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Ph.D. Management

Overcoming Absorptive Capacity Barriers:

**The Role of Innovation Intermediaries as Enablers and Beneficiaries of
Funded Collaboration Projects in the Digital Sector**

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This thesis is submitted for the degree Doctor of Philosophy

at Birkbeck, University of London

Department of Management

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Abstract

Background & Research Purpose

As innovation drivers and policy instruments, innovation intermediaries have an essential role in digitalisation. While the specific literature has a strong organisational focus, this thesis aims to explore their role within funded collaboration projects in digitalisation following a context-driven perspective. A focus on absorptive capacities extends the understanding by including a second, knowledge-transfer-related perspective. To gain a holistic understanding, it stresses the little-noticed benefits for intermediaries.

Methodology

To enable a contextual-driven analysis, the methodology consists of a comparative case study analysing project-based cases. The analysis of five funded collaboration projects enabled a practice-oriented investigation, founded on 27 interviews with intermediaries from five European countries and their clients. The obtained data was analysed through the developed absorptive capacity framework. The thematic and the project context built the two comparative key dimensions of this thesis.

Results

It became evident that intermediaries act at the very points where their clients lack absorptive capacities. Through the identification of absorptive capacity barriers, it was possible to outline obstacles their clients face during the projects. To solve them, intermediaries provide specific interactions. These can be assigned to five absorptive capacity components aligned with the outlined barriers. By considering the intermediaries perspective their occurring financial and non-financial benefits became apparent.

Contributions

The critical role of intermediaries in funded projects by far exceeds a mere mediating, supportive function. This thesis revealed the benefits but also the dependence of intermediaries on these projects. It was possible to outline requirements for their role in digitalisation and the powerful influence of the project context. This importance of contextual factors indicates the limitations of overarching approaches regarding the role of intermediaries. This thesis further demonstrated the substantial value of intermediaries to potential clients.

1. Introduction

Finding companies not affected by digitalisation is a difficult task these days. This wide-ranging topic offers enormous opportunities but poses significant challenges due to the entailed complexity (Bilgeri, Wortmann & Fleisch, 2017). Based on its broad scope, the requirements for business organisations widely differ but entail similar characteristics. An enormous level of complexity unites them, increasing the need for external support for various firms (Burchardt & Maisch, 2019).

Due to the global importance of the topic, major industrialised nations have developed different approaches and ecosystems to support their respective companies with the challenges of digital transformation and consequently strengthen their economies in the digital domain. Adapting general business practices is necessary to take a leading position in global competition and not lose out (Yang, Kim & Yim, 2019). In Europe, one important approach is promoting innovation, emphasised by the numerous funding opportunities in the EU to support companies in developing digital innovation (European Commission, 2023).

However, the innovation strategy is broader than financial resources to solve occurring digitalisation challenges. More than financial incentives are required since companies increasingly depend on external know-how to innovate. Therefore, companies receive direct support and supportive elements in the innovation ecosystem (Vidmar, 2019). These are essential, especially in the challenging digital innovation process.

To facilitate this process, a distinct group of organisations, innovation intermediaries, focus on supporting clients. For this reason, they have been and continue to be supported by innovation policies and act as an important fostering element. As a mediating link, innovation intermediaries connect different actors to enable innovation through direct or systemic

interventions (Howells, 2006; Dalziel, 2010; Vidmar, 2018; Kivimaa et al., 2019). In this role, they actively support innovation processes and are preferably active in fields characterised by change (Clarke & Ramirez, 2014; Parag & Janda, 2014; Gliedt, Hoicka & Jackson, 2018).

Existing studies focus primarily on intermediary organisations and their general role (Randhawa et al., 2017). Consequently, there are only a few insights into the role of intermediaries in digitalisation (Rossi et al., 2021).

These findings are particularly important because innovation policy, including the promotion of intermediaries, is being pushed particularly hard in this context and, in addition, support for innovation processes is increasingly needed in the face of the enormous challenges of the ongoing digitalisation (Yang, Kim & Yim, 2019).

Weighting the fact that digitisation is more the use of new technologies but a reaching transition, knowledge of innovation-promoting elements is of great importance. Knowledge is scarce about how intermediaries and their interactions behave in the face of this change, even though they are significantly changing the intermediaries' and their customers' structures due to digitalisation (Bäumle, Hirschmann & Feser, 2023).

Intermediation processes are usually rather complex procedures. Cooperation between intermediaries and their clients is mainly not bilateral but occurs in more complex relationships (Calamel et al., 2012; Cunningham & Ramlogan, 2012). Often this factor is underestimated, which justifies the need for more insights into the systemic actions of intermediaries (Kanda et al., 2020).

This thesis addresses the need for a more substantial knowledge base regarding the role of innovation intermediaries in digitalisation in a systemic way, considering the thematic as well as the project context during which cooperation takes place.

This research considers a second essential perspective by drawing on an absorptive capacity framework. It addresses the need for a more detailed understanding of intermediaries' roles to enable their clients to absorb external knowledge despite the lack of ostensibly necessary capacities (Spithoven, Clarysse & Knockaert, 2010; Alireza & Utz, 2020). To fulfil this objective, it outlines concrete absorptive capacity barriers to overcome by their clients within the scope of funded digitisation projects and the respective intermediary interactions to overcome them.

To allow a holistic view of the collaboration process, it further examines the little-noticed perspective of intermediaries' benefits occurring from these collaborations. A phenomenon which requires more attention, particularly in the researched funding context (Knockaert, Spithoven & Clarysse, 2014; Polzin, Flotow & Klerkx, 2016; De Silva, Howells & Meyer, 2018; De Silva et al., 2022).

A detailed qualitative analysis of funded collaborative projects involving intermediaries and their clients allows a detailed understanding of these objectives. Understanding how intermediaries support their clients is fundamental since it provides valuable insight for client organisations, innovation intermediaries, and policymakers regarding practice-oriented intermediation processes.

1.1 Research Focus

For the success of business organisations, innovation provides the critical component (Miozzo & Dewick, 2002). The core of the theoretical and practical innovation landscape is the essential foundation of competitive advantage, the innovation process (Phan, 2013). Despite this superior position and its undisputed importance for organisations, it is challenging to pin down and articulate (Bowen, Rostami & Steel, 2010). Due to its context-dependent, fast-changing and intangible nature, the innovation process constantly changes and involves many actors, different approaches, and influential factors (Rothwell, 1994; Tornatzky & Klein, 1982; Crossan & Apaydin, 2010; Sørensen, Mattsson & Sundbo, 2010). Thereby, innovation and change are two inseparable concepts. In the long run, companies depend on transforming their innovation processes, reacting appropriately, and adapting to their changing environment (Cooper, 1998; Van de Ven, Angle & Poole, 2000).

In many cases, the change companies face is based on technological progress, the primary source of innovation (Garcia & Calantone, 2002). Although the challenges that technological change brings to companies have traditionally always been great, its unique characteristic distinguishes the current digitally driven technological change from previous ones.

Inter alia, completely new possibilities arise for companies in the product, process, and service development. These not only hold a promising chance for new business models and related further industry development, but they also entail an enormous disruptive potential and catalyse the challenges of technological change (Madsen & Møller, 2017). Consequently, introducing emerging digital technologies offers many companies vast opportunities and considerable risks. Furthermore, organisations must not only meet the requirements of the physical world (e.g., hardware development, design and production). Integrating the digital world (e.g.,

digital services and data analysis) requires their full attention (Bilgeri, Wortmann & Fleisch, 2017).

Based on these challenges and the gaining importance of the ability to adapt to changes, it is increasingly difficult for companies to create the required capacities by themselves, wherefore the acquisition of external knowledge is essential for organisations to address this issue (Spender, 1993; Smedlund & Toivonen, 2007; Burchardt, & Maisch, 2019).

Consequently, more and more players have entered the market whose business model or goal is to support companies in the innovation process. Their primary ability is to link their specific knowledge to their clients' knowledge bases to create problem-solving, helpful services for their clients (Hipp, 1999). A distinct group of organisations that focus exclusively on supporting the innovation process of client organisations are innovation intermediaries (Shearmur, Dolo-reux, 2019).

Because of the broad and diverse groups of organisations referred to as innovation interme-diaries, they are difficult to delimit and categorise. As a result, the synonym innovat ion inter-mediary describes many different types of organisations and their interactions. Consequently, obtained findings are only transferable and generalisable to a limited extent (Dalziel, 2010).

