seizing capabilities to select appropriate partners involve three specific parts:

First, the **technological capability** is the capability to being able to understand the technological processes of the partners to select the right technological parts, complementary to its own products (I-D 1.112; I-D 3.181; I-D 4.154; I-L: Helfat & Raubitschek, 2018, p. 1395; Teece, 2018b, p. 1373).

Second, the **organizational capability** is the capability to select the overall strategically right partners in conformity with laws, regulations, and institutions (I-D 4.154; I-L: Lütjen et al., 2019, p. 508).

Third, the **commercial capability** is the ability to motivate partners to join the business ecosystem and to ensure a fair distribution of values among partners (I-D 4.154; Teece, 2018b, p. 1383).

The business **ecosystem sensing and seizing capabilities** in the sense of the ability to identify and select appropriate partners are therefore integral part of the selection process. This is particularly relevant for selecting new partners for business ecosystem innovation (I-L: Linde et al., 2021, pp. 5–6) and in extremely fast changing environments (I-B 5.424; I-L: Helfat &

Raubitschek, 2018, p. 1395). The fast changing environments of business ecosystems require further capabilities to constantly adapt to new technological opportunities and thus to constantly change historic **path dependencies** by dynamically reconfiguring the partner portfolio (Teece et al., 1997, p. 528). Overcoming path dependencies by strategic change is difficult and requires **reconfiguration capabilities**, which are not easy to acquire, but must rather be built iteratively as a **core competence**, thriving for long-term paths of dynamic business ecosystem development (I-C 3.175; Teece et al., 1997, pp. 528–529; Prahalad & Hamel, 1994, p. 13).

The partner selection process is shaped by sensing, seizing, and reconfiguration capabilities. These involve the continuous realignment of the strategic fit between the partners, which in turn determines the success of partner selection in business ecosystems (I-L: Lütjen et al., 2019, p. 508). The orchestration of partners thus requires the capability to manage, best combine, and continually develop the complementarities and core competencies of the partners to enable long-term prosperity for the business ecosystem (I-C 4.199; I-G 3.232; Adner & Kapoor, 2010, p. 310; Prahalad & Hamel, 1994, p. 13; Teece, 2018b, p. 1383). The orchestrator, in turn, must also ensure that the partners have the necessary skills to communicate via the interfaces (I-B 5.424). This management of interfaces needs to be considered as early as possible in the partner selection process (I-A 1.385).

7.5.5.2 The Importance of the Top Management Team

A move back to the DEDUCTION and the ABDUCTION chapters according to the **Inferential Pattern Matching Approach** in **Figure 82** highlights the importance of the **top management team** in the context of sensing, seizing and reconfiguration capabilities (D 10.33; D 11.83).

Figure 82. Move Back According to the Inferential Pattern Matching Approach

Source: Author’s representation

A company takes the orchestrator role if it has the necessary capabilities for it (D 12.64). Capabilities are particularly driven by top management team's competence and experience and are very much related to strategic change and **reputation** (A-SLR 2: Bierly & Gallagher, 2007, pp. 141–149). Archival interviews from this INDUCTION chapter discuss controversially the role of the dynamic capabilities of the top management team; while some attach great importance to it (I-C 1.327; I-C 3.220; I-C 4.351; I-C 5.121), as they are important drivers, especially for digital companies' innovativeness (I-L: Heubeck & Meckl, 2022, pp. 901-903), others see it as indifferent or unimportant (I-C 2.362; I-C 6.169; I-C 7.305). The role of the top management team is important for both, the orchestrator for having the necessary capabilities to select and dynamically adapt the partner portfolio (D 12.64; I-B 6.94) to achieve effective resource orchestration (I-L: Helfat et al., 2007, p. 19 in Helfat & Raubitschek, 2018, p. 1393) and for being flexible and resilient (I-B 6.216), and the partner, as the top management team is the figurehead for the partner so that the orchestrator has the feeling that they know what they are doing (I-C 1.327). The interconnection of **top management team** and **reputation** is further inductively confirmed (I-C 5.121). There is still a lot of uncertainty among companies on how to systematically proceed when selecting partners, which needs a competence level at which this issue can be addressed (I-C 4.276). Nevertheless, the operational level may not be neglected: the top management team needs to be involved in the operational organization to understand the needs for selecting suitable partners (I-SLR 1B: Poblete et al., 2022, p. 306). Despite the importance of the top management team, the impact of overconfidence in the sense of being excessively optimistic or downplay potential risks of partnering decisions requires attention (I-SLR 2B: Howard et al., 2023, p. 7). This overconfidence could for instance stem from information biases or gaps, such as described by the **principal-agency theory** (Eisenhardt, 1989a, pp. 58–63; Jensen & Meckling, 1976; Ross, 1973, p. 134) and could lead to suboptimal partner selection (I-SLR 2B: Howard et al., 2023, p. 34).

7.5.5.3 Partner Identification Strategies

As indicated in the DEDUCTION chapter, the **identification of potential partners is made once to create an MVE, and gaps are filled later to optimize the partner composition** (D 10.46; D 2.70). This is confirmed and matches inductively for DBEs: companies usually start with a handful of partners to create a MVE and then iteratively fill the gaps later with additional partners (I-B 6.79; I-D 4.137). It is suggested to proceed accordingly in circular ecosystems (I-L: Konietzko et al., 2020, p. 9).

The strategies for identifying partners are multiple. As mentioned in the DEDUCTION chapter, companies usually have a **portfolio of different business ecosystems** according to different objectives (D 4.11; D 12.33). This is inductively confirmed by the archival interviews for all types of business ecosystems (I-F 3.297; I-A 1.133; I-A 1.137; I-A 1.143; I-A 1.148; I-G 5.600). Generally, a critical mass of actors is needed for any type of business ecosystem such as to build a MVE without creating redundancies. **The whole business ecosystem must remain manageable.** This implies a suitable coverage and fit of partners (I-D 3.111). The focus must not always be on innovation topics but can include partners for different purposes (I-B 5445). The strategies for identifying new opportunities and partners are therefore multiple, the procedures are sometimes more and sometimes less systematic:

First-Mover-Strategy

The **first-mover-strategy** is particularly relevant for DBEs and platforms, but also for innovation- and sustainability-oriented business ecosystems (I-D 1.58; I-C 1.222; I-C 1.145). Being the first to grab a large number of actors is crucial for high scaling (I-D 1.58). This requires an **active search process**. Start-ups are, for instance, identified by looking for information on their homepages, relevant media, such as Startup Detektor, Deutsche Startups, Startup Insider in Germany, or LinkedIn (I-C 1.222). This strategy consists in pursuing several paths and as soon as a partner has been identified, conversations are taking place rapidly (I-C 1.145).

Coincidence-Strategy

The **coincidence-strategy** is pursued to remain up to date with innovations to different sides (I-C 1.41; I-SLR 1C: Wei et al., 2020, p. 9). For instance, companies use **general business ecosystems**, such as with universities to remain up to date regarding research (I-F 6.37), or with large partners (I-G 4.221). In the circular environment companies are naturally surrounded by potential partners (I-A 7.282). Companies try to maintain close contact with decision-makers, such as renewable energy lobby associations, in order to stay up to date and enable getting in contact with other partners (I-A 9.178). Generally, the coincident identification of potential partners plays a major role within partner selection in business ecosystems (I-A 7.282; D 6.60; A-SLR 1: Visscher et al., 2021, p. 626).

Partner Resource Pool

Large companies provide programs to attract a high scope of partners to a **partner resource pool**, such as the Siemens' Partner Ecosystem Program **MindSphere** for digital innovation, or **Next47** for disruptive ideas. Partners joining the pool are incentivized by benefits, such as marketing, business, and financial support. This partner resource pool is particularly relevant for digital innovation (I-SLR 1C: Wei et al., 2020, p. 10). Though attracting lots of partners, a partner resource pool has the downside of being not focused to a specific topic, so that this strategy should by combined with other partner identification strategies when looking for partners for particular objectives (I-SLR 1C: Acebo et al., 2021, p. 2682). A move back to the chapters ABDUCTION and DEDUCTION according to **Figure 83** highlights the importance of a partner resource pool: for coopetition, the first important step of partner selection is the constitution of a partner resource pool from prior personal or business relationships (A-SLR 2: Alves & Meneses, 2015, p. 33).

Figure 83. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

Customer- or Task-Driven Strategy

The demand-driven strategy consists in actively searching partners to satisfy customer demands. These partners can for instance be acquired by the partner pool provided through the before mentioned Partner Ecosystem Program MindSphere (I-SLR 1C: Wei et al., 2020, pp. 8–10). The customer-driven strategy is a catalyzer for sustainable innovations, which are sensitive to market recognition (I-SLR 1C: Acebo et al., 2021, p. 2682).

Follower-Strategy

The **follower-strategy** consists in looking what others are doing, especially the competitors. Particularly when they search for connecting r&d and digitalization, the companies look at which business ecosystems are in place and which partners are already on board. When the objective is to define standards, then it includes competitors, when the objective is to achieve a competitive advantage, it is without competitors (I-F 4.103; I-F 6.37; I-F 2.47; I-G 3.584). The follower-strategy is quite common for sustainability topics, where companies do not just want to bring innovations, but copy things and improving them instead of focusing solely on pure innovation, but it is also relevant for DBEs (I-B 2.314; I-G 3.584).

Coopetition

The careful selection of partners in coopetition collaborations is of particular relevance as engaging in coopetition can affect the long-term success of a company (A-SLR 2: Alves & Meneses, 2015, p. 33; I-SLR 2B: Gnyawali & Park, 2011 & Kraus et al., 2018 in Smiljic et al., 2023, p. 262). **Complementarity** between technological, financial, and managerial capabilities and skills and **culture fit** have been identified as most relevant criteria when engaging in coopetition (I-SLR 2B: Gnyawali & Park, 2009 & Bouncken & Fredrich, 2012 in Smiljic et al., 2023, p. 262). The willingness to engage in **explorative or exploitative** coopetition is positively influenced by the perceived **benefit for the own customer** base, the perceived **shared benefit** from jointly created **value**. The **fear of missing an opportunity** is further relevant for explorative coopetition. Exploitative coopetition is favored by **complementary** partners having **collaboration experience**. For exploration projects with high risk, partner selection for coopetition is based on **trust**, the potential for **long-term collaboration** and a **similar company size**. In mature industries similar company sizes are associated with mutual benefits, similar levels of commitment and the mitigation of asymmetry risk. Company size is however dependent on the specific corporate objective: coopetition including heterogeneous company sizes are favored by small companies for market considerations, cost reduction, and learning motives, and by large companies for technological innovation and the reduction of time to market (I-SLR 2B: Smiljic et al., 2023, pp. 269–271; Lee et al., 2016 & Chiambaretto et al., 2020 in Smiljic et al., 2023, p. 271). As confirmed by the abductive literature, trust, prior relationships, a shared benefit, culture fit, and complementarity are related to coopetition (A-SLR 2: Alves & Meneses, 2015, pp. 24, 26, 33).

The Up-Selection Process

The up-selection process is found again inductively. This process begins with an idea, is followed by a strategy and potential partners are approached informally. An upward cycle is built that becomes iteratively more powerful as more partners are continually added.

This process is particularly relevant for DBEs through the iterative upscaling of users and data, which will then more or less automatically lead to a successful business ecosystem (I-B 6.109), but also reflects the standard proceeding in innovation- and sustainability-oriented business ecosystems and is strongly based on prior relationships (I-A 14.425; I-C 1.124). The importance of **prior relationships** through personal networks and business relationships must not be underestimated (I-B 5.219; I-B 5.232; I-C 1.124) and is consistent with Teece et al. (1997) stating that "the capabilities approach suggests that such opportunities lie close in to one's existent business" (p. 529). Companies mostly identify new partners from prior direct or indirect relationships, but these links can also lead to **path dependency** (I-SLR 2B: Gulati, 1995 in Gaonkar & Mele, 2023, p. 82; Prahalad & Hamel, 1990, pp. 81–82; Teece et al., 1997, pp. 518–524). This is especially relevant, as often there are the same partners on certain topics (I-A 14.425). Relying on prior relationships further involves the downside of limiting the partner search to the known partners, excluding unknown partners with a potentially better fit. (I-L: Geum et al., 2013, p. 211).

A move back to the ABDUCTION chapter according to the **Inferential Pattern Matching Approach (Figure 84)** confirms this **path dependency** and underlines the importance of contacts from prior relationships as the initial step and non-conscious approach of a systematic partner selection process being the bottleneck reducing the number of potential partners to a limited group of partners (A-SLR 2: Alves & Meneses, 2015, p. 32). The DEDUCTION chapter underlines the importance of prior relationships, as companies hardly engage in partnerships without a prior working relationship (D-5.98).

Figure 84. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

This path dependency can be overcome with the access to external knowledge, such as scientific literature, a careful selection process, and a partner selection framework (I-L: Geum et al., 2013, pp. 211–212).

The networking effect involves **integrating the whole supply chain for sustainability-oriented business ecosystems** in order to create value as sustainability needs to be guaranteed throughout the whole value chain (I-B 2.81; I-B 4.263). Supply chains are further necessary to provide cost-effective and high-quality solutions (I-B 5.64). They are less relevant for DBEs (I-B 6.83).

Based on specific topics, partners from different areas, including customers, public institutions, or universities, are taken and gradually expanded (I-F 6.37). This multiplier effect of the up-selection process is beneficial in many ways: bridging ties lead to an increase in the number of partners who fit to the company, the number of potential explorative partners increases and resources, knowledge, and information become more heterogeneous outside the boundaries of the business ecosystem (I-L: Sytch et al., 2012, p. 1661). The key advantage of a company is its **portfolio of different business ecosystems**, enabling the exponential expansion of partnerships through prior relationships (I-SLR 1B: Amir & Prabawani, 2023, p. 14). The higher number of partners the broader the access to innovation with further partners (I-SLR 1B: Amir & Prabawani, 2023, p. 17). Therefore, part of the shared value proposition is always to look at whether potential partners are interesting for existing partners as well (I-C 1.195).

Independent of the strategy, the first step in the process for identifying partners are **prior relationships** (I-G 3.301; I-G 4.221). Usually, **informal** partner selection relies on prior relationships, while **formal** partner selection is applied with no or limited prior relationships (I-L: Brown et al., 2021, p. 12).

The partner identification strategies highlight the importance to **clearly distinguish between identification and selection** of partners. Hypothesis 2 is thus only partially confirmed:

Hypothesis 2

A structured approach including the

- corporate objectives (1)
- business ecosystem objectives / strategy (2)
- the selection process (3)
- the selection criteria (4)

▪ as well as the influencing factors (5) is pivotal for the successful partner selection in business ecosystems since a simple list of selection criteria would not take into account the underlying objectives of the company.	

7.5.6 Partner Selection Processes

7.5.6.1 Innovation Platforms

The identification and selection processes cannot be treated in isolation, as for instance the up-selection process is some kind of both, identification and selection process. Nevertheless, it is recommended to clearly distinguish these steps such as to have a structured proceeding (I-SLR 1B: Benramdane et al., 2023, p. 2).

Innovation Platforms are used for very specific requests (I-F 4.6). An inferential move back to the DEDUCTION chapter according to **Figure 85** reveals a match to the incubator network mentioned by one interviewee in the DEDUCTION chapter (D 11.60).