This research only considers a specific type of innovation intermediaries to achieve a clear organisational demarcation. These organisations have their primary focus on supporting cli-ents in the innovation process and aim at connecting different parties to enable the innovation process. Usually, these intermediaries originate in direct regional or supranational funding programs (Kulicke, 2009).

These different types of funding form the starting point and finance the organisations' foun-dation and initial phase, which is why project funding is essential for their sustainable

existence. Therefore, they are mostly private or partly state-owned and often without a genuine profit motive but, at least in the long term, be self-supporting and mainly financed through government-supported funding projects (Meyer & Kearnes, 2013; Mignon & Kanda, 2018).

These projects, which are so important for the intermediaries, are made possible by the numerous national and supranational funding initiatives in Europe (European Commission, 2023). There are considerable differences depending on the funding body and the type of project. This applies not only to the thematic focus but also to the direct or indirect involvement of companies in the projects. Especially with regarding digitalisation, there are numerous possibilities that are essential for the financing of intermediaries.

Therefore, funded collaborative projects are an important component of innovation promotion and an essential interaction framework for innovation intermediaries. These time-limited projects with clearly defined framework conditions allow organisations to expand their toolbox of resources and knowledge in a targeted manner (Arrigo, 2012; Bogers, 2012; Vom Brocke & Lippe, 2015). Intermediaries play a crucial role in these projects. They often act as project managers, in a crucial position to solve the challenges for the participants and develop the projects (Krause-Jüttler, 2011). In this vein, they also have the critical role of helping raise innovation resources, which can be considered a key function in supporting firms (Polzin, Flo-tow & Klerkx, 2016).

Due to the increasing need for support services in the innovation process, innovation intermediaries are becoming increasingly critical in the innovation landscape (Dalziel, 2010). They grew into an essential player for addressing political and socially relevant issues and supporting companies in overcoming barriers and compensating asymmetries in the market. For this

reason, they have become a crucial policy instrument in innovation (Howard Partners, 2007; Klerkx & Leeuwis, 2009). These intermediaries are an active element in the innovation landscape and play a significant role when change takes place, where the challenges and opportunities, as well as the need for support services, are exceptionally high (Day & Schoemaker, 2000; Clarke & Ramirez, 2014; Parag & Janda, 2014; Gliedt, Hoicka & Jackson, 2018; Kivimaa et al., 2019).

In consequence, intermediaries play a central role in digital change (Gamidullaeva, 2018). Due to their importance in advancing digital transformation and their role as supporters of digital innovation processes, they form the focus of this thesis.

1.2 Research Gaps

In digitalisation, innovation intermediaries are important facilitators of change. As policy instruments, they are actively used and funded to drive the development of new technologies and accelerate change (Rossi et al., 2022). This thematic context in which intermediaries operate is of great importance to better understand their role, as their interactions are highly dependent on it (Backhaus, 2010; Iturrioz, Aragón & Narvaiza, 2015). Accordingly, it is essential to look at innovation intermediaries active in the field of digitalisation in order to explore how they can support clients in this specific field.

Thereby, it is critical to include the thematic context of digitalisation. A thematic field currently receiving a great deal of attention and whose importance will continue to grow. However, most of the existing research in digitalisation or entailed emerging technologies (e. g. IoT, Big Data, Blockchain) focuses on the underlying technological aspects, the engineering background, the use and implantation of these technologies. Only a small, albeit growing, part of

the literature is devoted to the dynamics of innovation and the associated research fields, that these new technologies bring with them (Arnold, Kiel & Voigt, 2016; Ardito et al., 2018; Ibarra, Ganzarain & Igartua, 2018; Ubinati et al., 2020). Despite their essential role, the increasing need for innovation support services, and their growing importance, more research is needed on the actions of intermediaries in the specific context of digital innovation (Rossi et al., 2021).

This thesis aims to answer three research questions that focus on the collaboration process between intermediaries and their clients in funded collaborative digitalisation projects, to get a clear understanding of the role of innovation intermediaries in digitalisation.

1.2.1 Influence of Contextual Factors on Absorptive Barriers

The literature needs to sufficiently consider the various requirements of the different digitalisation areas and the resulting consequences for the interactions of innovation intermediaries. This distinction is essential in practice, as digitalisation covers a large area. The challenges of the actors, depending on their field of activity, not only differ significantly from the challenges of analogue topics but from each other (Bilgeri, Wortmann & Fleisch, 2017; Khin & Ho, 2019; Matos & Godina, 2020; Della Valle & Oliver, 2021).

In general, the environment in which intermediaries operate is of great importance for their actions, as they are dependent on it to a large extent. This dependency applies not only to the thematic context but also to the system and network in which they interact (Cunningham & Ramlogan, 2012).

Most intermediary activities occur within complex cooperation networks and projects (Calmel et al., 2012). Therefore, the focus must go beyond the intermediating organisation to understand the complex interaction process of intermediaries with their clients. One factor

receiving only limited focus is the level at which the intermediaries operate. Intermediary interactions can be bilateral, network-wide, or include funder parties. In this course, the same intermediary interacts at different levels regarding the specific interaction context (Kanda et al., 2020). The respective project context in which the intermediaries operate determines this position and directly influences the intermediary's role and activities.

Consequently, combining thematic influencing factors with the project context needs clarification in the literature. It still needs to be sufficiently researched and considered, especially concerning digitalisation. Ultimately, it is unclear how and to what extent external factors such as the thematic and the project context influence the cooperation between intermediaries and their clients in digitalisation. This thesis aims to answer the following first research question, to fill this gap:

RQ1: What are firms' main absorptive barriers to funded collaborations projects in digital technologies, and how are they influenced by thematical and project contextual factors?

1.2.2 Intermediation to Compensate Missing Absorptive Capacity

The interaction process between innovation intermediaries and their clients addressed in this thesis entails more than just research gaps concerning external influencing factors. The collaboration process per se also needs to be researched more closely. When intermediaries interact with their clients to support them in the innovation process, including an external source from the client's perspective leads to an open innovation process between the two parties. Depending on the nature of this process, a transfer of knowledge and partly resources take place. The receiving organisation requires specific integrative capabilities to absorb and benefit from the externally aggregated knowledge (Tzabbar, Aharonson & Amburgey, 2013).

These capabilities are crucial regarding the success of inbound external sources to accelerate and enable innovation processes (Chesbrough, Vanhaverbeke & West, 2006, Enkel, Gassmann & Chesbrough, 2009). The mediating variable that describes the ability to benefit from external knowledge is called absorptive capacity - the availability of capabilities, including the knowledge to recognise, acquire, assimilate, transfer, and exploit externally gained knowledge (Cohen & Levinthal, 1990; Zahra & George, 2002; Todorova & Durisin, 2007). This long-established concept may seem surprising at first glance in combination with the interaction of innovation intermediaries. However, the specific role of intermediaries makes the concept of absorptive capacity in the context of innovation intermediaries target-oriented and highly revealing.

Following the original view, the participating parties in the open innovation, respectively, knowledge transfer process need to have sufficient absorptive capacities to absorb external knowledge to derive maximum benefit from these processes (Vanhaverbeke, Van de Vrande & Cloudt, 2008). Contrary to this assumption, there is evidence that innovation intermediaries can compensate for or build up missing capacities to enable knowledge and resource transfer, even though required absorptive capacities are internally absent (Spithoven, Clarysse & Knockaert, 2010; Katzy et al., 2013; Kokshagina, Masson & Bories, 2017).

Since this linkage between innovation intermediaries and the absorptive capacity of their clients was first identified in a study more than ten years ago, there is still no sufficient knowledge in the literature of how intermediaries support clients who lack absorptive capacities (Spithoven, Clarysse & Knockaert, 2010; Alireza & Utz, 2020). This know-how is fundamental, especially in digital contact, as companies in this field need help mastering the associated challenges on their own, which is why they are increasingly dependent on external input. In order to be successful in digital change, absorptive capacities are of decisive

importance (Siachou, Vrontis & Trichina, 2021). As an innovation policy tool, intermediaries focus on supporting collaborative innovation processes, which is why a better understanding of their actions is a crucial building block for refining their interaction regarding knowledge transfer and capacity building for innovation processes and to justify their importance in the innovation landscape (Vaghef & Dornberger, 2021).

In addition, the limited existing research linking the areas of innovation intermediaries and absorptive capacity is strongly related to the organisational level and less to a systemic perspective of the intermediary interactions (Karlsen, Lund & Steen, 2023). Furthermore, the influence of the thematic context on the presence and compensation of non-existent absorptive capacities needs consideration. However, several types of absorptive capacities are not fundamentally applicable to every type of knowledge (Schmidt, 2005; Lim, 2009). Exploring the collaboration process between innovation intermediaries and their clients in terms of absorptive capacities has two significant advantages. Firstly, this concept from the field of knowledge transfer provides a framework that allows the division of the process into different, crucial areas necessary to enable visibility and understanding of this elusive process. Secondly, it provides an insight into the functioning of intermediaries, which aim to support companies with insufficient capacities and collaborative endeavours that are only possible with their involvement (Howard Partners, 2007; Kivimaa et al., 2019).

The second research question aims to gain further insights into the link between innovation intermediaries and the absorptive capacities of their clients:

RQ 2: How can innovation intermediaries compensate for missing internal absorptive capacities of collaborative organisations to process external knowledge?

1.2.3. Specific Benefits Intermediary

However, in the context of these two research questions, the question also arises regarding how the intermediaries can benefit within the collaborative innovation processes and projects framework. Since most intermediaries are not directly or only partially financed by the state, it is essential to consider how intermediaries can mobilise resources for themselves and further develop their services and knowledge base (Polzin, Flotow & Klerkx, 2016; De Silva, Howells & Meyer, 2018). Thereby, it needs more than a pure understanding regarding the generation of financial resources. Based on their knowledge-intensive interactions in rapidly changing thematic fields, intermediaries must continuously expand and further develop their capabilities (Lopez & Vanhaverbeke, 2009; Polzin, Flotow & Klerkx, 2016; De Silva, Howells & Meyer, 2018).

This perspective is not prominent in previous research, and the focus has been mainly on value creation for their client organisations rather than for themselves (Knockaert & Spithoven, 2016, De Silva, Howells & Meyer, 2018). Only if the research on the collaboration process considers a two-way flow of knowledge and resources is it possible to understand how intermediaries can develop themselves and survive in the long term (De Silva et al., 2022). At this stage, however, little is known about how intermediaries that depend on substantial funding indirectly through projects benefit from it (Knockaert, Spithoven & Clarysse, 2014. De Silva et al., 2022). In particular, the aspect of value creation between the intermediaries has been neglected, which is of great importance for understanding how they influence each other and what impact this has on their respective innovation systems (Inkinen & Suorsa, 2010, De Silva, Howells & Meyer, 2018). By answering the following third research question, this thesis aims to fulfil this gap regarding the value creation of intermediaries:

RQ3: How can innovation intermediaries benefit themselves from their interactions in collaborative projects?

By answering these three outline research questions, this thesis aims to generate a holistic understanding of the collaboration process between intermediaries and their clients in the context of digital innovation.

1.3 Knowledge Contribution

This research follows a comparative case study methodology based on the analysis and comparison of different funded innovation projects in which innovation intermediaries are involved to enable the aimed level of understanding.

The innovation intermediaries considered in this research are primarily self-financing through implementing funded projects. In addition to the actual project results, they provide themselves and their clients with the resources needed for the innovation process, which is a key function in supporting firms. However, compared to other core functions of intermediaries, such as inter-organisational network spanning or knowledge-based support, this interaction needs to be more well-researched to understand the practical, economic context of the research innovation supporting interactions (Polzin, Flotow & Klerkx, 2016). This factor is significant in challenging contexts, where intermediaries play a particularly complex role that forms the basis for engaging, mobilising, and mediating various stakeholders (Rosca et al., 2022).

For this reason, the analysis includes cases of funded innovation projects in digitalisation in which intermediaries participate in various forms. Thus, practically relevant data was analysed and compared in the form of a comparative case study which enables the detailed research of the unit of analysis, funded digitalisation projects with intermediary involvement. This

methodological framework allows to answer the three research questions to fill the gaps outlined and fulfil this thesis’s primary research objective.

The cases were researched using a step-by-step developed conceptual framework to guarantee a reliable and valid analysis. The conceptual framework founds on the concept of absorptive capacity. It forms the basis for making the interaction process between intermediaries and their clients more visible and dividing it into different components covering all parts of the process. This framework forms the basis for all three research questions to fully understand and capture the collaboration process in the context of the projects analysed. Figure 1 illustrates the research approach based on the three outlined research questions. In order fulfil the main research aim, the need to be answered and linked to get a holistic understanding regarding the innovation intermediaries in the digital context.

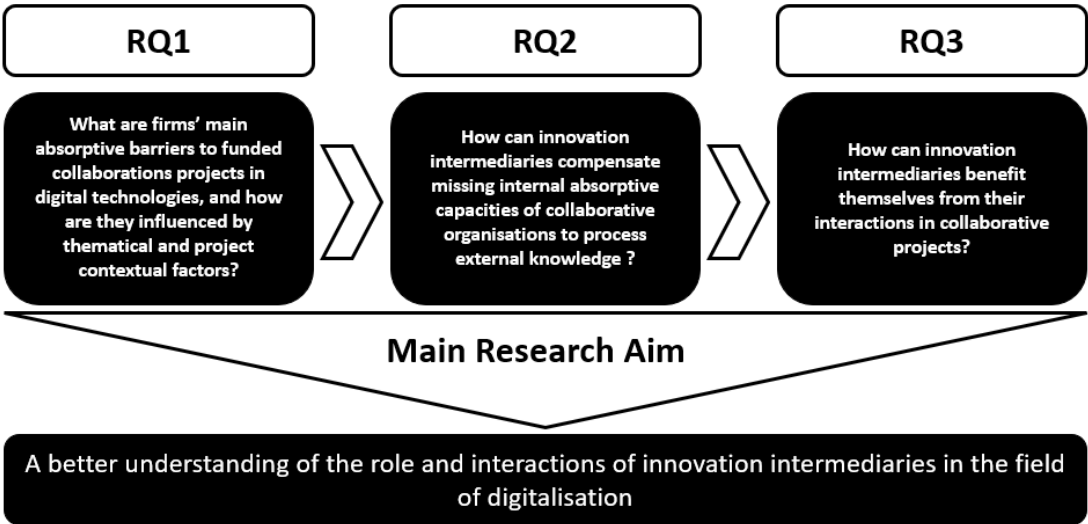


Figure 1: Overview Research Questions and Main Research Aim

Based on the chosen comparative case study, it was possible to develop detailed insights regarding the role of innovation intermediaries in digital innovation processes.

This thesis goes beyond existing literature by clearly focusing on the thematic area of digitalisation and the influence of the different directions in this broad area. This focus is of enormous importance, as digitisation can be seen as a technology in its own right and as a driver of several, far-reaching change processes such as sustainable transition (Bauer, Stevens & Hazeleger, 2021). Due to this complexity, companies are struggling to find the right partners and solutions to achieve their goals. This increased need for the support forms the basis and shows intermediaries' relevance as essential to digital innovation policies. From a public perspective, it is vital to understand the contribution of intermediation processes, as a significant amount of public funding goes into their creation and development. To make the best use of this funding, it is important to understand how the framework conditions in which intermediaries interact can and must be improved (Rosca et al., 2022).

To include the practical dimension, the influence of the project context is weighted as a further decisive factor to conclude the extent to which these two determinants influence the interaction process and the barriers to funded innovation projects.

The type of intermediaries explored in this paper will be delineated and defined to gain meaningful insights. This demarcation is essential as intermediaries cover such a broad spectrum, and a clear focus on a specific group of intermediaries is the only way to gain a clear understanding which allows the drawing of conclusions regarding their role, their mode of operation and their requirements (Klerkx & Lewis, 2008; Mignon & Kanda, 2018).

In contrast to most existing studies, this research thus goes beyond the organisational focus on the intermediary itself. Through this systemic approach, it is possible to outline the relationships and roles of individual actors and gain insights that allow an understanding of intermediary processes. Consequently, this approach enables the generation of added value to

most existing studies in the field of innovation intermediaries (Cunningham & Ramlogan, 2012; Stuck, Broekel, Revilla Diez, 2016; Randhawa et al., 2017).

This research links the two topics of innovation intermediaries and absorptive capacity to gain a detailed insight into the specific interaction process between intermediaries and their clients in addition to the external influencing factors. This linkage results in a conceptual framework that allows the division of the knowledge exchange between the two parties in a structured way and the illumination of the individual sub-aspects. As a result, it is possible to outline the specific interactions with which intermediaries compensate for the missing capacities of their clients.