Figure 85. Move Back According to the Inferential Pattern Matching Approach

Source: Author's representation

A common way of identifying and selecting partners is to be member of an innovation platform, such as Startup Autobahn or Plug & Play and to submit a partner request according to a specific corporate objective (I-F 4.6). The innovation platform is specialized in specific industries, such as Startup Autobahn in Germany for the automotive industry (I-F 4.6; D 11.60), an open corporate accelerator originated through Mercedes-Benz Group AG and including multiple corporate sponsor companies and more mature start-ups. Partners are from the automotive, IT, logistics, and chemical industries. The overall advantage of this innovation platform, in contrast to traditional corporate accelerators, is the emphasis on an **early strategic fit** between sponsors and start-ups, as only start-ups filling the innovation gaps are nurtured. Further, instead of focusing on exclusivity, network effects are focused, enabling open innovation and open platforms with costs spread among several sponsors. The strategic fit approach thus enhances the success of the collaborations and is validated with a proof-of-concept (POC) at low risk and cost, while start-ups do not sacrifice ownership stakes. To avoid bureaucracy and speed up engagement, Mercedes-Benz Group AG assigns supplier status to the start-ups from the beginning of the collaboration. This shortens the time needed to establish the relationship and concentrates attention on evaluating the start-up's potential. Less control and individual visibility are of course associated downsides, which are far outweighed by the benefits (I-L: Bettenmann et al., 2022, pp. 39-43). Both directions can be considered: start-ups may propose new ideas or established companies can request specific technologies (I-F 4.6).

The partner selection process for **innovation platforms** includes the following steps:

1. Scouting and Selection Phase

In the scouting and selection phase an **early strategic fit** is evaluated from a **down-selection approach**: Startup Autobahn sends a long-list, with 30-50 potential candidates and 5-10 out of them are selected (I-F 4.6; I-L: Gneiting, 2018, p. 25). This is followed by 30 minutes **Deep Dive events** devoted to specific technological projects, including a first meeting of the start-ups with the business units. One-on-one meetings are further arranged according to specific needs or interests (I-F 4.6; I-L: Bettenmann et al., 2022, p. 3; I-L: Gneiting, 2018, p. 25).

The relevance of the **strategic fit** as the overarching selection criterion has already been inferentially confirmed in the previous chapters (A-SLR 2: Bierly & Gallagher, 2007, p. 136; A-SLR 2: Bierly & Gallagher, 2007 in Alves & Meneses, 2015, p. 25; D 12.93; D 15.33). This is clearly supported by the archival interviews, which is further demonstrated by the high number of mentions (I-B 1.439; I-B 4.249; I-B 4.255; I-B 5.19; I-B 5.135; I-B 5.496; I-B 5.512; I-C 1.266; I-C 2.348; I-C 3.210; I-C 4.321; I-C 5.113; I-C 7.273). Strategic fit is not synonymous with equality, but with perfect complementarity (I-B 2.403; I-C 3.151). There is no need to have a perfect fit with the partner, as long as the strategic fit is guaranteed, less prioritized skills can later on be upskilled (I-SLR 1B: Iglesias et al., 2023, p. 8).

Closely related to the strategic fit is the **cultural fit**. Compared to the strategic fit, the relevance of the cultural fit is more significant or equally important as the strategic fit for some interviewees (I-B 5.151; I-B 5.166; I-B 5.514; I-B 6.212; I-B 6.234) and less significant as the strategic fit but still with a central importance for other interviewees (I-B 1.444; I-B 3.269; I-C 3.222; I-C 4.355; I-C 5.129; I-C 6.178), while still others do not attach any particular importance to the cultural fit, as long as the interfaces fit (I-C 1.342; I-C 2.373). The cultural fit is closely related to **trust** (I-B 4.298) or even part of it (I-B 6.262). **The relevance of the cultural fit** is undisputed and is confirmed across all chapters of this investigation (A-SLR 2: Holmberg & Cummings, 2009, p. 181; A-SLR 2: Cummings & Holmberg, 2012, p. 147; A-SLR 2: Alves & Meneses, 2015, p. 26; A-SLR 2: Dong & Glaister, 2006, p. 581; D 5.98; I-B 5.151; I-B 5.166; I-B 5.514; I-B 6.212; I-B 6.234). **Large companies** must be particularly aware of the difference of the cultural fit when they work with start-ups (I-B 5.140; A-SLR 2: Franco & Haase, 2015, p. 170). To be successful, companies need the attitude and mindset for a business ecosystem (I-C 7.253; I-I 1.87: Kawohl, 2022). The relevance of the strategic and the cultural fit are confirmed for all types of business ecosystems, as the answers stem from all types of industries.

2. Solution Adaptation Phase

During the solution adaptation stage, POC projects are carried out within 100 days, during which **clear and measurable expectations, goals, and critical success factors are aligned** and milestones are set (I-L: Bettenmann et al., 2022, p. 3). This is an important step, as the technological readiness of the start-ups can be tested, and start-ups obtain their first money (I-F 4.6).

The statements from the INDUCTION chapter confirm the significance of **clear and measurable expectations, goals, and critical success factors** (I-L: Bettenmann et al., 2022, p. 3). This in turn supports hypotheses 5 and 10, according to which a clear strategy, clear definitions, and clear choices are important for a successful partner selection in business ecosystems. As hypothesis 5 has only partially been confirmed, a look to further inductive observations leads to the following results: observations confirm that a clear definition of the business ecosystem aligned with a clear strategy, target, and the definition of the right partners are imperative for a successful partnership (I-A 1.96; I-A 1.106; I-A 6.230; I-B 2.98; I-C 4.44; I-G 1.245; I-G 2.60; I-G 2.104; I-G 3.248; I-G 4.283). A clear objective is closely related to the added value for the company’s customers (I-G 3.232). The targets are not necessarily the same, but complementary to achieve the value add (I-B 2.98; I-B 5.101). Independent of the type of business ecosystem a clear definition of the target and the business ecosystem type is essential for a successful partner selection (I-B 4.6; I-C 4.44; I-G 2.60). One interviewee (I-B 5) mentions the importance of the definition of the mutual expectations and key performance indicators (KPI) with which the success is measured (I-B 5.328). These findings are confirmed through relevant literature based on the example of the innovation platform Startup Autobahn (I-L: Bettenmann et al., 2022). The observations indicate that clearness with respect to strategy, definitions, choices, and expectations are essential to a successful partner selection in business ecosystems (I-C 4.44; I-G 2.60). Companies have a portfolio of different types of business ecosystems, but each type of business ecosystem has to be clearly chosen according to the respective objective (I-A 1.133; I-A 1.137; I-A 1.143; I-A 1.148; I-C 4.44; I-G 1.245). The overall results thus provide rich evidence to entirely confirm hypothesis 5.

Hypothesis 5 There is a lack of clear definitions for business ecosystem objectives and strategies and a lack of clear distinction between business ecosystem types, which makes it difficult to choose targeted partners for the respective type of business ecosystem.	✓

3. Solution Integration Phase

The main challenge of the solution integration, the last stage of the process, is the solution’s **scaling up**. Start-ups typically struggle to organize and prioritize the resources required to reach scale because they have a lot going on and various demands on their time (I-L: Bettenmann et al., 2022).

Hypothesis 8A is now entirely confirmed as the identification of partners by coincidence or prior relationships is not only relevant for small companies, but for all companies (**chapter 7.5.5.3**). Further, partners can be identified from a market review such as an innovation platform.

Hypothesis 8A The identification of potential partners is based on their objectives and made from prior relationships / hearsay, by coincidence, or a market review is made to actively identify potential partners. Contact can be made by both, the orchestrator, or the partner. Small companies usually actively approach bigger companies, as they are unknown, while larger companies are generally addressed by the partners, as they are well-known due to their size.	✓

7.5.6.2 The Down-Selection Process and Due Diligence

The down-selection process identified in the DEDUCTION chapter (D 4.81; D 7.80; D 11.47; D 15.75) is found inductively as well. The process begins with the identification or potential partners from a pitchbook and various databases, then a **long-list** is made, which is followed by a first selection according to a subject area and some few initial criteria, such as the criteria of having a certain level of maturity. The list is iteratively reduced to a **short-list** with a small number of players. In the next step their fit is evaluated within a personal meeting to evaluate the strategic and cultural fit according to a criteria list. Among the more specific criteria are the technology and the customer access the partner is able to provide. Among the strategic aspects, it is evaluated how a partner can be integrated, what are its dependencies and what are previous collaborations. This down-selection is usually done for start-ups, based on a fixed process, to which the company should strictly adhere to in order to achieve a successful partner selection (I-C 3.138). This down-selection approach is particularly confirmed for circular ecosystems (I-L: Brown et al., 2021, p. 10) and is somewhat similar to **an M&A screening process** (I-L: Calipha & Brock, 2019, p. 20): the strategic fit is again evidenced as being the most important selection criterion.

This selection process is followed by a **due diligence**, in which the candidates from the short list are examined in detail to evaluate their suitability (D 5.251; D 6.53; D 8.163; D 12.44; D 16.114; I-L: Calipha & Brock, 2019, p. 22).

7.5.6.3 Individual Partner Selection Approaches from Different Companies

As selection processes are quite individual, different approaches are presented in the following to meet the managerial demand for holisticness.

Approach 1

A **technology and strategy consulting company** (I-C 6) proposes the following selection process:

1	**Determine the strategy and corporate objectives according to the analysis of missing capabilities.**
2	**Make-or-buy decision** such as to define which components to make and which components to buy.
3	Verify the technical integration of partners through **interfaces** and identify needs to enable the fit of technical interfaces with the partner.
4	Analyze the fit of the partner according to **predefined selection criteria**.

5	Determine **incentives for the partner to join**.
6	**Configure and reconfigure the different components from different partners** and if they do not fit as expected, replace the one or the other partner (I-C 6.121; I-SLR 1B: Dalenogare et al., 2023, p. 2).

Approach 2

An interviewee from the **finance industry** (I-C 7) suggests the following process:

1	Determine an initial configuration: an **MVE**.
2	Determine the **shared value purpose** of this MVE.
3	**Criteria** like size and reputation are important.
4	Especially for the finance industry the **customer base** can also be a point: financial resources are needed, so that it makes sense to select partners accordingly.
5	**Complementary partners** providing financial resources, technical know-how, and customer access are needed. Later, it can be opened up for competitors to integrate a standard work for the entire industry.

In general, it must be considered that the finance industry could provide a good service offering as they have a large customer base with customer data (I-C 7.205; I-C 7.279). This approach makes it possible to test the processes within a small framework using a manageable number of partners (I-C 7.279). This **MVE** is a concept introduced by Ron Adner (Adner & Euchner, 2014; Leavy, 2022):

> "An ecosystem strategy starts with a vision, but the system is built over time, partner by partner. Success depends on finding a way to get your initial partners on board – finding your […MVE]. Then you craft the plan and the order, in which subsequent partnerships can be created. This is the principle of Staged Expansion. So the firm's first job is not so much to delight its customers at the outset, but rather to bring the partners on board, whose collaboration will be critical to generating that delight" (Leavy, 2022, pp. 7–8).

The MVE seems to be a common approach. As already uncovered in the previous chapters, it is pursued by several further companies and consultancies (D 10.46; D 2.70; I-B 6.79; I-D 4.137; I-I 1.104: Kawohl, 2022). This has the advantage of initial testing and optimization of value propositions to meet customer needs as best as possible (I-SLR 1B: Lingens et al., 2023, p. 12; I-I 1.104: Kawohl, 2022) and again underlines the importance to simultaneously consider the double value proposition (I-SLR 1B: Lingens et al., 2023, p. 7).

Approach 3

An interviewee from a **consulting company** (I-G 2) sees two general pathways which result in the decision to join or build business ecosystems:

1	The **innovation strategy determines the main areas of action** for the different innovation activities, which can include sustainability and circular innovation as well. Different business ecosystems are joined or built according to this innovation strategy.
2	Coming across a **very exciting product or business model within an innovation process** where the company realizes that **essential key capabilities are missing** that the company could perhaps build up, but it would take far too long, so that the company is looking for partners (I-G 1.245).

Independent of these ways, there is an identification stage and an evaluation stage. Selection criteria are defined in advance and partners evaluated accordingly. The fair value sharing in the sense of how much work each partner provides is discussed with the partner and how revenue is shared (I-G 1.267).

Approach 4

Another way, demonstrated by an interviewee from an **industrial company** (I-G 4) with a **DBE for collaborations in open innovation** is as follows:

1	**Defining the focus topics** in open innovation or for the optimization of solutions.
2	Within the partner **search process**, industry experts are interviewed about potential partners and a so-called match-making is made for potential partners.
3	A **decision funnel** helps to identify two or three partners.
4	With each of these two or three partners it is specifically investigated **which type of commitment** is pursued. This can be the integration of solutions by means of a venture client, reselling, or the joint go-to-market (I-G 4.341). For smaller companies this can be a supplier agreement or a start-up investment (I-G 4.385).
5	Once initiated, the partnership is **followed by the product owner** and a **constant reevaluation** of partner fit is accomplished (I-G 4.341).
6	A **long-term collaboration** results from those who continuously provide added value for the customer, so that this can lead to a **strategic partnership agreement** (I-G 4.385).
7	The DBE is structured into four parts: First, **technology partners** enabling software solutions, for instance, Amazon, Microsoft, IBM, who provide the core solution on which the company then builds further solutions. Second, **open innovation partners**, like start-ups or small consulting companies. Third, **strategic partners** who position the company's digital solutions on the market. Fourth, **value realization partners** who provide the channel so that the software solutions can be sold.
8	**New business models** are created with technology or strategic partners (I-G 4.246).

This again confirms the relevance of a functional innovation management as a basis for major collaboration activities, as **a business ecosystem is one tool among others** and often involves several different types of collaborations (I-G 1.300; I-G 1.267; I-G 4.341; I-G 4.385).

Approach 5

According to an interviewee from an **industrial company** (I-G 4), the process, even though very individual, should always follow these key elements: companies should have an initial focused strategy, a rough structure, dedicated resources, and enough manpower who can talk to partners and who can develop the strategy further, and then it is developed further iteratively (I-G 4.306).

Approach 6

An interviewee from the automotive industry (I-C 2) follows the following basic structure: Business model fit, interfaces fit, monetization (value distribution), and identifying the existing partners. If start-ups do not have the necessary digital interfaces, the company looks for alternative solutions to communicate with the start-up and exchange data.

After the analysis of the six different approaches, it becomes once again clear how different the approaches are. Therefore, it is essential that companies proceed in a very systematic manner and define very clearly what the form of cooperation should look like. Overall, the INDUCTION chapter provided rich evidence for hypothesis 20.

Hypothesis 20 The partner selection process depends on the type of business ecosystem. Especially the partner selection process for DBEs differs from other types of business ecosystems.	✓

No evidence could be identified for hypotheses 19 and 21.

To conclude, priorities have shifted significantly with the INDUCTION chapter, even though the initially discovered need for a systematic and holistic partner selection framework has strongly been confirmed by the investigation and literature identified in this INDUCTION chapter (I-SLR 1C: van de Wetering et al., 2017, p. 76; I-SLR 1C: Wei et al., 2020, pp. 3–4). The confirmed hypotheses from the INDUCTION chapter are indicated in **Table 38**.

Table 38. Confirmed Hypotheses from the INDUCTION Chapter

Topic	Content
The Definition of Corporate Objectives as the First Step	**Hypothesis 4A** The definition of the corporate objectives is the first step of the partner selection process within different types of business ecosystems and platforms and includes the identification of missing capabilities and the make-or-buy decision. The make-or-buy decision then entails a market analysis and a market entry strategy.

Reevaluation of Partner Fit over Time	**Hypothesis 17** The reevaluation of the partner fit over time is an important part of the partner selection process.
Double Value Proposition of the Orchestrator	**Hypothesis 9** Double value proposition: the orchestrator must be attractive for both, partners and its customers.
Number of Actors	**Hypothesis 6** The optimal number of actors within business ecosystems must be defined prior to the partner selection to define how broad or narrow the business ecosystem should be.
Roles	**Hypothesis 7** The role of the company and the type of actors need to be defined prior to the partner selection process.
A Criteria Catalog as Part of the Selection Process	**Hypothesis 12A** A criteria or requirements catalog is not used solely but as part of the partner selection process.
Clear Definitions	**Hypothesis 5** There is a lack of clear definitions for business ecosystem objectives and strategies and a lack of clear distinction between business ecosystem types, which makes it difficult to choose targeted partners for the respective type of business ecosystem.
Identification of Potential Partners	**Hypothesis 8A** The identification of potential partners is based on their objectives and made from prior relationships / hearsay, by coincidence, or a market review is made to actively identify potential partners. Contact can be made by both, the orchestrator, or the partner. Small companies usually actively approach bigger companies, as they are unknown, while larger companies are generally addressed by the partners, as they are well-known due to their size.
Partner Selection Process Depends on Type of Business Ecosystem	**Hypothesis 20** The partner selection process depends on the type of business ecosystem. Especially the partner selection process for DBEs differs from other types of business ecosystems.

Source: Author's representation

Table 39 indicates the partially confirmed and rejected hypotheses from the INDUCTION chapter.

Table 39. Partially Confirmed and Rejected Hypotheses

Topic	Content	Rejection
A Systematic and Dynamic Partner Selection Approach	**Hypothesis 2** A structured approach including the ▪ corporate objectives (1) ▪ business ecosystem objectives / strategy (2) ▪ the selection process (3) ▪ the selection criteria (4) ▪ as well as the influencing factors (5) is pivotal for the successful partner selection in business ecosystems since a simple list of selection criteria would not take into account the underlying objectives of the company.	
Timing	**Hypothesis 13** The time horizon of business ecosystems must be determined prior to the partner selection process.	
Creation of vs. Extension of or Participation in Existing Business Ecosystem	**Hypothesis 16** The partner selection approach for the extension of, respective participation in an existing business ecosystem is different to the creation of a new business ecosystem.	

Availability of Time and Information Determine the Partner Selection Process	**Hypothesis 19** The time and information available prior to the partner selection process determine how much companies rely on strategic expediency instead of rational decision-making criteria. This effect depends on the type of business ecosystem and is less pronounced within a DBE.	⊖
The Partner Selection Process Depends on the Objective, less on the Industry	**Hypothesis 21** The correlation of the partner selection process with the underlying objective is higher than with the respective industry.	⊖

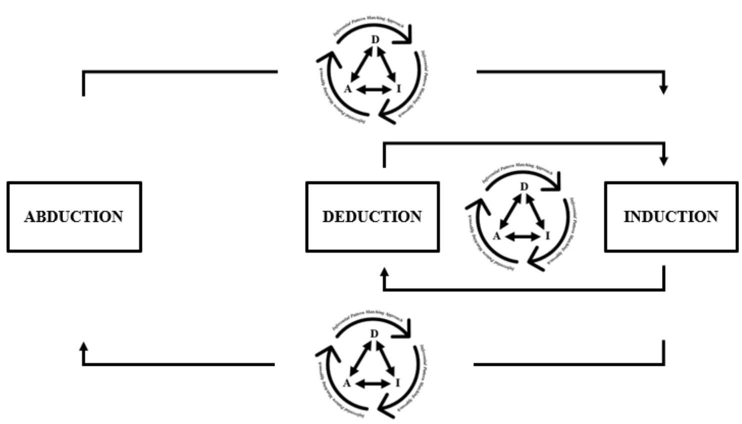
Source: Author's representation

7.6 Compilation of the Theoretical-Conceptual Framework and Presentation of the Theory

The overall intention of this study is to build a strong theory by the application of the **Inferential Pattern Matching Framework**, based on logic interrelationships instead of mere lists of criteria to provide a systematic framework for partner selection in business ecosystems (Eisenhardt, 1989b, p. 547).

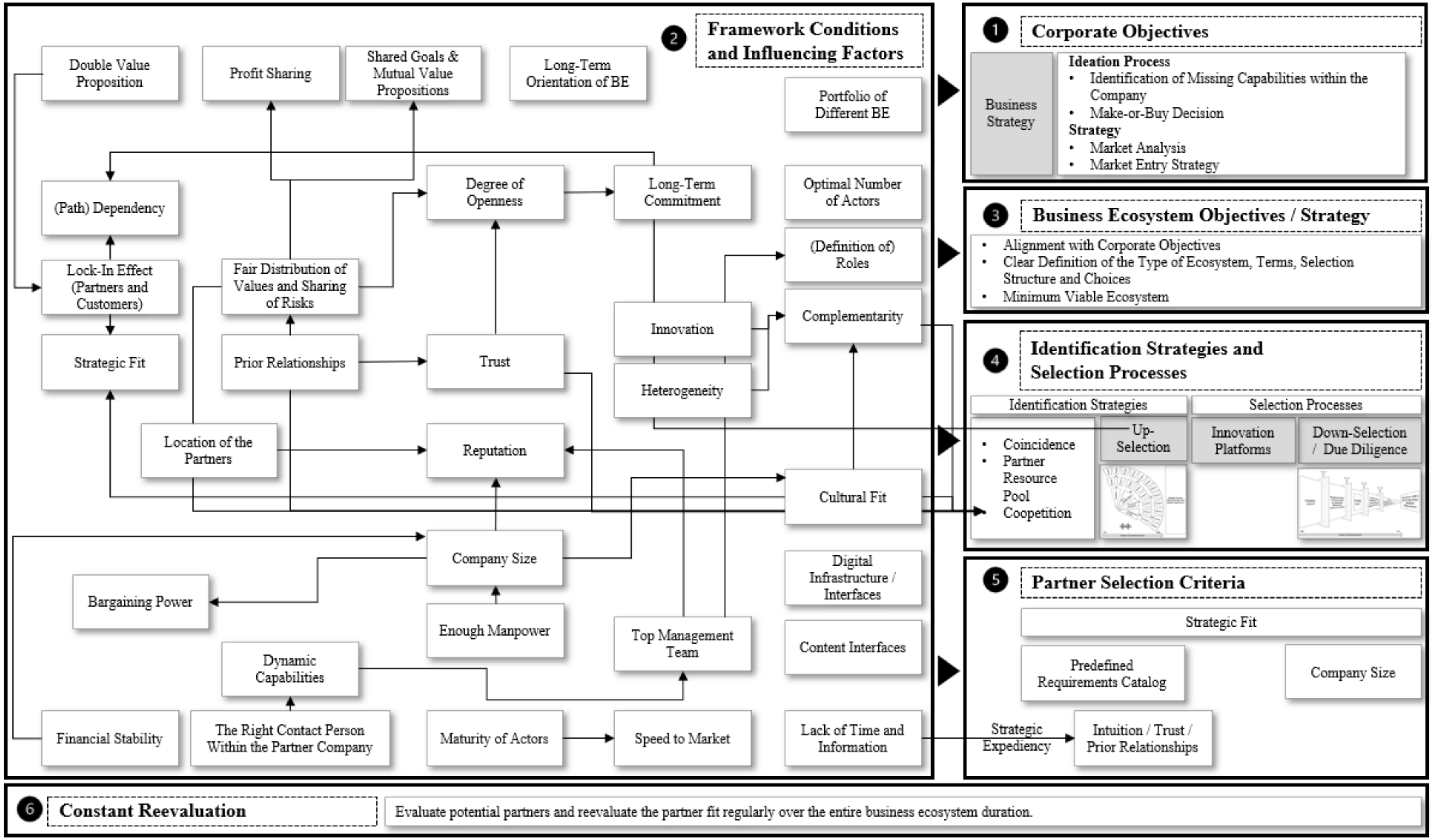
The matches of the iteratively gathered empirical and theoretical data (Sinkovics, 2018, p. 3) with a further move forth or back among the chapters ABDUCTION and INDUCTION, as well as DEDUCTION and INDUCTION according to the **Inferential Pattern Matching Approach** are represented in **Figure 86** and form the theoretical-conceptual framework from the INDUCTION chapter as demonstrated in **Figure 87**.

Figure 86. Inferential Pattern Matching Approach of Chapter INDUCTION with the Chapters ABDUCTION and DEDUCTION



Source: Author's representation

Figure 87. Insights from the Elements Inferentially Confirmed in the INDUCTION Chapter

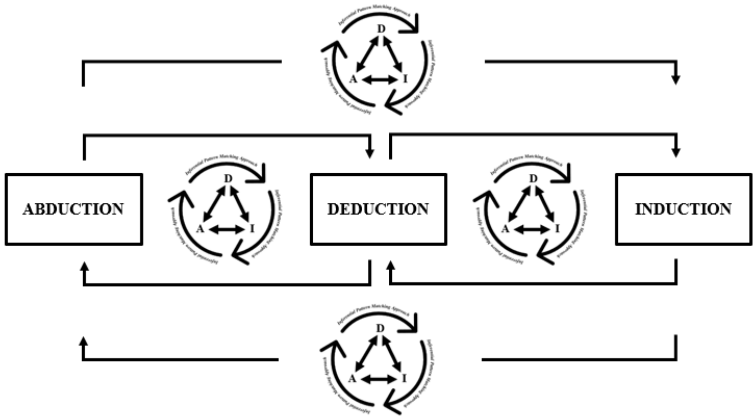


Source: Author's representation

Results reveal that the framework conditions and influencing factors have a much greater importance than initially expected. This must not lead to the assumption that the selection criteria are less important than the influencing factors when selecting partners in business ecosystems. Rather, this investigation provides generalizable insights into the interrelationships of influencing factors, which can be applied to all types of business ecosystems, while the selection criteria are quite company and business ecosystem specific, so that their generalizability is hardly possible.

The **Inferential Pattern Matching Framework** based on the inferentially generated insights among all chapters, ABDUCTION, DEDUCTION, and INDUCTION, is presented in **Figure 88**.

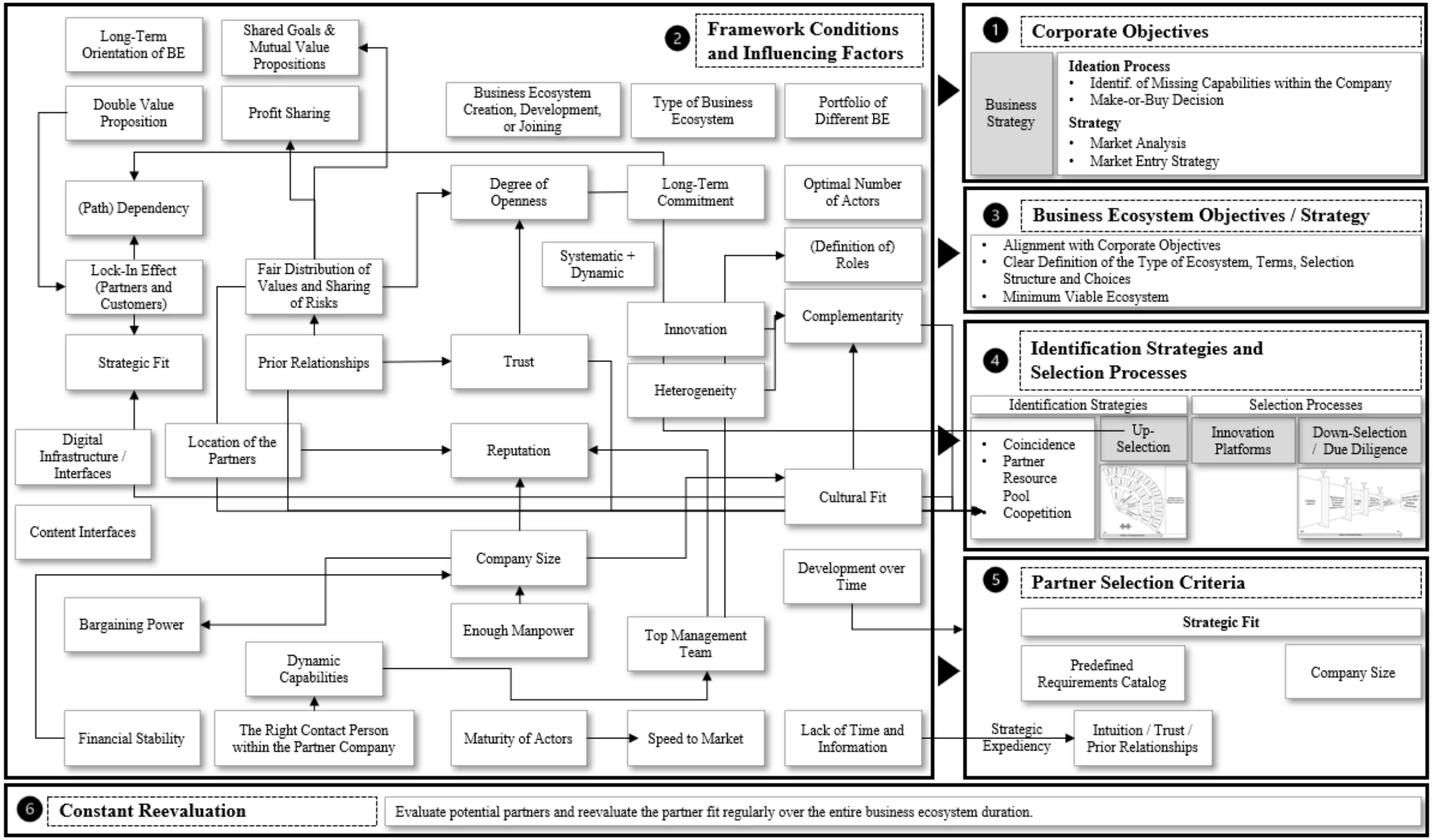
Figure 88. The Inferential Pattern Matching Framework



Source: Author's representation

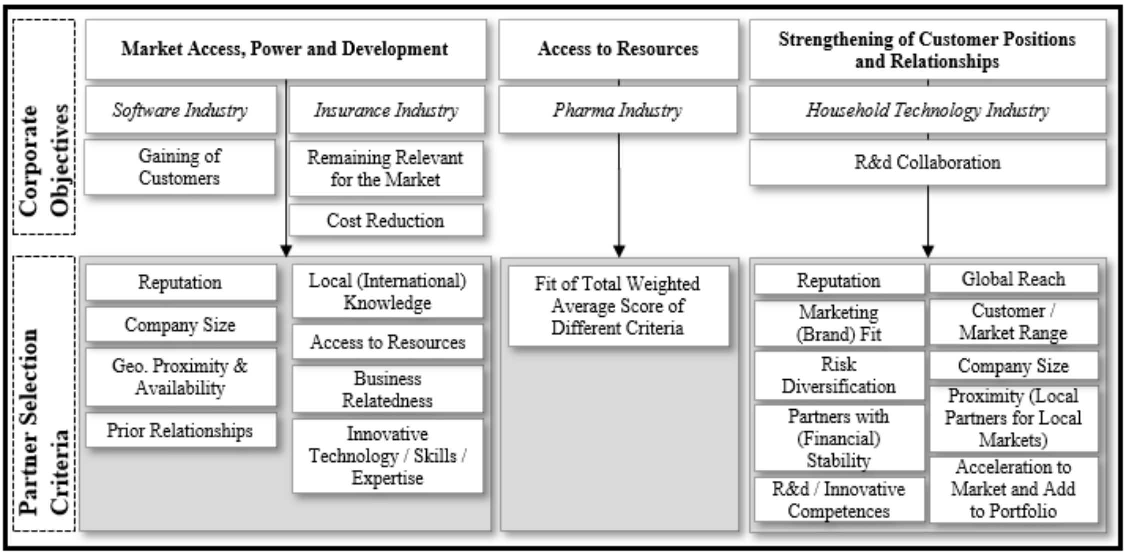
The consolidation of the insights based on the **Inferential Pattern Matching Framework** leads to the development of the theoretical-conceptual framework and results in a state-of-the-art **systematic framework for partner selection in business ecosystems** as illustrated in **Figure 89** including the **confirmed pathways** in **Figure 90**. The overall validated hypotheses are illustrated in **Table 40**.