In addition, this thesis highlights the added value that these interactions and collaborative projects offer for intermediaries. It provides recognitions into how intermediaries benefit financially and non-financially from collaborative projects, a thematic focus of many intermediaries, to enable their long-term existence.

This thesis fulfils the research gaps outlined in the academic framework by making these significant contributions. The findings of this research also have high practical relevance. First, they offer valuable insights for existing innovation intermediaries in their dealings with their clients, such as the barriers they face for digitalisation projects and the factors that determine them. These barriers are particularly relevant for companies to advance digitalisation (Görzig et al., 2017).

Second, it allows conclusions regarding the targeted service provision towards their clients.

Third, this research provides insights regarding the use of intermediary services. In this context, the concrete services intermediaries perform as part of economic and innovation

promotion are outlined, an important question that can only be answered by a clear operationalised description of their tasks and interactions (zu Köcker, Schneider & Grieb, 2017).

In addition, the research results are of considerable relevance for policymakers, as they have a direct link to the intermediaries and use them as a tool to advance issues such as digital transformation. These insights are important because they highlight to what extent intermediaries are necessary as a policy tool and what lessons result from their interactions with the funding frameworks (D'Oca et al., 2018). This is valuable knowledge, especially in the digital context, as innovation and intermediaries occupy a critical supporting element due to the prevailing policy structure (Yang, Kim & Yim, 2019). For this reason, intermediation in the context of innovation and digitisation is also at the core of numerous debates. As an interface between different stakeholders from business, science and politics, the role of intermediary as an innovation tool is important for each of these groups. Scientific evidence is scarce on the role of intermediaries for open-ended change and its implications for targeted innovation and transition policies (Bäumle, Hirschmann & Feser, 2023).

Consequently, the findings of this work reveal needs in the intermediary process and difficulties that are very helpful for the strategic implementation of support organisations in the innovation process.

1.4 Research Structure

The thesis consists of a total of nine chapters. The literature review contained in chapter two forms the first half of the theoretical basis for this study and contains two focus areas. The first part of the literature introduces and defines the research focus of this thesis, innovation intermediaries. This section highlights their specific characteristics and the innovation context

in which they interact. Further, it sharpens the picture of innovation intermediaries by outlining specific intermediary activities and delineating the group of innovation intermediaries dealt with in this research.

The second part of the literature review presents the context in which the researched intermediaries operate. This includes the role of intermediaries in funded collaboration projects and their role in the context of technological and digital change. Thereby, the main focus is on the challenges and opportunities of the respective topics and their unique characteristics.

Chapter three presents the step-by-step development of the conceptual framework on absorptive capacity. The underlying concept of absorptive capacity is the second theoretical part of the theoretical basis for this thesis. Through a detailed discussion and illustration of the concept, it transits into the applied conceptual absorptive capacity framework by introducing the core concept, its components, and antecedents in the transfer of external knowledge. Further, it outlines the connection between absorptive capacity and open innovation and the specific position of innovation intermediaries concerning this process. This dedicated link forms the basis for the framework's focus, the linkage between absorptive capacity and innovation intermediaries.

Chapter four includes the methodology of this thesis. It presents the methodological framework of this research and the respective points included. Further, it details the chosen research approach and purpose based on the presented research philosophy. The core of the methodology chapter is the highlighted research strategy, in which the selection of the chosen research methodology, the comparative case study research, is justified and presented in detail.

Closely linked to the methodology, chapter five describes the data basis of this research. This chapter includes the case selection strategy and the data collection approach. In addition, it sets out the data interpretation to guarantee its traceability.

Three chapters that align with the three research questions outline this thesis's findings. Chapter six highlights findings regarding upcoming absorptive capacity barriers for organisations to involve in funded collaboration projects. The developed conceptual framework structures these findings are structured through the developed conceptual framework. A particular focus is on the influence of the thematic and project context on upcoming barriers.

Chapter seven outlines the obtained results concerning the enabling interactions of innovation intermediaries to enable their clients to overcome the outlined barriers. The absorptive capacity framework is applied to outline the concrete interactions addressing the respective barriers precisely.

Chapter eight emphasises the findings regarding the third research question, the benefits for the intermediaries entailed in funded collaboration projects. Particularly it points out the direct influence of the thematic and project context and a holistic perspective, including financial and non-financial benefits.

Chapter nine discusses the collected findings and presents the derived conclusions. At first, a summary of the research gaps and the research aim is presented, followed by a discussion of the main findings. Finally, it outlines the theoretical and practical contributions, the limitations of this thesis, areas for further research and a conclusion.

2. Literature Review Innovation Intermediaries

The Literature review introduces the underlying theoretical perspectives on innovation, innovation intermediaries and the researched context in which they interact. The core of this research, innovation intermediaries, is briefly introduced and explained in the first part of the literature review. This introduction is accompanied by an outline and clarification of the core concept of innovation. Further, the specific activities of innovation intermediaries are outlined to provide a clearer picture of innovation intermediaries and their interactions. In order to further sharpen the field of innovation intermediaries dealt with within this research, intermediaries are delimited by further organisational factors.

The second part outlines the vital context of the intermediaries' intermediation activities. This context entails the project and the thematic context in which the intermediaries interact. The project context focuses on funded collaboration projects, the role of the intermediaries and their business model, and the thematic context highlighting the role of intermediaries in technological change, the specific characteristic of digital change and entailed challenges for intermediaries and their clients.

2.1 Research Focus Innovation Intermediaries

Innovation intermediaries form an independent, overarching class of organisations, including a broad range of enterprises that support firms in innovation (Dalziel, 2010). A major contribution to this understanding was made by Howells (2006) in providing an extensive review of this line of business and providing the first widely accepted definition of innovation intermediaries (Howells, 2006). By interpreting innovation intermediaries as their own line of business, the attention regarding the topic increased. Consequently, since this early contribution, the

research on this type of organisation has significantly strengthened and caused an evolvement of the understanding regarding innovation intermediaries.

The perception that intermediaries are independent actors in the economic environment is significant for various reasons. On the one hand, although they are an essential innovation policy instrument, these organisations need to be more noticed or included in studies and reports based on the lack of clear designation, which makes it very difficult, especially for policymakers, to quantify their importance and influence. On the other hand, it is only possible to produce a meaningful theory on the topic and thus clarify questions and problems in which intermediaries play a decisive role through a clear demarcation (Dalziel, 2010). Appendix 1 contains further background information on innovation policy.

Primarily the aim of supporting the innovation process of other parties is the critical characteristic of innovation intermediaries (Howard Partners, 2007). By maintaining this key feature, Dalziel (2010) expanded the term by considering the complexity and variety of intermediaries (Dalziel, 2010). Vidmar (2018) followed this understanding by providing a more comprehensive and detailed definition (Vidmar, 2018). Kivimaa et al. (2019) provide a valuable addition to this definition of the organisational form of innovation intermediaries with their definition of so-called transition intermediaries (Kivimaa et al., 2019). This particular type of intermediary relates to the field of sustainable transition. However, its focus on fundamental change processes overlaps with digital transformation, which is examined in this thesis and characterised by fundamental change processes. The following table provides an overview of the four definitions presented.

Definition Intermediaries	Source
<p><i>“An organization or body that acts as an agent or broker in any aspect of the innovation process between two or more parties.”</i></p>	<p><i>Howells, 2006, p. 6</i></p>
<p><i>“Organizations or groups within organizations that work to enable innovation, either directly by enabling the innovativeness of one or more firms, or indirectly by enhancing the innovative capacity of regions, nations, or sectors.”</i></p>	<p><i>Dalziel, 2010, p. 3</i></p>
<p><i>“An innovation intermediary is an organisation or a group within an organisation, whose main objective is to carry out interventions enabling innovation, either directly by enabling the innovativeness of one or more firms, or indirectly by enhancing the innovative capacity of regions, nations, or sectors.”</i></p>	<p><i>Vidmar, 2018, p. 5</i></p>
<p><i>“Actors and platforms that positively influence sustainability transition processes by linking actors and activities, and their related skills and resources, or by connecting transition visions and demands of networks of actors with existing regimes in order to create momentum for socio-technical system change, to create new collaborations within and across niche technologies, ideas and markets, and to disrupt dominant unsustainable socio-technical configurations.”</i></p>	<p><i>Kivimaa et al., 2019, p. 10</i></p>

Table 1: Definition Innovation Intermediaries

In order to take into account the crucial intermediate position between the most relevant interest groups of government, business and science, the following definition of innovation intermediaries is the foundation for this thesis: *an organisation or a group within an organisation whose main objective, as a mediating link between public authorities, business organisations and the scientific field, is to carry out innovation-enabling interventions, either directly by enhancing the innovativeness of one or more organisations or indirectly by enhancing the innovative capacity of a system or region.*

By this definition, based on Dalziel (2010), Vidmar (2018) and Kivimaa et al. (2019), the innovation-promoting nature of innovation intermediaries is strongly considered. Further, it highlights their most important function, the connection of different parties who, without

intermediation, would have difficulties establishing productive cooperation and a targeted transfer of resources (Dalziel, 2010; Vidmar, 2018; Kivimaa et al., 2019).