Figure 89. A State-of-the-Art Systematic Framework for Partner Selection in Business Ecosystems



Source: Author's representation

Figure 90. Confirmed Pathways



Source: Author's representation

Table 40. Overall Validated Hypotheses

Topic	Number	Content
A Systematic and Dynamic Partner Selection Approach	1	**Hypothesis 3** The partner selection framework for business ecosystems must be systematic and dynamic at the same time.
The Definition of Corporate Objectives as the First Step	2	**Hypothesis 4A** The definition of the corporate objectives is the first step of the partner selection process within different types of business ecosystems and platforms and includes the identification of missing capabilities and the make-or-buy decision. The make-or-buy decision then entails a market analysis and a market entry strategy.
Clear Definitions	3	**Hypothesis 5** There is a lack of clear definitions for business ecosystem objectives and strategies and a lack of clear distinction between business ecosystem types, which makes it difficult to choose targeted partners for the respective type of business ecosystem.
Number of Actors	4	**Hypothesis 6** The optimal number of actors within business ecosystems must be defined prior to the partner selection to define how broad or narrow the business ecosystem should be.
Roles	5	**Hypothesis 7** The role of the company and the type of actors need to be defined prior to the partner selection process.
Identification of Potential Partners	6	**Hypothesis 8A** The identification of potential partners is based on their objectives and made from prior relationships / hearsay, by coincidence, or a market review is made to actively identify potential partners. Contact can be made by both, the orchestrator, or the partner. Small companies usually actively approach bigger companies, as they are unknown, while larger companies are generally addressed by the partners, as they are well-known due to their size.
Double Value Proposition of the Orchestrator	7	**Hypothesis 9** Double value proposition: the orchestrator must be attractive for both, partners and its customers.

Clear Strategy and Clear Choices	**8**	**Hypothesis 10** Having a clear strategy, making clear choices, and using clear terms are important prerequisites for a successful partner selection.
General Selection Criteria Based on Objectives Instead of Checklist of Criteria	**9**	**Hypothesis 11** The partner selection process depends on the objectives the business ecosystem is pursuing.
A Criteria Catalog as Part of the Selection Process	**10**	**Hypothesis 12A** A criteria or requirements catalog is not used solely but as part of the partner selection process.
Timing	**11**	**Hypothesis 14** The development over time is a criterion which is of major importance and must be especially considered for the general and specific selection criteria in accordance with the company and business ecosystem related objectives.
Extension of, or Participation in Existing vs. Creation of New Business Ecosystem	**12**	**Hypothesis 15** The decision for the extension of, respective participation in an existing, or the creation of a new business ecosystem is dependent on the time available prior to the formation of the business ecosystem.
Reevaluation of Partner Fit over Time	**13**	**Hypothesis 17** The reevaluation of the partner fit over time is an important part of the partner selection process.
Pathway and Composition	**14**	**Hypothesis 18** Predefined objectives define the pathway for the partner selection approach and the final composition of the business ecosystem. They are transferable to different industries.
Availability of Time and Information Determine the Partner Selection Process	**15**	**Hypothesis 19** The time and information available prior to the partner selection process determine how much companies rely on strategic expediency instead of rational decision-making criteria. This effect depends on the type of business ecosystem and is less pronounced within a DBE.
Partner Selection Process Depends on Type of Business Ecosystem	**16**	**Hypothesis 20** The partner selection process depends on the type of business ecosystem. Especially the partner selection process for DBEs differs from other types of business ecosystems.

Source: Author's representation

Together with the 16 hypotheses, which were validated through this investigation, this state-of-the-art systematic partner selection framework for business ecosystems based on the **Inferential Pattern Matching Framework** builds the following established theory $\mathbf{T_E}$ (Minnameier, 2010, pp. 241-242; Peirce, 1931-58 in Ormerod, 2024, p. 59; Sutton & Staw, 1995, p. 378) of this study:

Strong Theory (T_E)

A **systematic partner selection framework in business ecosystems** is based on six consecutive and interlocking steps: the corporate objectives (1), the framework conditions and influencing factors (2), the definition of business ecosystem objectives / strategy (3), partner identification and selection processes (4), partner selection criteria (5) and involves the constant reevaluation of partner fit over the entire business ecosystem duration (6).

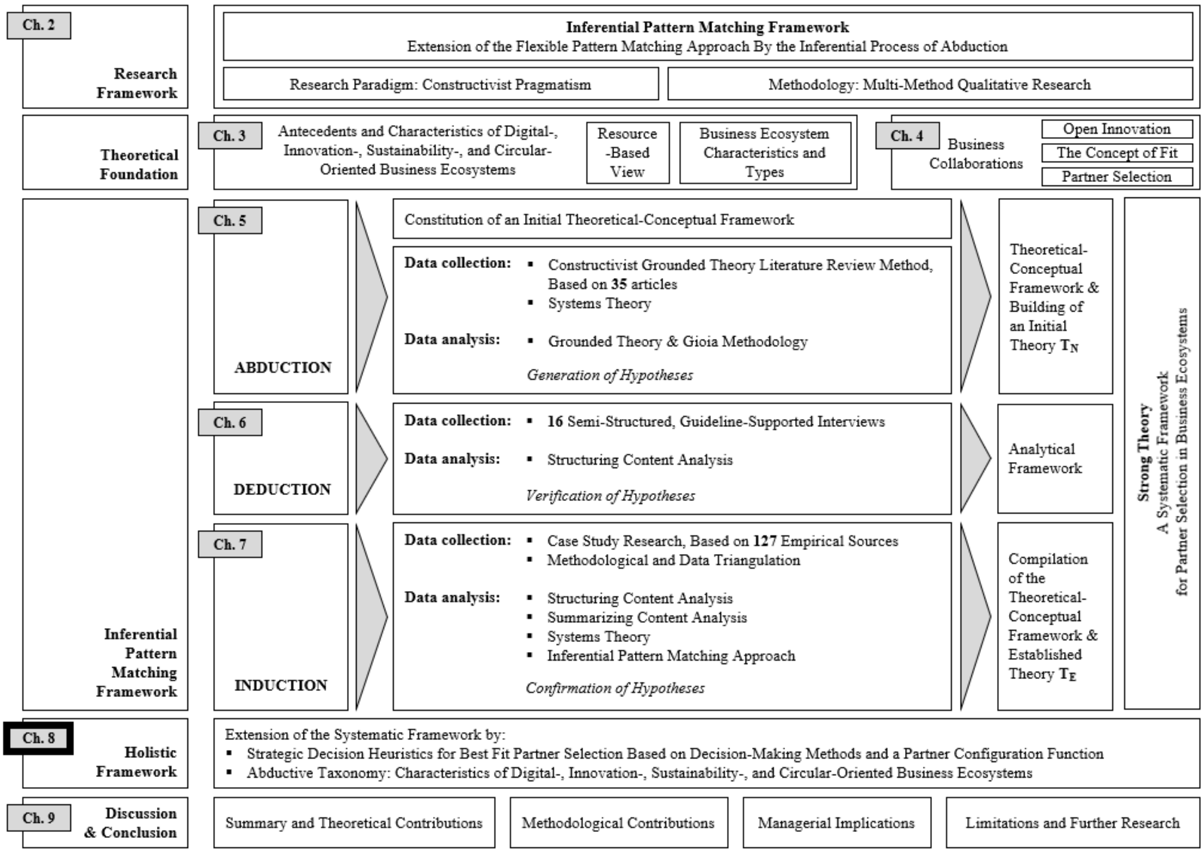
Further to the **systematic framework and strong theory identified** by the application of the **Inferential Pattern Matching Approach**, the next chapter provides strategic decision-making techniques and a business ecosystem partner configuration method based on heuristics, as well as an **Abductive Taxonomy** providing detailed insights into the peculiarities of partner selection within different business ecosystem types. The systematic partner selection framework is supplemented by these elements to provide a holistic partner selection framework for business ecosystems. The **research question** is again redirected according to the new insights from the INDUCTION chapter (Tecuci et al., 2018, p. 10):

Research Question 5

Which decision-making tools can support the different steps in the partner selection process to obtain an adequate selection of partners? What are the differences among the partner selection in different business ecosystem types?

Figure 91 illustrates the thesis structure leading to chapter 8.

Figure 91. Thesis Structure



Source: Author’s representation

"The whole is more than the sum of its parts."

Aristotle

(in Teece, 2018a, p. 360)

8 A Holistic Framework for Systematic Partner Selection in Digital-, Innovation-, Sustainability-, and Circular-Oriented Business Ecosystems

8.1 Extension of the Systematic Framework by Decision-Making Techniques, a Business Ecosystem Partner Configuration Function, and an Abductive Taxonomy

The strong theory built by the **Inferential Pattern Matching Framework** within the prior chapters will be enriched by further insights identified within the INDUCTIVE investigation. These insights **result from**, but are not completely evidenced by this author's **Inferential Pattern Matching Approach and Framework**. As this study is based on **constructivist-pragmatist** research (Nonhoff, 2011, p. 91), it follows a target-oriented goal: for best **completeness and holisticness** of the partner selection framework, data should be analyzed as deeply as possible as it would be wrong to leave out **data with important findings** just because strong evidencing with the **Inferential Pattern Matching Approach** is not possible. Therefore, the new insights are analyzed inductively within this chapter to lead to plausibly true results (Sarbo & Cozijn, 2019, p. 246) and contribute to the holisticness of the framework and particularly to the managerial depth of this study.

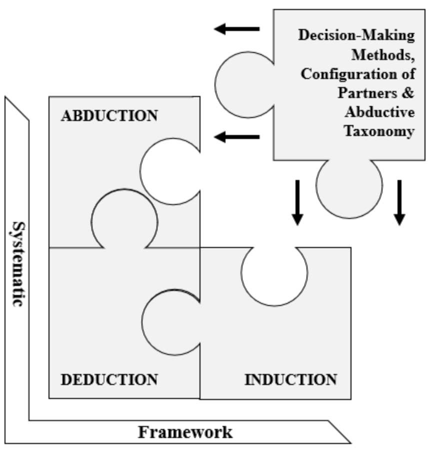
Heuristics are applied to identify and propose **decision-making techniques and configuration of partners to support the partner selection in business ecosystems** with an optimal or close to optimal result without relying on large amounts of data to support the development of appropriate decision-making techniques (Massironi & Guicciardi, 2011, p. 165; Mousavi & Gigerenzer, 2014, p. 1676; Thorngate, 1980, p. 219; Wah et al., 1995, p. 763).

This study proposes an **Abductive Taxonomy**, which is particularly useful for this investigation, as it considers the differences in characteristics among the different business ecosystem types identified in the INDUCTION chapter and based on the chapters ABDUCTION and DEDUCTION. An **Abductive Taxonomy** takes "[…] the view that no one-fits-all model would do in organizing and understanding the processes […]" (Faissal Bassis & Armellini, 2018, p. 1059). As opposed to the systematic framework which tries to generalize the findings, the **Abductive Taxonomy** thrives for highlighting individual characteristics, so that in combination, the theoretical-conceptual framework and the **Abductive Taxonomy** support the aim of holisticness of this study.

The combination of the framework with the decision-heuristics and the **Abductive Taxonomy** for different types of business ecosystems leads to a holistic framework for selecting partners in in different types of business ecosystems, providing useful interrelationships with the systematic framework developed in the prior chapters and create **valuable synergies**, so that the **value of the whole, the systematic framework, decision-heuristics, and Abductive Taxonomy is greater than the sum of its parts** (Ennen & Richter, 2010, p. 207). As business ecosystems in real life are seldom purely one type of business ecosystem, but contain elements of digital, innovation, sustainability, and sometimes circularity, this investigation provides a holistic framework in addressing digital-, innovation-, sustainability-, and circular-oriented business ecosystems.

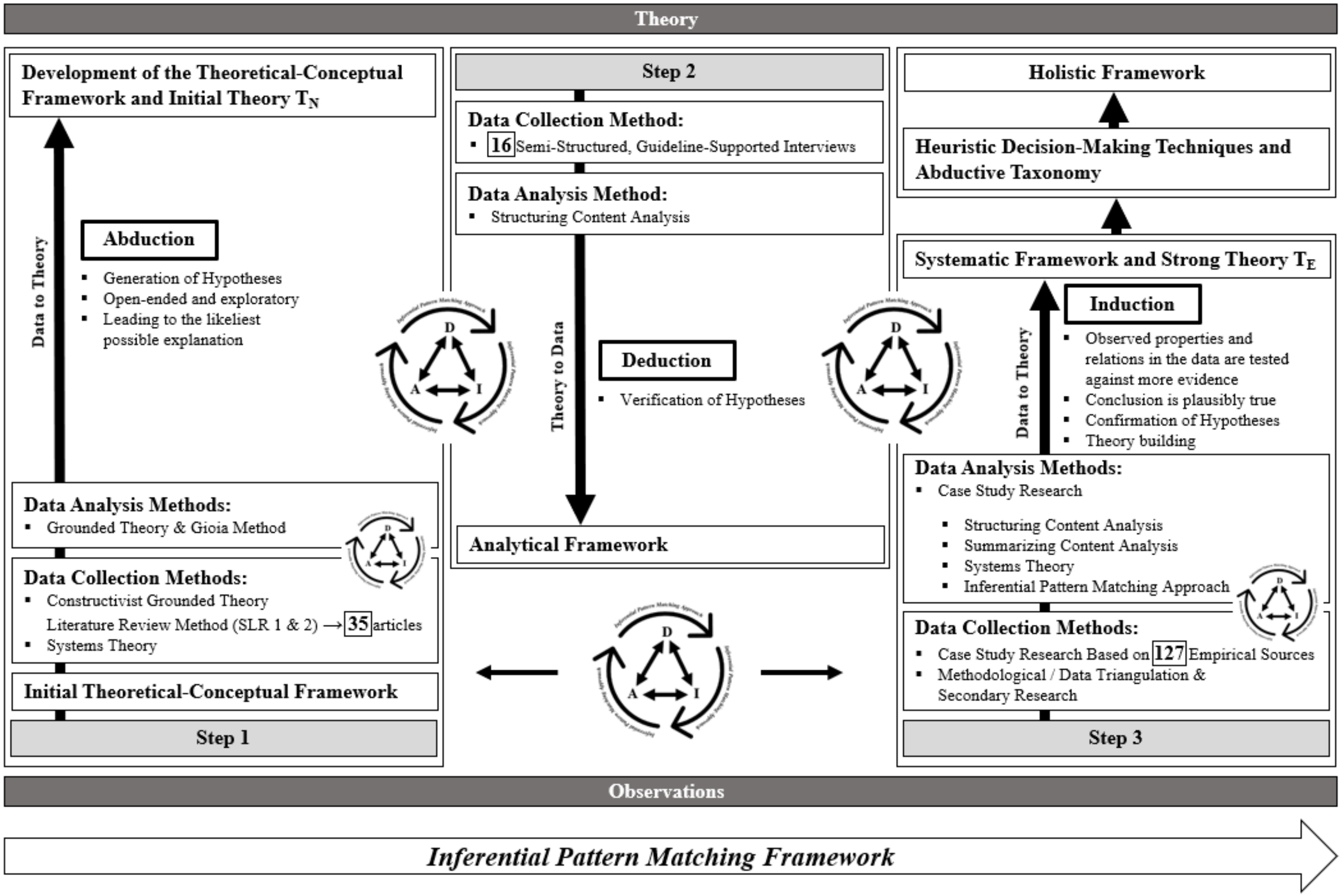
The decision-making techniques including the partner configuration function, as well as the **Abductive Taxonomy** will complete the holistic framework for partner selection in business ecosystems, as illustrated by the puzzle in **Figure 92** and the **Inferential Pattern Matching Framework** in **Figure 93**.

Figure 92. The Consolidating Piece of the Puzzle



Source: Author's representation

Figure 93. The Holistic Framework Resulting from the Inferential Pattern Matching Framework



Source: Author's representation

8.2 Strategic Decision Heuristics for Best Fit Partner Selection

8.2.1 Data Collection and Data Analysis: Heuristics

Heuristics are **simple decision processes** which are applied, if large amounts of data need to be processed with limited available time, if complete data is not available, or in complex and rapidly changing environments, so that a decision underlies high uncertainty (Mousavi & Gigerenzer, 2014, p. 1676; Thorngate, 1980, p. 219). Further, they can be used to obtain generalizability from individual phenomena (Massironi & Guicciardi, 2011, p. 165; Wah et al., 1995, p. 763). Heuristics could then lead to optimal or close to optimal decisions without the complete exploitation of data (Thorngate, 1980, p. 219), as the ignorance of potentially relevant data can be compensated by the efficiency of the heuristics and the capabilities of the decision maker (Thorngate, 1980, p. 220). The ignorance of data does not lead to an inaccuracy of the results, as with the reduced data sample the estimation error is lower as well (Mousavi & Gigerenzer, 2014, p. 1673).

From a **constructivist-pragmatist** perspective (Nonhoff, 2011, p. 91), heuristics are particularly valuable as efficient decision processes taking the personal experience of the decision maker into account lead to optimal or close to optimal decisions (Massironi & Guicciardi, 2011, pp. 162, 166; Silver et al., 1980, p. 153). The decision maker's ability to select appropriate variables outweighs complex procedures or complete data availability for obtaining optimal results (Kleinmuntz, 1985, p. 696). A heuristic is particularly useful when having the following characteristics: a realistic effort for obtaining the solution, a solution targeting an average optimum, a low risk to achieve a poor solution and a simple implementation (Silver et al., 1980, p. 155). Heuristics are used to determine probabilities for decision-making techniques applied within the partner selection framework for business ecosystems in complex and rapidly changing environments with high uncertainty (Mousavi & Gigerenzer, 2014, p. 1676; Thorngate, 1980, p. 219). The authors from the SLRs in the ABDUCTION chapter applied different decision-making methods, which will be analyzed using decision-heuristics.

8.2.2 Strategic Decision-Making Techniques Based on Heuristics

Strategic decision making is central to shape a company's direction (Eisenhardt & Zbaracki, 1992, p. 17) and involves the identification of the relevant goals according to a decision problem, the search for alternatives, the prediction of consequences for each alternative, the evaluation of each alternative regarding prior defined selection criteria and the selection of the best alternative to achieve the prior defined goal (Anderson, 1983, p. 201; Sayer, 2004, p. 1). Strategic decision making is particularly challenging in high-velocity environments, such as is the case with partner selection in business ecosystems, which involve innovative, fast, and high-quality decisions, as mistakes and delays are costly (Bourgeois & Eisenhardt, 1988, p. 833). Consequently, the decision-making process in such fast moving markets involves quick decisions based on few alternatives, few sources of information, and limited time for analysis (Mintzberg, 1973 in Eisenhardt, 1989c, p. 544). This emphasizes the need for the development of appropriate decision-making methods.

As a systematic partner selection process should consider both, practical and theoretical approaches (Yoon & Song, 2014, p. 1069), this investigation adds theoretical decision-making techniques to the study to complete the partner selection framework. **Heuristics** enable the simple decision making with limited time, incomplete data, high uncertainty and a complex, fast changing environment (Mousavi & Gigerenzer, 2014, p. 1676; Thorngate, 1980, p. 219). Its role has become continuously more important in recent years, particularly within **multi-criteria-based decision making (MCDM)** in business environments, in which the finding of an exact optimal solution appears to be impossible due to its increasing complexity (Dyer et al., 1992, p. 650; Wallenius et al., 2008, p. 1341).

In this investigation, heuristics are applied to serve two goals:

First, heuristics are applied within this investigation to identify appropriate decision-making techniques from the SLRs in the ABDUCTION chapter within this study with an optimal or close to optimal result without relying on large amounts of data to support the development of appropriate decision-making techniques and a partner configuration function.

Second, heuristics are proposed by this study to provide a useful tool for managerial decision-making among the developed partner selection framework to suggest simple decision-making techniques based on heuristics (Massironi & Guicciardi, 2011, p. 165; Mousavi & Gigerenzer, 2014, p. 1676; Thorngate, 1980, p. 219; Wah et al., 1995, p. 763).

8.2.3 Strategic Decision-Making Techniques Identified from the SLRs

This study identified two major decision-making techniques among the **SLRs from chapter ABDUCTION**: contingency model-based decision making and multi-criteria decision making.

Contingency Model-Based Decision Making shall be defined as the process of evaluating potential partners according to the manifestation of two different categories represented using a contingency model demonstrating high or low expression of each category (Shah & Swaminathan, 2008, p. 474; Shaikh & Levina, 2019, p. 3). The advantage of a qualitative decision-making technique is that characteristics, which are hardly measurable and for which it is difficult to gather relevant data within companies (Shaikh & Levina, 2019, p. 3) can be presented in a simple and for everyone understandable way. The disadvantage of this kind of decision making is the high subjectivity of criteria and evaluations. A further drawback is the limited focus on two categories leading to either a too limited analysis or a high abstraction.

Franco and Haase (2015) provide a classification which enables the definition of the **business ecosystem type** according to the determinedness of the objective and the ascertainment of the strategy (pp. 177-179). Vaez-Alaei et al. (2022) focus on the **selection criteria** in dependence of the **business ecosystem type**. They classify the importance of knowledge-specific selection criteria, such as trust, similarity, and complementarity according to the respective manifestations of technical complexity of the collaboration and the partner's history of collaboration (pp. 1023-1026). Shah and Swaminathan (2008) similarly focus on the selection criteria related to the business ecosystem type. They cluster the selection criteria trust, complementarity, commitment and financial payoff according to the dimensions of process manageability, which is the degree of interaction, coordination and control required, and outcome interpretability, which refers to the degree of difficulty associated with being able to interpret or understand with certainty the exact outcomes of the partnership (pp. 473-477). Akhavan et al. (2017) use a SWOT-Analysis combined with MCDM method for the evaluation of potential partners (pp. 169-182).

Multi-Criteria Decision Making (MCDM) methods have been widely applied for partner selection among various industries (I-SLR 2C: Chang et al., 2019, p. 3). Authors from SLR 2 majorly used **MCDM methods** or even combinations of multiple MCDM methods. The aim of MCDM is to combine objective survey data with subjective judgments thereby providing an effective source of information for decision making regarding partner selection in business ecosystems (I-SLR 2C: Kumar et al., 2017 in Chang et al., 2019, p. 3). This combination of objective data with subjective judgement thus perfectly fits to the **constructivist-pragmatist approach** (Nonhoff, 2011, p. 91) of this investigation.

The tools which are mentioned or applied by most of the authors are the **Analytic Hierarchy Process (AHP)** (A-SLR 2: Liou et al., 2011, pp. 3517–3518; A-SLR 2: Vaez-Alaei et al., 2022,

p. 1013; A-SLR 2: Solesvik & Encheva, 2010, pp. 704–706), the **Analytic Network Process (ANP)** (A-SLR 2: Chen et al., 2008, p. 455; Liou et al., 2011, pp. 3517–3518; A-SLR 2: Vaez-Alaei et al., 2022, p. 1013; A-SLR 2: Solesvik & Encheva, 2010, p. 706), the **utility analysis** (A-SLR 2: Cummings & Holmberg, 2012, pp. 153–156; A-SLR 2: Holmberg & Cummings, 2009, pp. 181–184) and the **fuzzy-set theory** (A-SLR 2: Ding & Liang, 2005, pp. 200–210; A-SLR 2: Vaez-Alaei et al., 2022, p. 1013), or **hybrid MCDM approaches**, as for instance fuzzy set incorporated in ANP (A-SLR 2: Liou et al., 2011, pp. 3515–3516).

Other tools, like for instance fuzzy quantitative strategic planning matrix (A-SLR 2: Akhavan et al., 2017, p. 169), the maximum score estimator (A-SLR 2: Mindruta et al., 2016, pp. 211–212), formal concept analysis (A-SLR 2: Solesvik & Encheva, 2010, pp. 707–708), or game theoretic techniques (A-SLR 2: Fahimullah et al., 2019, p. 42861) are mentioned once only within SLR 2 and are applied to too specific industries. For generalizability, this investigation focuses on the most often used tools in this study. The following MCDM methods are proposed for partner selection in business ecosystems.

8.2.4 The Utility Analysis

The utility analysis, introduced by Brogden (1949), and also referred to as multi-attribute utility theory (MAUT), is a method for organizational decision making, which enables the choice among alternatives based on their relative weighting and therefore offers a concrete procedure for evaluating selection options (Cabrera & Raju, 2001, pp. 92-101). It refers to the selection of complex alternative courses of actions within a decision-making process, whereby each criterion is evaluated according to the decision maker’s weighted preferences and aggregated to value and finally ranked according to their importance. This ranking is usually made on a 1-10 scale (Huber, 1974, pp. 1398–1399).

Utility analysis thus provides relative contributions of different selection options to enable strategic decision on optimal partner selection corresponding to a company’s strategic objectives (Cabrera & Raju, 2001, p. 99). Despite its non-mathematical character, utility analysis is a useful method, as it includes multiple criteria to simplify choices for the achievement of near to optimal solutions (Cabrera & Raju, 2001, pp. 98–99; Dyer et al., 1992, pp. 648–650). Even though being highly subjective, this method is managerially accepted as providing meaningful information. It is transparent and easy to understand and applied by decision-makers and at the same time flexible to adapt to unexpected changes (Bell et al., 1977,

p. 354; Dyer et al., 1992, p. 647; Manouselis & Costopoulou, 2007, p. 320). Its increased use in current publications underlines its ongoing importance for strategic decisions in organizations (Zayat et al., 2023, pp. 4–5).

Similar to Bell et al. (1977), this study suggests the following arithmetic mean formula for calculating the utility (pp. 253-254):

$$U_i = \sum_{j=1}^{n} w_j \, u_{ij}$$

where $\sum_{j=1}^{n} w_j$ = 100%, U_i represents the aggregated utility for the alternative *i*, *n* is the number of total evaluation criteria applied, w_j is the weight of the evaluation criterion *j* and u_{ij} is the partial utility of the alternative *i* based on the evaluation criterion *j*.

Cummings & Holmberg (2012) apply a utility analysis, which they call weighted decision matrix, for the evaluation of best fit in their partner selection process (A-SLR 2: pp. 153-156). In accordance, this study suggests using the utility analysis for the decision regarding the **best fit partner selection criteria (step 5 of the partner selection framework)**, as preferences for the different partner options can easily be attached to the different selection criteria. Further, this model helps considering the changing over time of the different selection criteria (A-SLR 2: Cummings & Holmberg, 2012, pp. 153–156).

8.2.5 The Analytic Hierarchy Process (AHP)

The **Analytic Hierarchy Process (AHP)** was introduced by Saaty (1977) and is an MCDM method based on a pairwise comparison matrix (p. 234). This approach decomposes a complex multi-criteria decision problem into hierarchies by using AHP, which is based on qualitative and quantitative elements. The decision problem is decomposed into small entities (Cheng & Li, 2007, p. 278 in A-SLR 2: Liou et al., 2011, p. 3517). These small entities are then structured within a matrix, and weighted and ranked by the value of their eigenvector. Hierarchies are built by the decision problem at the top level, criteria and eventually sub criteria in the middle, and alternatives at the bottom level (A-SLR 2: Liou et al., 2011, p. 3517).

Scales of priorities are built, similar to the utility analysis, but are created from pairwise comparisons within one hierarchy and not one at time using a utility function which then aggregates the evaluated criteria (Saaty, 2005, p. 18). For each pairwise comparison the criteria are weighted on a scale of relative importance within a criteria weights matrix (Saaty, 2004,

p. 13). The advantage of this method is the unfolding of complex decision processes (Saaty, 2004, p. 33). The clustering of a complex multi-criteria decision problem into a hierarchical matrix leads to efficiency, due to pairwise comparisons, and consistency, as multiple comparisons are represented in a structured manner, exceeding the capacity of a person's mind (Saaty, 1977, p. 275). The decision process is highly structured and transparent, as each pairwise comparison follows a linear sequence and only the hierarchy level above can be influenced. The inconvenience is that a realistic representation of a decision problem is not necessarily possible, as the criteria might not always consist of a hierarchical structure and a deviation from the chronological sequence is not possible (A-SLR 2: Liou et al., 2011, pp. 3517–3518; Schenkerman, 1994 in Saaty, 2005, pp. 29–30).

In principle, AHP is similar to the utility analysis, as a utility function is used to evaluate alternatives of a decision based on different criteria. The basic difference to the utility analysis is that instead of analyzing one criterion at a time, AHP builds matrices to provide rankings of multi-criteria problems (Saaty, 2005, p. 16). This can be demonstrated by the following formula:

$$M_{ij} = \lambda_{max}\, w_j$$

in which w_j is the weight of the evaluation criterion j and λ_{max} is the maximum eigenvalue of matrix M , which is the matrix based on the alternatives i for the evaluation criterion j (Saaty, 1977, pp. 235–236; A-SLR 2: Chen et al., 2008, p. 455).

Usually, a scale of numbers between 1 to 9 is used to express relative importance among the alternatives and to guarantee consistency, the reciprocal value is assigned to the compared value (Saaty, 1977, pp. 234, 244, 245, 246).

A reciprocal matrix for the different alternatives $i_{A\text{-}C}$ for evaluation criterion j can be represented as an example as follows:

j	i_A	i_B	i_C
i_A	1	2	6
i_B	1/2	1	3
i_C	1/6	1/3	1

where n is the number of elements compared, in this case $n = 3$ (i_A, i_B, i_C), and a comparison of the importance of the elements leads to the following ranking, beginning with the first upper row; the other values are obtained from reciprocity: a comparison among a same letter of course leads to 1, due to equal importance. A is twice as important as B and six times more important than C. Thus, B is half of A, C is one-sixth of A and B is three times more important than C. In this case, complete consistency is obviously given and only one of the eigenvalues λ_i equals n, which is λ_{max}; and all other $\lambda_i = 0$ (Saaty, 2004, p. 4; Saaty, 1977, pp. 235-236). Consequently, as $n = 3$, $\lambda_{max} = 3$, which is the alternative i_C with the highest eigenvalue for evaluation criterion j.

Real-world pairwise comparisons are unlikely to have such a consistency (Saaty, 2004, p. 10). When eigenvector and eigenvalue are calculated, it is thus important to calculate a consistency index (μ), such as to test the consistency across the values compared (Saaty, 2004, pp. 22–23; Saaty, 1980, p. 51 in Belton, 1986, pp. 12–13):

$$\mu = \frac{\lambda_{\max} - n}{n - 1}$$

Complete consistency is achieved if $\lambda_{max} = n$. With inconsistency always $\lambda_{max} > n$ (Saaty, 1977, p. 237) and a consistency ratio below 0.1 (Saaty, 1987, p. 165). The approximation of λ_{max} then results from the following formula (Saaty, 1977, p. 237), representing a multi-attribute value approach (Belton, 1986, p. 9):

$$\lambda_{max} = \sum_{j=1}^{n} w_j \, M_{ij}$$

As the complexity of the calculation increases with n of matrix M and several algorithms can be used to approximate the weighting, it is suggested to perform AHP analysis using dedicated software, for instance, **Super Decisions Software** so that only the main equations are presented here (A-SLR 2: Chen et al., 2008, p. 455; Erdoğmuş et al., 2006, pp. 274–275).

As AHP method allows for a hierarchically modelling of the real world (Saaty, 1977, p. 272), it can for instance be applied for the determination of the relative importance of **each selection criterion (step 5 of the partner selection framework)** (I-L: Geum et al., 2013, p. 217).

8.2.6 The Analytic Network Process (ANP)

To overcome the inconvenience of the strictly hierarchical structure of AHP, it was further developed into the **Analytic Network Process (ANP)**, a method with greater depth that allows the study of more complex interrelationships (A-SLR 2: Liou et al., 2011, p. 3517; Saaty, 2004,

p. 33). Like AHP, ANP is based on pairwise comparisons in relation to the elements of the network structure, which are represented within a reciprocal matrix, from which the total value is estimated and a priority ranking is built (Saaty, 1999, p. 9). In contrast to AHP's strictly hierarchical structure the ANP follows a network structure, allowing to consider interdependencies between the elements and among different clusters, providing more accurate answers about real world decisions (A-SLR 2: Liou et al., 2011, p. 3517; Saaty, 1999, pp. 1–2). This is accomplished through presenting the interdependences within a **supermatrix** (Saaty, 1999, pp. 2–3). The overall approach for ANP is thus comparable to the AHP approach with the additional use of the supermatrix (A-SLR 2: Chen et al., 2008, pp. 455-457; A-SLR 2: Liou et al., 2011; pp. 3517-3518).