This understanding coincides seamlessly with the consistent opinion that intermediaries occur when different actors have difficulties interacting directly. At this point, they appear and help bridge financial, cultural, capacity or knowledge gaps to enable the different actors to work together (Kivimaa et al., 2019). Even though this delineation reduces the number of organisations, this work follows the view that a clear, narrow delimitation is needed. Only then is it possible to create a detailed understanding of the functioning of the organisations under study.

The different intermediary functions have very different requirements regarding the organisations performing them, how they are performed, and their financing background. This dispersion is mainly due to the intangible nature of the activity and the combination of private and public interest in the different interventions (Klerkx & Lewis, 2008). Especially in the previously defined role as a link between the state and the economy and in their role as a policy instrument, a precise understanding of what intermediaries can do and which findings regarding their interactions can be generalised is of particular importance (Mignon & Kanda, 2018).

In the context of this broad role of innovation intermediaries, they widely differ in their function to enable innovation. In order to support firms in the creation of innovation, intermediaries mainly address and resolve market asymmetries and compensate for the missing knowledge and capabilities of their client firms (Howard Partners, 2007).

2.1.1 Characteristic Innovation Process

To fully understand this primary function of intermediaries, it is necessary to generate a clear view of the innovation processes they support. The innovation process is an essential building block of this thesis and entails several ambiguities due to its specific characteristics.

Despite the agreement on the importance of innovation for organisations in general, there is a lack of consensus in the innovation literature regarding the interpretation and definition of the term innovation itself (Bowen, Rostami & Steel, 2010). Considering the context-dependent, fast-changing, intangible and complex nature of the innovation process, this situation is not remarkable. Instead, it is a logical consequence of innovation's development and continuous change and its related research (Rothwell, 1994; Tornatzky & Klein, 1982; Crossan & Apaydin, 2010). However, this should not lead to the understanding that there is no need for a consistent definition of innovation - the contrary is given. Managerial and theoretical implications depend highly on the perspective from which innovation is examined (Eveleens, 2010).

The innovation process encompasses a wide range of activities, and understanding has evolved considerably. The fundamental idea of innovation, the striving for improvement and the tendency to rethink things and processes is an inherent human ability, wherefore the innovation phenomenon is not new (Fagerberg, 2004). The abstract nature of innovation makes it difficult to grasp the concept, and incredibly initial attempts to define it contained several weaknesses, such as the almost complete lack of analysis of the innovation process itself and the lack of distinction between change and innovation (Godin, 2008; Hansen & Wakonen, 1997). The latter distinction is important as the concepts of innovation, and change are close.

However, innovation always causes change, and change is not always innovation (Van de Ven, Angle & Poole, 2000).

Timely innovation definitions overlap in the core of the meaning and differ in the focus of the definition. Thereby the definitions can be grouped by this focus. Building upon the first definitions of innovation, a broad group interpreted newness as the core concept of innovation.

According to this logic, innovation is defined as a: "*New product or service, new process technology, new organisation structure or administrative systems, or new plans or programs pertaining to organisation members*" (Damanpour, 1996, p. 694). Undoubtedly, the developing of something new is an indispensable part of innovation. However, more than this characteristic is needed to address the whole meaning of innovation. By adding the aim of innovation, understanding the term is more significant, and the distinction to other terminologies is sharpened. Therefore, West & Anderson (1996) describe innovation as the effective application of products and processes which are new to organisations and are intended to benefit them and their stakeholders (West & Anderson, 1996).

In contrast, Crossan and Apaydin (2010) present a broader definition which includes novelty but does not limit the character of innovation to this feature: "*production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargements of products, services, and markets; development of new methods of production; and establishment of new management systems. It is both a process and an outcome*" (Crossan & Apaydin, 2010, p. 2).

Although this definition is concise and excessive, it provides the most precise and comprehensive explanation of innovation. The complex and so challenging delineated nature of the innovation process forms the core of this research. Based on its complexity, innovation is a

strategic endeavour involving diverse processes, including many actors, approaches, and influential factors (Sørensen, Mattsson & Sundbo, 2010).

Above all, this understanding that innovation has a vast spectrum, is very variable, and entails a complex character that can take on very different forms is fundamental for understanding the perspective subsequent innovation research takes. Based on this fundamental understanding that innovation, while intangible, is critical to the success of any business organisation, this thesis strongly follows the view that innovation, and consequently its support and promotion, must contain and focus on both the process and the outcome. Even though this introductory definition of innovation may seem abstract, it is nevertheless an essential basis for understanding the work and, above all, the highly challenging and rapidly changing environment in which innovation intermediaries operate. In order to fulfil their primary task, innovation support, it is essential to understand why innovation is such a challenging but worthwhile subject area. However, to leave this high level of abstraction and understand the practical problems intermediaries and their clients are confronted with, the more specific problems and opportunities for innovation in the field of digitalisation are discussed, building on this basic understanding.

2.1.2 Specific Intermediary Activities

Despite the efforts to define innovation intermediaries as a distinct, clearly delineated category of business organisations, there is, accompanying the fundamental discussion on innovation, no consensus in the literature on how precisely these actors are delimited, identified, and categorised. Finding a line that distinguishes a regular business interaction from

intermediation is challenging. This ambiguity leads to intermediation taking a broad spectrum from formal to self-defined to partially hidden informal forms (Kivimaa et al., 2019).

Due to the lack of this precise demarcation line, investigation based on activities included many organisations of different types (e.g., consultants, municipal institutions, architects, university institutions, platforms, and innovation centres). This broad perspective prevents the definition of intermediaries in retrospect based on their type of organisation (Kant & Kanda, 2019). Moreover, such findings on intermediaries are hard to transfer and generalise, as the differences between this vast spectrum of organisations must be addressed. Although the exact synonym knows them, these very different organisations have different motivations, priorities, funding backgrounds and, consequently, different capabilities that enable them to interact (Hodson & Marvin, 2010). Because of this difficulty, there is a broad consensus in the literature that it is more beneficial to define intermediaries in terms of their functions and activities rather than their organisational form (Moss, 2009; Vidmar, 2018).

However, there is a wide variety of existing grouping approaches that may differ well - for example, Vanhaverbeke and Lopez (2009) group innovation intermediaries into three function-based categories. The first group includes intermediaries who focus on connecting activities and includes gatekeepers and knowledge brokers. The second category maintains organisations that provide collaboration and support services. The last group represent innovation intermediaries focussed on technical services (Lopez & Vanhaverbeke, 2009).

Agogué et al. (2017) also differentiate three different classes of intermediaries based on their primary function. Intermediaries for problem-solving support companies lacking special skills or knowledge during a particular problem or developing an innovation. They can connect the firm with external experts or provide their knowledge. Organisations that act as a broker for

technology transfer are focused on commercialising technological developments. The third category of innovation intermediaries acts inside an innovation system and supports networking, bridges actors, builds objectives and recruits new organisations for the system (Agogué et al., 2017).

Dalziel (2010) even summarises the activities of innovation intermediaries in two main functions: inter-organisational network activities and activities related to technology development. The remaining activities are only peripheral phenomena summarised in other activities, e.g., training activities, provision of space, and marketing activities (Dalziel, 2010).

However, these classifications' characteristics need to be expanded to map innovation intermediaries' functions adequately. Therefore, Kilelu et al. (2011) provide a more detailed overview of the leading innovation intermediary functions - demand articulation/stimulation, network brokering, knowledge brokering, innovation process management, capacity building and institutional building (Kilelu et al. 2011). Although this overview is criticised based on neglecting the intermediaries' interventions and its incompleteness based on its linkage to Howells' (2006) basic research, it provides a comprehensible and sufficient overview of intermediary functions (Vidmar, 2018).