Due to the consideration of interrelationships, ANP is deemed an appropriate method for decisions regarding partner selection for collaborations (A-SLR 2: Chen et al., 2008, p. 455). The four vertical categories of the partner selection framework perfectly portray a decision problem, with different criteria, alternatives, and interrelationships: the corporate objectives (1), the business ecosystem objectives / strategy (3), the identification strategies and selection processes (4), and the partner selection criteria (5). As **the four vertical categories of the partner selection framework** do not necessarily follow any strict hierarchical structure, ANP is preferred to AHP, allowing it to handle interdependences among the different categories and therefore follows a network structure (A-SLR 2: Chen et al., 2008, pp. 462–463; Saaty, 2004, pp. 1–2; Saaty, 1999, pp. 1–2).

8.2.7 The Fuzzy-Set Theory

As some information might be too vague to be quantified by weights, another practical model for vague and complex multi-criteria problems is the fuzzy-set theory (A-SLR 2: Ding & Liang, 2005, p. 200).

First introduced by Zadeh (1965) the fuzzy-set theory classifies vague data or imprecise information as possibility distributions on a grade between zero and one (A-SLR 2: Ding & Liang, 2005, p. 200; Zadeh, 1965, pp. 338–339).

Zadeh (1965) define and characterize fuzzy set as follows:

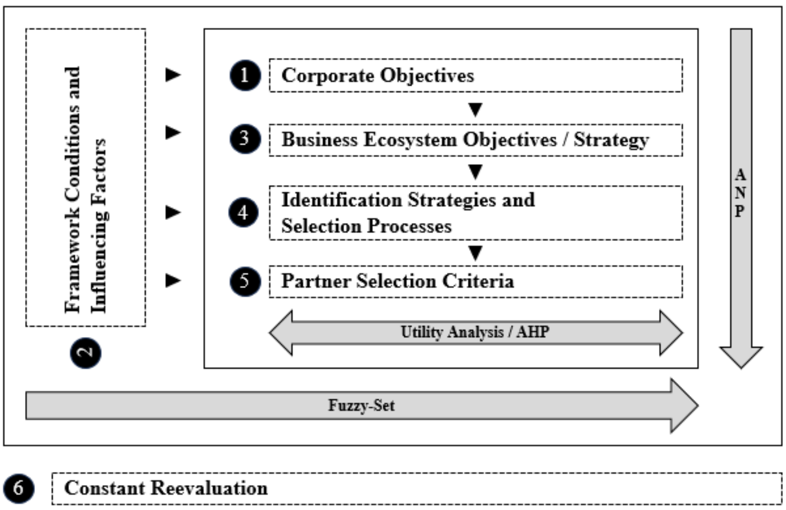
> "Let *X* be a space of points (objects), with a generic element of *X* denoted by *x*. Thus, $X = \{x\}$. A *fuzzy set (class) A* in *X* is characterized by a *membership (characteristic) function* $f_A(x)$ which associates with each point in *X* a real number in the interval [0, 1],~

with the value of $f_A(x)$ at x representing the "grade of membership" of x in A. Thus, the nearer the value of $f_A(x)$ to unity, the higher the grade of membership of x in A. When A is a set in the ordinary sense of the term, its membership function can take on only two values 0 and 1, with $f_A(x) = 1$ or 0 according as x does or does not belong to A. Thus, in this case $f_A(x)$ reduces to the familiar characteristic function of a set A" (p. 339).

According to Ding & Liang (2005), the **fuzzy-set method** could be applied to the decision on the partner selection criteria (pp. 197-198). This study rather suggests its application to **evaluate the impact of the influencing factors (step 2 of the partner selection framework) on the steps one, three, four, and five**, as the impact of influencing factors is too vague to being expressed by other types of methods.

As for the Contingency Model-Based Decision-Making Matrix, the MCDM methods provide many useful and easy to use methods. The MCDM methods however have the advantage that they are more flexible and decision making is based on multiple criteria. MCDM is thus a highly effective, simple to implement, and fast way of rigorous decision making (I-SLR 2C: Chang et al., 2019, p. 13). Specific methods can be attributed to a particular category, which allows for a more fine-grained decision-making, leading to more targeted partner selection decisions. For the whole partner selection framework, the best combination of MCDM methods is suggested, which leads to a state-of-the-art decision-making structure for the partner selection within business ecosystems and is demonstrated by the following **Figure 94**.

Figure 94. The Combination of Quantitative Decision-Making Tools According to the Partner Selection Categories



Source: Author's representation

8.2.8 Business Ecosystem Partner Configuration Function

Based on the **RBV** and the **ROT** managers need to **structure, bundle, and leverage** a company's internal and external resources such as to achieve orchestration by efficient portfolio configuration (Sirmon et al., 2007, p. 277; Sirmon et al., 2011, p. 1390). The simulation of the business ecosystem configuration is important to select the right partners (Aagaard & Rezac, 2022 in Shen et al., 2024, p. 10) and involves the linking of key actors to each element of the resource orchestration process (Andersén & Ljungkvist, 2021, p. 155). This is consistent with Foss et al. (2023), who emphasize the need to focus on the establishment as well as the continued control of the partner configuration (pp. 2-3). The configuration of business ecosystem partners is of utmost importance as a failure or withdrawal of one single partner could weaken the entire business ecosystem (Lingens et al., 2022, p. 560). The initial business ecosystem configuration can be determined by a total payoff function. It is assumed that total payoff is the sum of determined and random components (I-SLR 2B: Heckman, 1978 in Gaonkar & Mele, 2023, p. 85). Based on the theoretical model of network formation as provided by Gaonkar and Mele (2023) **from SLR 2B from chapter INDUCTION** and their proposition to adopt this approach to other network types (p. 102), this investigation proposes a payoff function within business ecosystems to evaluate different partner compositions and to derive the marginal payoff for alternative companies i with a business ecosystem configuration g and the sum of evaluation criteria j, which is θ = (α_0, α_1, β, γ), given by the sum of net benefits of each link, as demonstrated by the following formula (p. 85):

$$U_i(\mathrm{g}\,;\,\theta) = \sum_{j=1}^{n} g_{ij} \left[\underbrace{\alpha_0}_{\text{cost}} + \underbrace{\underbrace{\alpha_1 \cdot sametype_{ij}}_{\text{homophily/heterophily}} + \underbrace{\beta \cdot pop_i}_{\text{popularity of i}} + \underbrace{\gamma \cdot common_{ij}}_{\text{common partners}}}_{\text{benefit}} \right]$$

The payoff is the arithmetic mean of all links of the orchestrator's evaluation criteria j with partner companies i and results from the costs and benefits generated by each link. Costs are represented by α_0 and benefits are the sum of homophily, popularity, and common partners. The evaluation criterion $sametype_{ij}$ equals one if there is a fit of evaluation criterion j among the partners i, and otherwise it is zero; while α_1 indicates the homophily of the partner, or how much it valuates homophily. The evaluation criterion pop_i indicates the number of relationships of partner i and can also be expressed as the partner's popularity. β indicates the respective value of the partner's relationships or popularity. The criterion $common_{ij}$ represents the number of shared partners among the orchestrator and the partners, so that γ indicates the value for each additional partner or the benefits resulting from having shared partners. The marginal payoff can then be calculated for each additional partner.

This **business ecosystem partner configuration method** can for instance be applied for a structured approximate estimation of network formation using Bayesian approach (Gaonkar & Mele, 2023, pp. 82, 101; Mele & Zhu, 2023, p. 114). Currently, this quantitative approach is computationally intensive, as especially the relationships among the elements are difficult to identify and represent quantitatively so that it is expected that faster computational methods could overcome this hurdle (Gaonkar & Mele, 2023, p. 101; Mele & Zhu, 2023, p. 120). In the near future, **artificial intelligence** is expected to provide a fast mean for a structured representation of variables and links (Scanagatta et al., 2019, p. 425).

8.3 Development of an Abductive Taxonomy

8.3.1 Classification, Typology and Taxonomy - Distinguishing the Terms

Taxonomies are acknowledged in research and management as supporting the analysis and understanding of complex phenomena by the classification of objects (Nickerson et al., 2013, p. 336). As the term is often used interchangeably with classification and typology, though they are not equivalent (Lambert, 2015, p. 53; Nickerson et al., 2013, p. 337), a clear distinction of the terms shall shed light on their respective characteristics.

Classification is defined as ordering elements into groups or classes based on their similarity, such as every group is internally as homogeneous as possible while being as distinct from one another as feasible. Classifications are particularly relevant for the investigation of organizational strategies consisting of dimensions in many different configurations (Bailey, 1994, p. 1; Hambrick, 1984, p. 27). Typology and taxonomy are two basic approaches to a classification and can like a classification refer to its process and its result (Bailey, 1994, p. 6; Smith, 2002, p. 381). A classification is based on conceptual or empirical data and can be unidimensional or multidimensional (Bailey, 1994, p. 1). The distinction between typology and taxonomy is important, because although they are both types of classifications, share similar characteristics, and are often used interchangeably, there are major differences among them (Bailey, 1994, p. 6).

A **typology** typically involves qualitative classifications and is entirely verbal and conceptual, without referring to empirical data (Bailey, 1994, p. 6; Hambrick, 1984, p. 28; Lambert, 2015, pp. 52–54). Complex concepts are simplified by categorizing objects according to a limited number of characteristics (Lambert, 2015, p. 52). Due to the influence of the researcher's interpretation capability of qualitative data, a typology might deviate from reality and should therefore be favored for descriptive than for explanatory purposes (Pinder & Moore, 1980 in Hambrick, 1984, p. 28). A typology is based on essentialism and due to its underlying specific purpose, it involves a small number of characteristics with a focus on the essence of the group, the monothetic groups, and hence provides a limited utility (Bailey, 1994 and McKelvey, 1982 in Lambert, 2015, pp. 51–53). Monothetic groups are characterized by containing cases being identical regarding all dimensions and variables measured (Bailey, 1994, p. 7). Within a typology, the reasoning is top-down, and hence deductive (Lambert, 2015, pp. 52–54).

A **taxonomy**, in turn, is based on empiricism and is characterized by a clear focus on systematic empirical observation based on numerical, quantitative data (Hambrick, 1984, p. 28) and results from the classification of generalized elements based on their complete observable characteristics forming polythetic groups of objects with the greatest number of shared characteristics instead of being identical on all variables (Bailey, 1994, p. 7; Lambert, 2015, pp. 52–53). The reasoning within a taxonomy is bottom-up and therefore inductive so that empirical data is grouped according to the overall similarity of the variables (Bailey, 1994, p. 7; Lambert, 2015, pp. 53–54). The research environment is typically exploratory, including as many variables as possible. While results are statistically valid, the result may not necessarily be useful from the researcher's point of view (Lambert, 2015, p. 53). A comparison of typology and taxonomy is illustrated in **Table 41**.

Table 41. Comparison of the Characteristics of a Typology and a Taxonomy

Typology	**Taxonomy**
The Product of Essentialist Philosophy	The Product of Empiricist Philosophy
Categories (types) are Conceptually Derived	Categories (taxa) are Empirically Derived
Few Characteristics Considered	Many Characteristics Considered
Top-Down Reasoning: Deduction	Bottom-Up Reasoning by Inference: Induction
Mostly Qualitative Classifications	Quantitative Classifications
Monothetic Groupings	Polythetic Groupings
Specific Classification	General Classification
Provides a Basis for only Limited Generalizations	Provides a Basis for Wider Generalization

Source: Author's representation, adapted from Lambert (2015, pp. 53–54)

8.3.2 Data Analysis: Abductive Taxonomy

Applied to this investigation, there is the dilemma that there is much to suggest that a classification should be carried out using a taxonomy, being able to uncover generalizations, as with the connection to observations the development of a testable, relevant, and valid theory is enabled (Lambert, 2015, p. 53; Eisenhardt, 1989b, p. 532 in Lambert, 2015, p. 53). A taxonomy, however, is characterized as relying on quantitative data and hence excluding the researcher's interpretative influence on the data, while this investigation is purely qualitative, relying on **constructivist-pragmatist research** (Nonhoff, 2011, p. 91).

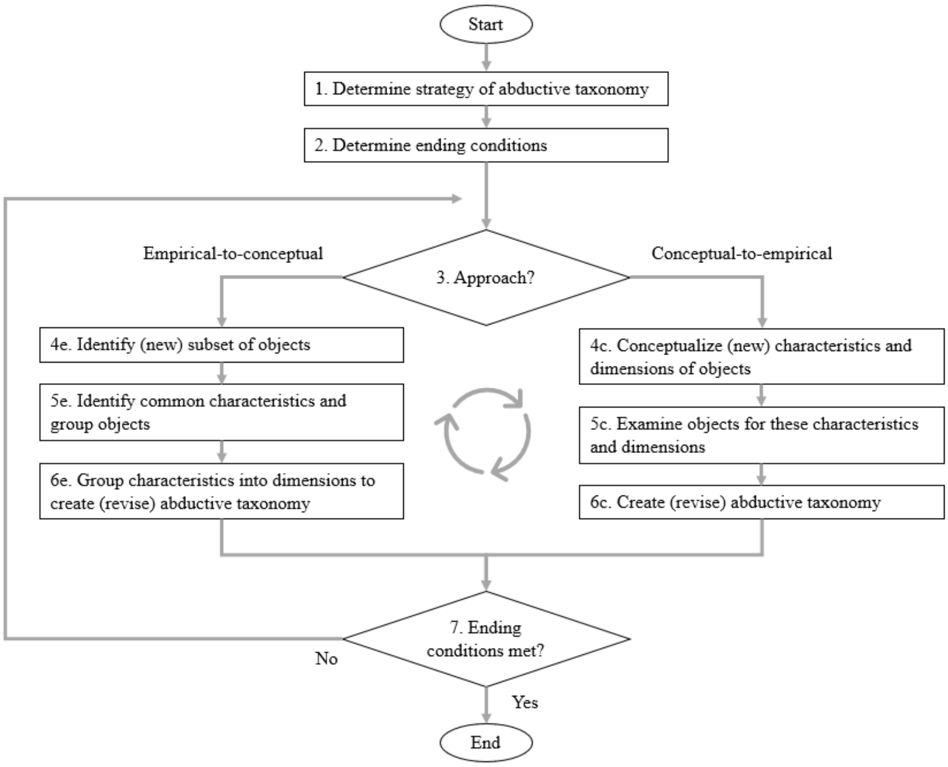
Much literature uses the term taxonomy to classify both, a typology, in which data is derived conceptually, and a taxonomy, in which data is derived empirically (Nickerson et al., 2013, p. 338). This investigation focuses on its core purpose, the pursuit of rigorous scientific research (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377; Sutton & Staw, 1995, p. 378) and therefore is clearly transparent on the use of definitions (Grodal et al., 2021, pp. 591–593). For this reason, this study employs the newly created term **Abductive Taxonomy** (Sinkovics, 2018, pp. 6-8; Minnameier, 2010, pp. 241-242; Nickersen et al., 2013, p. 336) for the combination of elements from a typology and a taxonomy, as the researcher is part of the investigation, which is based on conceptual and empirical data and iteratively combines abductive, deductive, and inductive elements (Timmermans & Tavory, 2012, p. 180). Minnameier (2017) uses a similar term of an inferential taxonomy, but for a taxonomy applied to the inferential triad of abduction, deduction, and induction (pp. 175-195) and not for the taxonomy being itself inferential. This study, in contrast, suggests that the taxonomy itself is inferential, as data is iteratively derived from theory and observations. While other articles rely on less precision using the term taxonomy when meaning both (Nickerson et al., 2013, p. 338), this study thus proposes the **Abductive Taxonomy**. To differentiate from the term used by Minnameier (2017, pp. 175-195), this study adopts the term abductive instead of inferential and provides the following definition:

Author's Definition

Abductive Taxonomy is the combination of a typology and a taxonomy relying on flexibly and inferentially gathered conceptual and empirical qualitative data.

The overall design of the process of the **Abductive Taxonomy** essentially follows the proposition made by Nickerson et al. (2013) and is illustrated in the following **Figure 95** (p. 345):

Figure 95. Development of an Abductive Taxonomy



Source: Author's representation, with major elements from Nickerson et al. (2013, p. 345)

The process includes a clear strategy for developing the **Abductive Taxonomy**, including the different dimensions and objects, the determination of ending conditions, such as conciseness, robustness, comprehensiveness, extendibility, and explanation about dimensions and objects (Nickerson et al., 2013, pp. 344–345). The approaches, empirical-to-conceptual and conceptual-to-empirical, can be either used iteratively (Nickerson et al., 2013, p. 345), such as to cycle between abduction, deduction, and induction, or from a concluding chapter, such as is the case of the INDUCTION part of this investigation, which involves the whole concluding knowledge based on the previous ABDUCTION and DEDUCTION parts. The process is iteratively repeated until the priorly defined ending conditions have been met (Nickerson et al., 2013, p. 346). The fusion of abduction and taxonomy thus perfectly fit due to their iterative character.

To the best of the author's knowledge, this is the first study providing a clear term, **Abductive Taxonomy**, for the combination of typology and taxonomy based on a qualitative research approach in which data is gathered iteratively in cycling between theory and observations. This newly created term is particularly helpful in avoiding confusion and provides a well-defined process of classification (Nickerson et al., 2013, p. 340). The **Abductive Taxonomy** based on the systematic partner selection framework in business ecosystems contains data from the INDUCTION chapter, which is generated based on the insights of the ABDUCTION and DEDUCTION chapters. Different categories are investigated regarding specific characteristics for digital-, innovation-, sustainability-, and circular-oriented characteristics. This **Abductive Taxonomy** is valuable, as it emphasizes again that boundaries among different business ecosystem types are blurring (Gupta, R. et al., 2019, p. 100). so that a look at various characteristics can help to define the perfect business ecosystem type; a major prerequisite for a targeted and successful partner selection. The results are illustrated in **Table 42**.

Table 42. Abductive Taxonomy

Category	Digital Business Ecosystem	Innovation Ecosystem	Sustainability Innovation Ecosystem	Circular Ecosystem
Time Pressure and Lack of Information (Strategic Expediency)	The lack of time and information effect can be to some extent moderated by a DBE, as "you can onboard faster and are more flexible. And you can simply act faster. Simply because data can be stacked more quickly if the interfaces fit" (D 2.146).			
Trust	Trust is an influencing factor as well, especially for the sharing of data and is therefore considered being particularly relevant for DBEs.			
Objectives and Selection Criteria	DBEs thriving for market access, power, and development for the scaling of sales of software products to gain new customers. Relevant **selection criteria** are for this objective are, apart from the strategic fit as the overarching selection criterion: innovative technology/skills/expertise, reputation, local knowledge, geographic proximity and availability, business relatedness, company size, prior relationships, trust, access to resources.			
Degree of Openness	There is often this not-invented-here-syndrome that has to be overcome, especially for DBEs.			Particularly relevant for circular-oriented business ecosystems to enable innovations.
				A closed system with a handful of carefully selected partners, supported with incentives and excluding competitors to advance its competitive position for plastic recycling.
Number of Actors				Circular-oriented business ecosystems focus on a small number of actors, but more intense interdependencies which are long-term oriented.
Trust	Trust is particularly relevant for DBEs with regard to data sharing, data generation and Artificial Intelligence (AI) interaction, as actors cannot be sure what will happen with their data.			
Long-Term Commitment and Sharing of Same Values			Regarding sustainability-oriented ecosystems, the commitment and shared vision further involves a real interest in sustainability and not green washing activities for reputation reasons, such as certificate trading for emission limits. Green washing can be definitely a criterion to avoid selecting a partner, even if all other criteria fit.	Regarding sustainability-oriented ecosystems, the commitment and shared vision further involves a real interest in sustainability and not green washing activities for reputation reasons, such as certificate trading for emission limits. Green washing can be definitely a criterion to avoid selecting a partner, even if all other criteria fit.
Complementarity		Innovativeness arises from the complementarity of the actors, especially within sustainability-and circular-oriented innovation. Complementarity refers to a heterogeneity of resources with a simultaneous accordance among partners referring to their goals and the sharing of the same values to achieve culture fit. It is of particular relevance for innovation activities in general and sustainability-oriented activities in particular: sustainability partners with a similar mindset and heterogeneous resources are selected, as the similarity of the partners increases the likelihood for collaboration. Complementarity is further particularly relevant for international business ecosystems in the biopharmaceutical industry. These are positively influenced by selecting partners with complementary resources and a willingness to share these resources.	Innovativeness arises from the complementarity of the actors, especially within sustainability-and circular-oriented innovation. Complementarity refers to a heterogeneity of resources with a simultaneous accordance among partners referring to their goals and the sharing of the same values to achieve culture fit. It is of particular relevance for innovation activities in general and sustainability-oriented activities in particular: sustainability partners with a similar mindset and heterogeneous resources are selected, as the similarity of the partners increases the likelihood for collaboration.	Innovativeness arises from the complementarity of the actors, especially within sustainability-and circular-oriented innovation.

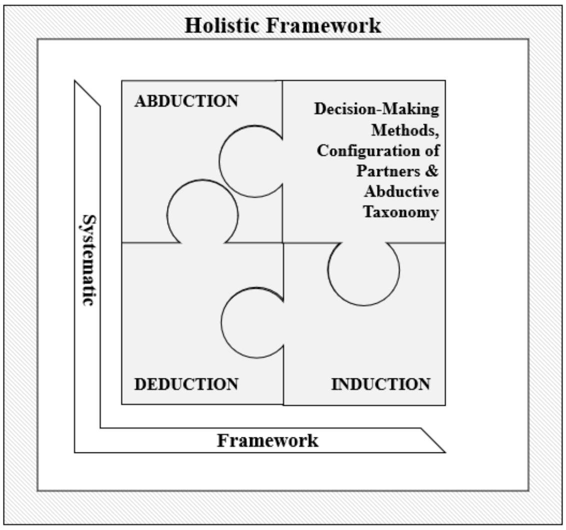
Category	Digital Business Ecosystem	Innovation Ecosystem	Sustainability Innovation Ecosystem	Circular Ecosystem
Players	Customers often serve as data sources to enable innovation in hardware or digital solutions. DBEs and especially platforms might further include competitors through coopetition, and data suppliers, such as credit agencies or self-generated data and other data suppliers who have valuable information from the industry.	Universities are important partners in innovation- and circular oriented business ecosystems, as they provide know-how on how to innovate and legislators and regulators are important for the creation of the legal requirements, or they can act as neutral orchestrators and have a social interest to solve a specific problem. Having the financial support from public authorities decreases risks, especially for small actors in innovation ecosystems. Public authorities might also provide financial support, which decreases risks especially for small companies and often determines if projects are pursued. This is of particular relevance to sustainability innovation ecosystems, in which financial support is essential for engagement in sustainable innovation due to significant upfront costs and high output uncertainty. Start-ups provide explorative know-how on innovation or sustainability topics. Customers often serve as data sources to enable innovation in hardware or digital solutions.	The European Union is very much engaged in and promotes circular economy programs. Public institutions support sustainability goals as well. Start-ups provide explorative know-how on innovation or sustainability topics. Non-Governmental Organizations (NGOs) are typically involved for Environmental, Social and Corporate Governance (ESG) topics. Suppliers are often part of sustainability-oriented business ecosystems and platforms. There are topics which can only successfully be achieved when competitors are included, as for instance in the mobility transition or sustainable mobility.	The collaboration of large companies with start-ups and universities is especially relevant for circular projects. Universities provide know-how on how to innovate for instance on circular economy and recycling. The European Union is very much engaged in and promotes circular economy programs. Non-Governmental Organizations (NGOs) are typically involved for Environmental, Social and Corporate Governance (ESG) topics.
Collaboration of Large Companies with Start-ups and Universities				The collaboration of large companies with start-ups and universities is especially relevant for circular projects. Universities provide know-how on how to innovate for instance on circular economy and recycling.
Financial Support from Public Authorities		Financial support from public authorities decreases risks, especially for small actors in innovation ecosystems.	This is of particular relevance to sustainability innovation ecosystems, in which financial support is essential for engagement in sustainable innovation due to significant upfront costs and high output uncertainty.	
Heterogeneity		Especially for innovation and sustainability-oriented business ecosystems, for instance in an exploratory environment, a wide variety of company types and sizes is necessary.	Especially for innovation and sustainability-oriented business ecosystems, for instance in an exploratory environment, a wide variety of company types and sizes is necessary.	
Roles				There are typically four roles in circular ecosystems: producer, consumer, scavenger and decomposer and typically do not involve large traditional companies, but rather start-ups, or other intrinsically motivated innovators. Compared to traditional business ecosystems, actors in circular ecosystems play unique roles with regard to the circularity of resources.
Financial Stability	The initial investment for creating a business ecosystem and especially of a DBE must not be underestimated; as well as the availability of manpower for the maintenance and development of a DBE or platform. There is thus a high correlation of financial stability with the company size.			
Location of Partners	The location of the partners is **not of relevance for DBEs.**			The location of the partners is relevant for partnerships that are subject to regional supply relationships, as it is clearly the case for circular ecosystems.
Speed to Market and Maturity of Partners		Speed, in turn is correlated with the maturity of the actors. When companies take the decision to collaborate with partners, it is because of a lack of capabilities or the need of a speed to market. This is particularly relevant when thriving for a first-mover-position, for instance for promoting sustainability innovations. In this case, it is necessary that the partner has some kind of maturity, and with this the capability to implement innovation.	Speed, in turn is correlated with the maturity of the actors. When companies take the decision to collaborate with partners, it is because of a lack of capabilities or the need of a speed to market. This is particularly relevant when thriving for a first-mover-position, for instance for promoting sustainability innovations. In this case, it is necessary that the partner has some kind of maturity, and with this the capability to implement innovation.	

Category	Digital Business Ecosystem	Innovation Ecosystem	Sustainability Innovation Ecosystem	Circular Ecosystem
Basic Digital Infrastructure		The focus for other types of business ecosystems than DBEs is not so much on digital innovation, but on a basic digital infrastructure enabling interfaces for communication and data sharing. If a company does not have its own digital infrastructure, it needs partners or platforms providing this digital infrastructure.	The focus for other types of business ecosystems than DBEs is not so much on digital innovation, but on a basic digital infrastructure enabling interfaces for communication and data sharing. If a company does not have its own digital infrastructure, it needs partners or platforms providing this digital infrastructure.	The focus for other types of business ecosystems than DBEs is not so much on digital innovation, but on a basic digital infrastructure enabling interfaces for communication and data sharing. If a company does not have its own digital infrastructure, it needs partners or platforms providing this digital infrastructure. . In circular ecosystems the interfaces are necessary for accessing the resources and capabilities for being able to implement circular objectives. Circular ecosystems need DBEs for the digital connection, for instance data is generated on CO2 savings.
First-Mover Strategy	The **first-mover-strategy** is particularly relevant for DBEs and platforms, but also for innovation- and sustainability-oriented business ecosystems.	The **first-mover-strategy** is particularly relevant for DBEs and platforms, but also for innovation- and sustainability-oriented business ecosystems.	The **first-mover-strategy** is particularly relevant for DBEs and platforms, but also for innovation- and sustainability-oriented business ecosystems.	
Coincidence-Strategy		The coincidence-strategy is pursued to remain up to date with innovations to different sides. For instance, companies use general business ecosystems, such as with universities to remain up to date regarding research, or with large partners.		In the circular environment companies are naturally surrounded by potential partners. Companies try to maintain close contact with decision-makers, such as renewable energy lobby associations, in order to stay up to date and enable getting in contact with other partners.
Partner Resource Pool	Large companies provide programs to attract a high scope of partners to a **partner resource pool**, such as the Siemens' Partner Ecosystem Program MindSphere for digital innovation, or Next47 for disruptive ideas. Partners joining the pool are incentivized by benefits, such as marketing, business, and financial support. This partner resource pool is particularly relevant for digital innovation.	Large companies provide programs to attract a high scope of partners to a **partner resource pool**, such as the Siemens' Partner Ecosystem Program MindSphere for digital innovation, or Next47 for disruptive ideas. Partners joining the pool are incentivized by benefits, such as marketing, business, and financial support. This partner resource pool is particularly relevant for digital innovation.		
Customer-Driven Strategy			The customer-driven strategy is a catalysator for sustainable innovations, which are sensitive to market recognition.	
Follower-Strategy	The follower-strategy is quite common for sustainability topics, where companies do not just want to bring innovations, but copy things and improving them instead of focusing solely on pure innovation, but it is also relevant for DBEs.		The follower-strategy is quite common for sustainability topics, where companies do not just want to bring innovations, but copy things and improving them instead of focusing solely on pure innovation, but it is also relevant for DBEs.	
Up-Selection Process	The networking effect involves integrating the whole supply chain for sustainability-oriented business ecosystems in order to create value as sustainability needs to be guaranteed throughout the whole value chain. Supply chains are further necessary to provide cost-effective and high-quality solutions. They are less relevant for DBEs.		The networking effect involves integrating the whole supply chain for sustainability-oriented business ecosystems in order to create value as sustainability needs to be guaranteed throughout the whole value chain. Supply chains are further necessary to provide cost-effective and high-quality solutions. They are less relevant for DBEs.	
Down-Selection Approach (Long-List)				This down-selection approach is particularly confirmed for circular ecosystems.

Source: Author's representation

The decision-making methods and configuration of partners as well as the **Abductive Taxonomy** further complete the systematic partner selection framework identified by the **Inferential Pattern Matching Framework** and lead to a holistic framework for systematic partner selection in business ecosystems. This is illustrated by the completed **Quadruple Puzzle of Holistic Research** in **Figure 96**.