Based on a literature review of the functions performed by intermediaries, the following table provides a summary of the essential functions. The four basic categories build a classification within this work's framework to obtain a subdivision of the individual functions and are mostly consistent with the findings of relevant papers. Due to possible redundancies, similar or identical functions were named only once with the respective author. Thus, this list only claims to be a partial presentation of all sources related to intermediary functions but rather an overview of the most relevant ones.

Category	Function	Source
Research	Demand articulation	Klerkx & Leeuwis, 2009
	Foresight and Diagnostics	Howells,2006
	Market formation	Kanda et al., 2019
	Scanning and information Processing	Howells, 2006
Interorganisational	Gatekeeping and brokering	Howells,2006
	Middlemen	Lopez & Vanhaverbeke, 2009
	Network composition	Klerkx & Leeuwis, 2009
	Nurturing business linkages	Dalziel, 2010
	Community and consensus building	Dalziel, 2010
	Networker or Bridger in Innovation Ecosystems	Agogu�e et al., 2017
Resource	Physical Space	Vidmar, 2018
	Access to Equipment	Vidmar, 2018
Acquisition	Resource Mobilization	Kanda et al., 2019
	Provision of funding	Vidmar, 2018
Knowledge	Knowledge processing, generation, and combination	Howells, 2006
	Knowledge exchange	Vidmar, 2018
	Knowledge brokering	Kilelu et al. 2011
	Knowledge development and diffusion	Kanda et al., 2019
	Scanning and information processing	Howells, 2006

Table 2: Most important Intermediary Functions

After presenting these primary functions, there is a less abstract picture of what the synonym innovation intermediary means compared to the definitions outlined at the beginning of this chapter. However, the difficulty in making a clear distinction regarding this massive spectrum of organisations and their functions still needs to be solved. In order to fully understand the actions and role of intermediaries, it is necessary to consider the context in which intermediaries operate as well as the stakeholders with whom they interact (Backhaus, 2010).

Therefore, it is necessary to narrow down this context and the entailed intermediaries more targeted to produce precise results that relate to this thesis's research question. Otherwise, it is tough to solve applied problems in meaningful detail. This specific perspective is crucial when it comes to an understanding of the influence, the role, and above all, the exact functioning of intermediaries. Depending on the view taken, intermediaries are understood in the literature as passive or active elements in their business environment (Parag & Janda, 2014).

For example, when considering an important function of intermediaries, network activities, the intermediation process is often limited to that of a network facilitator. However, intermediaries who have specialised in this function as an organisation are often the active constructors of a network and should, therefore, not be misunderstood as a passive agent that only aims to bridge gaps between firms (Clarke & Ramirez, 2014). Although both positions have their *raison d'être*, in this thesis, innovation intermediaries are clearly seen as active elements in collaborative innovation processes. This assessment is particularly understandable if one considers the context in which intermediaries operate. They are particularly active and essential when change occurs (Kivimaa et al., 2019).

The second remaining issue is that the interactions of intermediaries, as described, are extensive and thus allow for a broad scope of different interpretations. The focus on functions creates a blurred demarcation and, consequently, a challenging distinction between intermediaries among each other and different organisations offering similar services. This distinction is only possible through further narrowing, as the spectrum of intermediaries with the delimitations mentioned above is still too wide for gaining meaningful insights. Intermediaries vary significantly in terms of their target group, position in the innovation process, organisational form, and financial background. These are all different determinants according to which it is possible to delimit but also categorise intermediaries (Mignon & Kanda, 2018).

2.1.3 Organisational Delimitation

The basis of financing is particularly significant, as it determines the complete orientation of the intermediary. Although there are intermediaries with different financing backgrounds and business models, the position of an innovation intermediary is tough to combine with a classical profit-oriented entrepreneurial orientation. In order to generate sufficient revenues and profits, the intermediary must play a clear role in the innovation process, which the companies remunerate. However, many of the aforementioned functions, such as gatekeeping, network brokerage, need articulation or knowledge brokerage are very difficult to represent and quantify. To avoid this problem, profit-oriented intermediaries must shift their service spectrum towards measurable services. In turn, this orientation positions them more towards knowledge-intensive business services KIBS, as the basic intermediary services are no longer the main focus, which consequently changes the attitude towards the customers and vice versa (Klerkx, & Leeuwis, 2008). For more information on the definition of KIBS and the distinction from intermediaries, see Appendix 2.

In contrast, publicly funded intermediaries often have the problem of being confronted with political decisions and even having to elaborate on them. They are subject to the task of being technology-neutral and thus cannot commit to specific providers or technologies. Nevertheless, they have certain decision-making power, as they can take a strategic direction by selecting sure network participants (Mignon & Kanda, 2018). These government-related institutions can be state-initiated foundations, state-owned companies or government agencies and arranged between the state and private bodies. They are a complementary policy instrument and an alternative to traditional tools. However, they differ from business-based intermediaries operating for profit (Kivimaa, 2014).

There is a third group of intermediaries between these two opposing poles, which will be explored in more detail in this thesis. They are mostly private or partly state-owned and often without a genuine profit motive but, at least in the long term, be self-supporting. A prominent group of intermediaries that can be assigned to this category are, for example, many thematically different-oriented cluster organisations. These intermediaries, which primarily aim to develop interdependence and cooperation between actors along a value chain of specific industries or different interface sectors, were initially supported by governmental, European and regional initiatives that made it possible to create the necessary basic structures and starting points. In most cases, however, this funding is limited in time, after which the organisations must broadly support themselves (Kulicke, 2009). This type of funding is particularly important in digitisation, as almost all industrialised nations are spending considerable amounts of money on policies to equip companies to meet the challenges that come with it (Yang, Kim & Yim, 2019). In Europe, in particular, this approach is therefore ubiquitous and of great importance for the entire innovation ecosystem, which is represented by a large number of funding programs (European Commission, 2023).

From that point on, they depend on sources of income such as membership fees and funded projects to be sustainable. Due to the difficulties of intermediaries behaving in a profit-oriented way, they are mainly financed by state-supported federal projects that generate financial resources for the intermediary and the other participants in the project over a certain limited period. Consequently, their activities are always limited to the project period, which leads to planning uncertainties and a lack of long-term certainty (Mignon & Kanda, 2018).

In this indirect role, intermediaries have an important function as an executive, practical organ of innovation funding without being directly state-funded (Meyer & Kearnes, 2013). This function is not only about generating capital for the intermediary itself. In this role, intermediaries

have a critical function for their clients. They help to raise resources for innovation. However, this function of intermediaries receives little attention in the literature, although resource mobilisation can be considered a key function in an innovation system. This service often enables the development of new technologies and innovations (Polzin, Flotow & Klerkx, 2016).

2.2 Intermediation Context

To further narrow down and specify the group of intermediaries dealt with in this research, the context in which they operate is outlined and considered. The thematic context in which intermediaries operate is of great importance to better understand their role, as their interactions depend highly on it (Backhaus, 2010; Iturrioz, Aragón & Narvaiza, 2015). To address this important finding, the context in which the innovation intermediaries in this thesis operate is of particular importance. In order to be able to describe the specific factors and the associated characteristics and challenges in detail, both the thematic and project context in which they operate are examined.

2.2.1 Funded Collaboration Projects

As outlined, this thesis focuses on researching intermediaries financed in the foreground by funded projects. Funded innovation projects represent a particular form of collaborative innovation processes and have a specific character with which the intermediaries are confronted. In general, funded collaborative projects can be defined as a time-limited endeavour with a defined framework regarding resources, costs, and time. These projects aim to develop and evaluate novel findings under predefined objectives (Vom Brocke & Lippe, 2015). This

collaborative approach has become the norm in the European innovation funding landscape (Calamel et al., 2012).

Although collaborative innovation projects offer great potential by significantly expanding the pool of resources and knowledge, they are a complex undertaking that poses several difficulties. These barriers often prevent these specific collaborations in innovation (Enkel, Gassmann & Chesbrough, 2009; Arrigo, 2012; Bogers, 2012). Especially between the theoretical concept and the practical implementation, there are a number of barriers that need to be overcome to collaborate successfully in the field of innovation (Hartley, Sørensen & Torfing, 2013). In the context of funded projects, the existing barriers that generally occur in collaborative innovation processes exist and are complemented by the specific characteristics of the funded projects. This results in four focal points and the associated challenges.

First, they comprise a heterogeneous consortium of partners from business, science, and public bodies. They can be thematically and geographically close together or widely dispersed (Vom Brocke & Lippe, 2015). This compilation involves a high risk, as the partners usually lack experience in interacting with each other, and there are often difficulties in finding common goals that motivate the partners equally (Ansell & Gash, 2008).

Second, the project responsibility is equally distributed among the different participants and contractually regulated, which makes each partner an autonomous equal partner in contrast to a provider-client approach. Third, in almost all cases, there is an independent financial source for this kind of cooperation, primarily public funding (Vom Brocke & Lippe, 2015).

Fourth, the projects are carried out with economic or other self-interested goals in mind. Partners usually collaborate when they need to pool resources and share knowledge on a specific problem. These basic needs of each partner can lead to conflicts of interest (Hartley, Sørensen

& Torfing, 2013). For example, integrated industrial partners ensure the application context of the research and the transition from theoretical research to practical application while research institutions pursue other objectives (Vom Brocke & Lippe, 2015). This obstructive factor should not be neglected, as leadership and management play a major role in reducing or compressing collaborative barriers (Ansell & Gash, 2012).

Project management is a role that is often assigned to the intermediaries in funded projects. These projects are generally difficult to manage, as the abovementioned factors are usually accompanied by high pressure to generate demonstrable innovation results due to the funding. The combined barriers to collaborative innovation outlined above and the specific factors make these projects and their consortia challenging to coordinate and manage (Calamel et al., 2012). The intermediaries often provide support even before the project's actual start and help their clients identify suitable funding opportunities before it comes to project development, implementation and, finally, the legal protection of any cooperation results (Krause-Jüttler, 2011).

The coordination of such a project usually takes place through work packages distributed among the different participants. The responsibility for each work package is assigned to the individual partners, while the lead partner is responsible for the overall project coordination. Intermediaries often act as project managers or lead partners responsible for project management. The lead partner has four main tasks: overall management, coordination, and communication within the project, and serves as the sole contact point with the funding agency. Any monitoring and control mechanisms must be agreed upon with this funding agency (Calamel et al., 2012).

2.2.2 Spectrum Funded Collaboration Projects

The challenges outlined above are a fundamental characteristic of funded collaborative projects. They differ significantly from one another, meaning that the individual factors' weighting differs considerably depending on the type of project.

When looking at the challenges of collaborative funding projects, it can be summarised that in their framework, the various difficulties that arise in the context of collaborative innovation have to be overcome, as well as specific barriers that arise in the context of the different funding landscapes. In return, this type of project offers the great advantage of financial support, which reduces the risk of innovation development for many organisations and enables and finances the collaboration of intermediaries (Polzin, Flotow & Klerkx, 2016).

In particular, the role of intermediaries differs significantly depending on the type of project. One factor that makes the different roles of intermediaries more systemic is the level of interaction of the intermediaries. By researching the different roles, innovation intermediaries can fill in, Kanda et al. (2020) outline this connection by highlighting the influence of the level of interaction on the role of an innovation intermediary. The type of interaction, the tasks, and the position of an intermediary regarding inter-organisational collaboration vary greatly. Through the conceptualisation of the four stages, the systematic differentiation of the various roles becomes very clear. While level 0 focuses on intermediation between individual parties, level 1 intermediaries connect individual participants in a network. Level 2 describes the intermediation between different networks, and in level 3, the highest level, intermediaries act as mediators between actors, networks, and institutions. Highlighting these three different levels, not only the collaborative settings in which the intermediaries operate become clear but specific role models and requirements with which the intermediaries are confronted

emerge, depending on the intermediation level (Kanda et al., 2020). This different level of intermediation occurs in collaborative innovations intermediaries in general and is given in a practical context mainly by project structures. For this reason, this influencing factor also plays an essential role in the focus of this research.

As already anticipated, this bilateral interaction displays only a tiny part of the activities of innovation intermediaries. Moreover, these one-to-one interactions are often carried out by private organisations specialising in consulting that support their clients in achieving specific goals in the innovation process (Howells, 2006). However, most intermediary activities occur in the context of more complex collaborative networks and projects (Calamel et al., 2012).. Innovation collaboration often occurs in the context of projects, mainly funded, as already explained in chapter 2, an essential context of intermediary interaction, mainly because of the focus on resource mobilisation (Polzin, Flotow & Klerkx, 2016). However, in contrast to the presentation of level 0 intermediation, these projects consist of heterogeneous consortia with different partners such as companies, research institutions and innovation intermediaries, and the roles can differ significantly depending on the distribution and the situation presented (Vom Brocke & Lippe, 2015)

In addition, the funding agency plays a vital role in funded projects, as the consortium is always in close contact with them regarding project monitoring and controlling. The point of contact with the project is often the intermediary (Calamel et al., 2012). To illustrate this relationship, the figure 2 outlines a different level of intermediation/interaction of intermediaries.

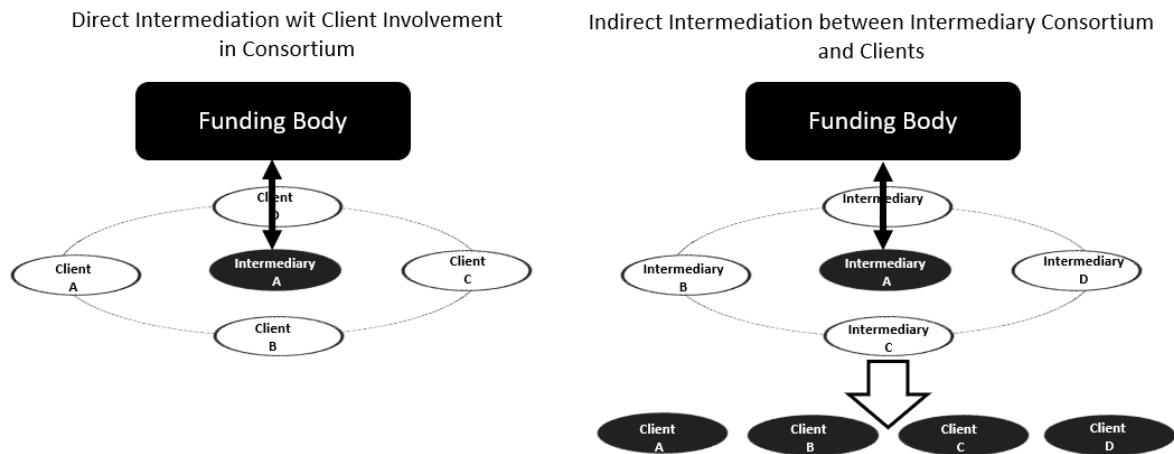


Figure 2: Direct vs Indirect Intermediation Projects

The left figure illustrates a low level of interaction between the intermediary, the funding body and its clients. In this case, the clients are directly involved in the project. As lead partner, the intermediary coordinates the projects, including the contact with the funding body. In contrast, the illustrations on the right show a high level of interaction. In this case, intermediaries form a project consortium. One of the intermediaries, the lead partner, is in contact with the funding body. The clients are not directly integrated into the consortium but indirectly supported as external partners within the project with resources, knowledge, and other incentives. This division already indicates a fundamental difference between direct and indirect funding projects.

Such a distinction is particularly important for intermediaries who operate in an environment that is characterised by strong changes, as they act in particularly intertwined thematic fields and, as drivers of change, mediate and represent the various interests of different actors (Kvima et al., 2020).

To provide an overview of the challenges that arise in funded collaborative projects and the factors that influence the role of intermediaries, Figure 4 summarises the most important factors. Depending on the type of project, entailing direct or indirect intermediation, the challenges can be weighted differently, and the role of intermediaries can change.

The spectrum of projects is delimited by the ends, which either involve direct client involvement or indirect involvement, as shown. Within this spectrum, represented as a dark black arrow with two ends, are four significant challenges and four of the intermediaries' most essential roles in these projects. These are arranged in such a way that they are all important, but increasingly for the end they are closer to. However, this pictorial representation is primarily intended to show that these eight factors are decisive for the entire spectrum of funded projects.