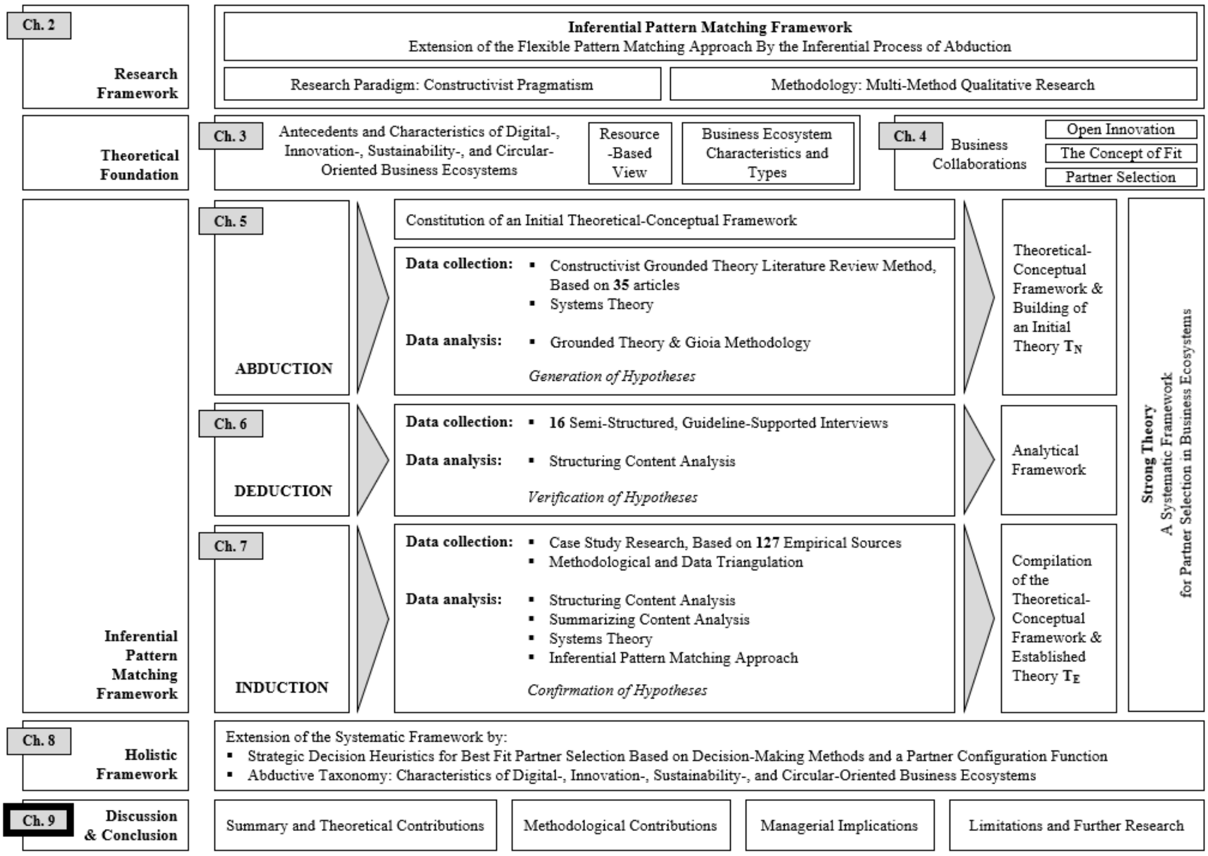
Figure 96. The Completed Quadruple Puzzle of Holistic Research



Source: Author's representation

Figure 97 illustrates the thesis structure leading to the final chapter.

Figure 97. Thesis Structure



Source: Author’s representation

"Strong studies are those which present interesting or framebreaking theories which meet the tests of good theory or concept development (e.g., parsimony, testability, logical coherence) and are grounded in convincing evidence."

Kathleen M. Eisenhardt

(Eisenhardt, 1989b, p. 549)

9 Discussion and Conclusion

9.1 Summary and Theoretical Contributions

In today's fast changing competitive environment shaped by emerging trends like digitalization, innovation, sustainability, and circularity, understanding the structures and dynamics of business ecosystems to systematically select partners is an important imperative for business ecosystem success (Basole et al., 2024, p. 1; Eisenhardt & Martin, 2000, p. 1111; Parida & Wincent, 2019, p. 14). Attempts exist to provide partner selection frameworks for instance for platform-based innovation ecosystems (Wei et al., 2020, p. 1) or software ecosystems (Beelen et al., 2022, p. 1), but this investigation revealed that business ecosystems are often more complex and the definitional boundaries are blurring, so that business ecosystems involve several different characteristics to be considered when selecting partners.

The overall aim of this doctoral thesis was to develop a holistic framework for systematic partner selection in digital-, innovation-, sustainability-, and circular-oriented business ecosystems: a systematic framework for partner selection that is fundamentally applicable to business ecosystems, including strategic decision heuristics for best fit partner selection based on decision-making methods and a partner configuration function were uncovered. Together with key topics relevant for specific business ecosystem types, such as digital-, innovation-, sustainability-, and circular-oriented business ecosystems, this study provided a holistic framework for partner selection in business ecosystems. Instead of studying single elements in isolation, this investigation provided a systematic and holistic framework to uncover the interrelationships of the different parts such as to achieve a full understanding of the topic (Teece, 2018a, p. 360). The aim was further to contribute to originality, theory, and practice (Stokes, 1997 and Corley & Gioia, 2011 in Nenonen et al., 2017, p. 1131).

Research approach: this study developed a generalizable systematic framework and strong theory in a first step and heuristic decision-making and partner configuration methods, as well as characteristics of different business ecosystem types to provide overall holisticness and best managerial applicability in a second step.

Based on a constructivist-pragmatist research paradigm (Nonhoff, 2011, p. 91), this study built a strong theory T_E for a systematic framework for partner selection in business ecosystems in the major part of this investigation in applying a novel rigorous scientific research method (Morse et al., 2002, p. 14; Prager et al., 2019, p. 377; Sutton & Staw, 1995, p. 378) proposed by this thesis: the **Inferential Pattern Matching Approach** - an extension of the flexible pattern matching approach by the inferential process of abduction (Sinkovics, 2018 in Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252; Minnameier, 2010, pp. 241-242; Linneberg & Korsgaard, 2019, p. 264; Timmermans & Tavory, 2012, pp. 179–180), which, together with the theoretical-conceptual and analytical frameworks formed the **Inferential Pattern Matching Framework**. Flexible and inferential pattern matchings among at least two of the types of reasoning, abduction, deduction, or induction are at the core of this innovative method, providing a strong theoretical foundation for qualitative research (Timmermans & Tavory, 2012, p. 180).

An initial pre-reading in the **ABDUCTION** chapter provided a first insight into the topic. The research question and the working hypotheses were iteratively redirected with emerging new insights throughout the investigation (Dewey, 1938, p. 142 in Casula et al., 2021, p. 1709; Tecuci et al., 2018, p. 10). Data collection based on Constructivist Grounded Theory Literature Review Method (Charmaz, 2006, p. 10; Wolfswinkel et al., 2013, p. 52) resulting in 35 articles and systems theory and data analysis with Grounded Theory and Gioia Methodology led to valuable insights on the macrostructure of the partner selection framework. An initial systematic framework for partner selection in business ecosystems was built based on a general partner selection process and an application-oriented process based on pathways resulting in 18 working hypotheses and an initial theory T_N.

The working hypotheses were verified in the **DEDUCTION** chapter by 16 semi-structured, guideline-supported interviews, which resulted in a redirection of the framework and working hypotheses (Dewey, 1938, p. 142 in Casula et al., 2021, p. 1709; Tecuci et al., 2018, p. 10) and the building of an analytical framework.

The **INDUCTION** chapter finally confirmed major parts of the systematic framework and hypotheses by the application of case study research. This case study research involved data collection based on 127 empirical sources grasped by methodological and data triangulation. The multiple different data were analyzed using structuring and summarizing content analysis, systems theory, and the **Inferential Pattern Matching Approach**. Together with the theoretical-conceptual and analytical frameworks this completed the **Inferential Pattern Matching Framework** and led to a state-of-the-art systematic partner selection framework for business ecosystems, which, together with the guidelines confirmed by the hypotheses built the **strong theory T_E** (Minnameier, 2010, pp. 241-242; Peirce, 1931-58 in Ormerod, 2024, p. 59; Sutton & Staw, 1995, p. 378) of this study, which can be summarized as follows:

Strong Theory (T_E)

A **systematic partner selection framework in business ecosystems** is based on six consecutive and interlocking steps: the corporate objectives (1), the framework conditions and influencing factors (2), the definition of business ecosystem objectives / strategy (3), partner identification and selection processes (4), and partner selection criteria (5) and involves the constant reevaluation of partner fit over the entire business ecosystem duration (6).

Even though each single chapter, ABDUCTION, DEDUCTION, and INDUCTION represents itself convincing evidence, the validity of the findings is further increased by the pattern matchings among at least two of these chapters, as the goal was to build a strong theory. Therefore, only the patterns validated among two of these chapters were included in the finally established theory T_E.

Apart from the strong theory, further insights generated by the investigation based on the **Inferential Pattern Matching Framework** were used to identify strategic decision heuristics for best fit partner selection based on decision-making methods and a partner configuration function. Further, an **Abductive Taxonomy** supported the identification of individual characteristics of digital-, innovation-, sustainability-, and circular-oriented business ecosystems. As these insights were generated by, but not completely based on the **Inferential Pattern Matching Approach**, they were presented in a further step. Overall, these insights lead to a holistic framework for systematic partner selection in business ecosystems.

The **strength of this investigation** lies in its simultaneous depth and breadth: a systematic framework is built, which is generalizable and applicable to all types of business ecosystems. Major decision-making methods are identified for different steps within the holistic partner selection framework as well as a partner configuration function to guarantee successful partner selection. Holisticness is achieved by the identification of specific characteristics according to different business ecosystem types based on an **Abductive Taxonomy**. This investigation therefore proposes several perspectives and interrelationships enabling deep insights into the topic. Instead of presenting a mere list of partner selection criteria, this study provides a **state-of-the-art holistic framework for systematic partner selection in digital-, innovation-, sustainability-, and circular-oriented business ecosystems**. The investigation further revealed the high importance of framework conditions and influencing factors as well as their interrelationships within the overall partner selection framework. It became further apparent in the study that the borders of definitions between companies for the different types of business ecosystems are not sharp. Often, different definitions are used for elements which mean the same. Further, business ecosystems do not follow mere digital, innovation, sustainability, or circular topics, but a mixture of these characteristics. The comparison of the definitions among the interviews in the DEDUCTION chapter supported this impression: the major challenge for the successful selection of partners is the frequent lack of clear definitions (Jacobides, 2022, pp. 109–110), among scholars and practitioners alike.

Method-fit: this study reveals that collaborations within business ecosystems are not just there but evolve gradually (Holmberg & Cummings, 2009, p. 168). Just like business ecosystems, a research study is evolving, as results from one study alone do not build a strong theory (Sutton & Staw, 1995, p. 378). It is rather the iterative cycling among results with new insights built on each other which leads to innovative results. This iterative character of both, the topic itself and the research method, confirms the suitability of the **Inferential Pattern Matching Approach and Framework** for this underinvestigated topic. In general, this innovative qualitative research method has proven to be the right approach, as many different terms with the same meaning can only be harmonized by an experienced researcher, who is integral part of the study and provides the direction for the investigation (Peirce CP 5.265, 1893 in Friedman, 1999, p. 731; Charmaz, 2006, p. 187; Sobh & Perry, 2006, p. 1198; Timmermans & Tavory, 2012, p. 179). The impressive results would not have been possible with a quantitative research approach.

9.2 Methodological Contributions

Methodological contributions are characterized by the introduction of methodological advances to address empirical challenges or the illustration of new analytical techniques (Goldfarb & King, 2016 and Certo et al., 2017 in Bergh et al., 2022, p. 1839). They provide additional extension to theory and knowledge (Bergh et al., 2022, p. 1839). Due to its innovativeness, the **Inferential Pattern Matching Approach and Framework** significantly contributes to the research landscape:

First, it is not bound to specific methods, so that it can be flexibly applied with a variety of methods and might even be applied in quantitative research (Sharfman & McManus, 2023, p. 374), though its core is in qualitative research (Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252; Sinkovics, 2018, pp. 6–8).

Second, due to the three different steps of pattern matching, this approach enables a deep and holistic investigation of the research topic to build a strong theory (Bergh et al., 2022, p. 1845; Sutton & Staw, 1995, p. 378).

Third, it provides a rigorous and structured tool, with a clear frame (Bergh et al., 2022, p. 1839) and which is thus transparent and easy to implement, as it combines a flexible pattern matching approach with an inferential process.

Fourth, due to its various underlying methods, it has a high explanatory power (Bergh et al., 2022, p. 1845).

Compared to existing approaches, its strength is that the research question is iteratively adapted according to each step of data collection and analysis (Jacobsson & Åkerström, 2013 and Nairn et al., 2005 in CohenMiller et al., 2020, p. 5; Dewey, 1938, p. 142 in Casula et al., 2021, p. 1709; Tecuci et al., 2018, p. 10) leading to a high research evidence, by simultaneously being based on flexible patterns instead of rigid structures. The real focus of the topic only becomes apparent in the course of the study, so that further patterns can then be specifically sought. This approach is therefore best suited for investigations thriving for depth and holisticness, especially for the discovering of novelties within complex phenomena.

The provision of a clear definition of an **Abductive Taxonomy** for the combined application of a typology and a taxonomy (Nickerson et al., 2013, pp. 338–345; Timmermans & Tavory, 2012, p. 180) further methodologically contributes to the study, as it provides more transparency to its scientific application.

9.3 Managerial Implications

This research makes several contributions to practice, resulting in six major managerial implications:

First, companies should systematically structure complex partner selection ventures within business ecosystems according to the identified categories and guidelines.

Second, the framework serves as a step-by-step instruction, being at the same time general enough to be applied to all business ecosystems and being simultaneously context-specific to give precise instructions according to digital-, innovation-, sustainability-, and circular-oriented characteristics.

Third, this partner selection framework is holistic and at the same time simple in its application, helping companies to take quick and targeted decisions.

Fourth, the application-oriented pathways identified from different corporate objectives give companies practical guidance on partner selection processes within frequently recurring objectives.

Fifth, this research is supported by practice-oriented decision-making methods. Managers obtain a simple, practice-, and context-oriented decision-making method per category or per category-groups within the selection process, helping them to simplify their partner selection decision by a state-of-the-art structuring of the different elements and hence providing more targeted partner selection decisions. The partner configuration supports managers to structure, bundle, and leverage a company's internal and external resources such as to achieve orchestration by efficient portfolio configuration (Sirmon et al., 2007, p. 277; Sirmon et al., 2011, p. 1390).

Sixth, several elements, though not strongly evidenced by the **Inferential Pattern Matching Approach,** but providing single evidence might be taken from this thesis for practical use cases.

9.4 Limitations and Further Research

This study contributes to the growing body of knowledge regarding business ecosystem research by providing a state-of-the-art holistic framework for systematic partner selection in digital-, innovation-, sustainability-, and circular-oriented business ecosystems. However, like any work, this study has limitations, which open opportunities for further research:

First, this framework could be applied to test different corporate objectives to identify more and deeper application-oriented pathways.

Second, as the last chapter is not completely based on the **Inferential Pattern Matching Approach**, further research could provide stronger evidence for the decision-making methods proposed for the different steps of the partner selection framework as well as the partner configuration function and the individual characteristics identified within the **Abductive Taxonomy**.

Third, this study advocates the application of the **Inferential Pattern Matching Approach** as a useful method for flexible and rigorous research (Bouncken, Qiu, Sinkovics, & Kürsten, 2021, p. 252; Sinkovics, 2018, pp. 6–8).

Fourth, this study inspires subsequent work to apply the **Abductive Taxonomy** to flexibly and inferentially combine elements from typology and taxonomy with a clear definition of the research method (Nickerson et al., 2013, pp. 338–345; Timmermans & Tavory, 2012, p. 180).

Fifth, future research could apply artificial intelligence methods for a structured representation of variables and links among the concepts (Scanagatta et al., 2019, p. 425). In future, software that can process large amounts of data could utilize an even larger database to confirm or challenge T_E (Minnameier, 2010, pp. 241-242; Peirce, 1931-58 in Ormerod, 2024, p. 59).

Declarations

Declaration of Partial Support

Chapter ABDUCTION was supported in parts by a second researcher. The researcher contributed to the co-development of the investigation of partner selection in digital business ecosystems by the use of a systematic literature review. The researcher contributed to the co-development of the definition of the inclusion and exclusion criteria for the data collection, and parts of the data analysis including the following: the main categories forming the partner selection approach, the operationalization of the partner selection process investigated by prior literature, as well as the first draft of a general partner selection process. Moreover, the researcher provided input on the first draft of the systematic partner selection framework.

Chapter DEDUCTION was supported by a second researcher, who conducted the interviews based on the author's guidance.

Declaration of Generative AI in Scientific Writing

During the preparation of this work the author used DeepL (https://www.deepl.com/de/translator) and Google Translator (https://translate.google.com/) to check the accuracy of the translations, Grammarly (https://grammarly.com/) to check the grammatical correctness, and QuillBot (https://quillbot.com/paraphrasing-tool) for the revision of formulations. After using these tools, the author reviewed and edited the content as needed and takes full responsibility for the content of this doctoral thesis.

This statement is based on the recommendations for scientific writing in the guide for authors provided by Science Direct (https://www.sciencedirect.com/journal/artificial-intelligence/publish/guide-for-authors).

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