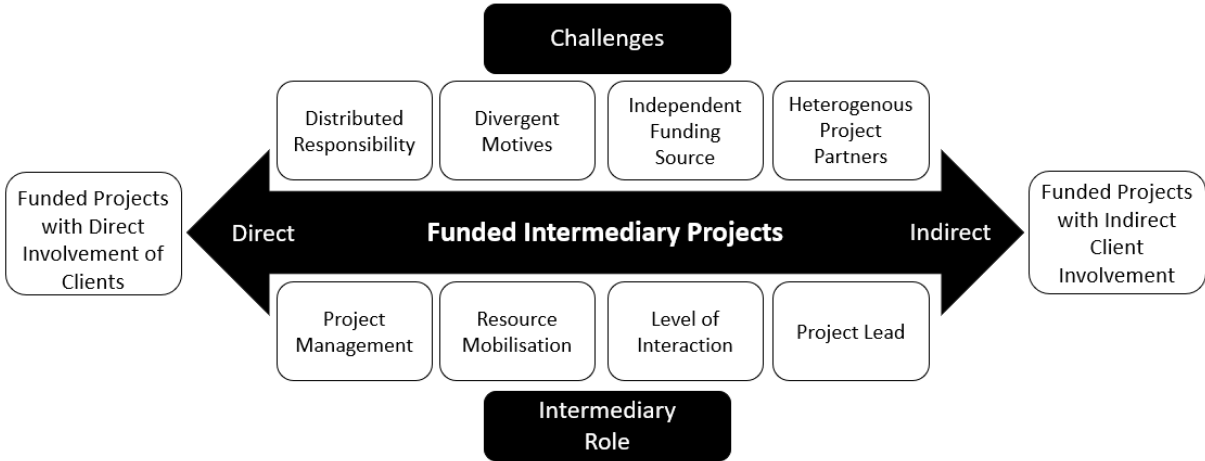


Figure 3: Spectrum Funded Intermediary Projects

This illustration already teases the tremendous impact of the project context on intermediaries and presents a wide range of challenges that need to be overcome by them (based on

Ansell & Gash, 2012; Calamel et al., 2012; Hartley, Sørensen & Torfing, 2013; Vom Brocke & Lippe, 2015; Polzin, Flotow & Klerkx, 2016; Kanda et al., 2020).

2.2.3 Intermediary Business Model

Not only the question of funding is somewhat complex and opaque regarding innovation intermediaries. As important supporters of innovation processes, they must provide and develop the necessary capacities to perform this role and the activities outlined above. The activities that intermediaries carry out for their clients should, therefore, not be misunderstood as completely one-sided. Rather, one must imagine a two-way flow of knowledge from the intermediary to the client, but also in the other direction. Although the benefits for the intermediaries are much more challenging to recognise as they are outside the direct focus, the intermediaries generate added value through their interactions (Lopez & Vanhaverbeke, 2009). However, this aspect is often somewhat underestimated, although it is a logical connection, since innovative intermediaries, especially if they are not or no longer state-funded, must take care of their long-term survival. Notably, as many of their services are knowledge-based, they need to continuously develop and adjust themselves in order to be able to make this contribution in the long term (De Silva et al., 2022).

For this reason, it is essential not only to understand how they generate their financial resources but also how they develop their knowledge base and the resulting services within the collaborative innovation processes (Polzin, Flotow & Klerkx, 2016; De Silva, Howells & Meyer, 2018). Specific activities, such as creating and supporting inter-organisational networks, require intermediaries to continuously expand their own networks, which is why they are constantly looking for new partners and alliances. In this way, they can strengthen their network,

increasing their attractiveness to other clients (Lopez & Vanhaverbeke, 2009). This development is an integral part of their business model. Generally, a business model includes the value creation, capture and delivery processes and is focused on customer needs and the value an organisation can deliver (Teece, 2010).

Joint-funded projects play a significant role in this context as they simultaneously enable intermediaries to generate value for the clients and themselves. In addition, intermediaries generate internal value through their intermediary process, which, for example, increases their knowledge base. In general, intermediaries can use the lessons learnt further as they can be transferred from one client or project to another, making them versatile and very broadly applicable (Geels & Deuten, 2006). Therefore, the benefits of funded collaboration projects cover more than just the financial sphere. Knowledge-, network- or market-based benefits may also result (De Silva, Howells & Meyer, 2018).

Consequently, for a holistic view and understanding of intermediaries, it is essential to capture the role of intermediaries for their clients and how the intermediaries themselves have benefited from the projects studied. Therefore, research should pay more attention to this part of understanding intermediaries rather than focusing on how intermediaries create value for their clients rather than themselves (Knockaert & Spithoven, 2014). However, more recent research on intermediaries has started to address this non-negligible aspect. Notable findings accompany the analysis of the internal value creation of innovation intermediaries. Several factors have been found that can be attributed to both financial and non-financial benefits (De Silva, Howells & Meyer, 2018).

Very little is known about the impact of funded initiatives on innovation intermediaries and their further development (Knockaert, Spithoven & Clarysse, 2014). Particularly concerning

intermediaries, which do not have a completely independent business model but rely on government funding, there needs to be more focus on how they benefit from the innovation activities. For this reason, innovation processes between intermediaries and their clients are a two-way value creation process rather than a one-way one (De Silva et al., 2022). In addition, the value creation of firms and intermediaries, but especially between intermediaries themselves, needs to be put into the context of their intermediary functions and the resulting consequences. However, this point is essential for understanding intermediaries as support organisations not only for their clients but for the whole innovation system in which they interact (De Silva, Howells & Meyer, 2018). The intermediaries also influence each other in this value-creation process (Inkinen & Suorsa, 2010). For this reason, this thesis will not only look at the one-sided benefits in the collaboration process between intermediaries and their clients but will also consider the value creation for the intermediaries. However, the projects in which the intermediaries operate only represent part of the context. The thematic framework in which intermediaries operate must also be included.

2.2.4 Drivers of Change

The importance of innovation for the success of companies, their regions and countries has been proven by many studies and is no longer questioned (e.g., Teece, 1986; Porter, 1990; Hurley & Hult, 1998). This recognition regarding the relevance of innovation for the competitive advantage of firms is accompanied by a no less essential and accepted maxim - competing in the economy through innovation is not a one-off event. Companies must develop the ability to change, react appropriately, and adapt to their changing environment (Cooper, 1998). In many cases, the change companies face is based on technological progress, the primary source

of many types of innovation (Garcia & Calantone, 2002). Based on constant changes, organisations must respond to new external conditions by adjusting their business processes. Despite these attempts, they often cannot find adequate responses and fail to adapt successfully (Shamiyeh, 2014).

Based on these challenges and the gaining importance of the ability to adapt to changes, it is increasingly difficult for companies to create these determinants by themselves, wherefore the acquisition of external knowledge is of increasing importance for organisations in order to address this issue (Spender, 1993; Smedlund & Toivonen, 2007; Burchardt, & Maisch, 2019).

Technological change can have very different characteristics and effects. A rough differentiation can be made between incremental and radical changes. Following this understanding, technological innovations are divided into a spectrum. On the one hand, there are well-understood product characteristics, which are improved in economic terms through incremental improvements in production. The refinement of processes and the increase in productivity are in the foreground. The other spectrum is represented by radical innovations that satisfy new customer interests or meet a known demand through a new approach (Abernathy & Utterback, 1978). This broad range of technology originating from technical revolutions covers technologies with comparable limited underlying developments (Rotolo, Hicks & Martin 2015).

Consequently, this radical change often leads to substituting a new product or process for an old one or at least modifying the existing product life cycle (Lambe & Spekman, 1997). In order to differentiate between these types and dimensions of technological change, the concept of technological transition, a technological change of particular importance and extent, is introduced. Following the outlined product-based view, technological transition can be defined:

“as a fundamental change in the nature of a product and the core technology that underpins that product” (Taylor & Helfat, 2009, p.719).

In the context of a technological transition, a product and the underlying core technologies will completely change (Taylor & Helfat, 2009). On average, the adoption rate of new technologies is less than 30 per cent. Therefore, failure in this procedure is a constant factor, and there is a certain amount of risk and uncertainty for organisations (Cervone, 2010). In contrast, technological transformation is defined as using new technologies to improve the efficiency and effectiveness of existing products and services – a piece-by-piece business model improvement through advanced technologies (Jetter, Satzger & Neus, 2009; Çalışkan, 2015).

Figure 4 illustrates the main differences between technological transformation and transition, which will play a more significant role in this thesis and is decisive for understanding and classifying technological change. The two dark black boxes show the two categories, and below them are three essential characteristics of each classification:

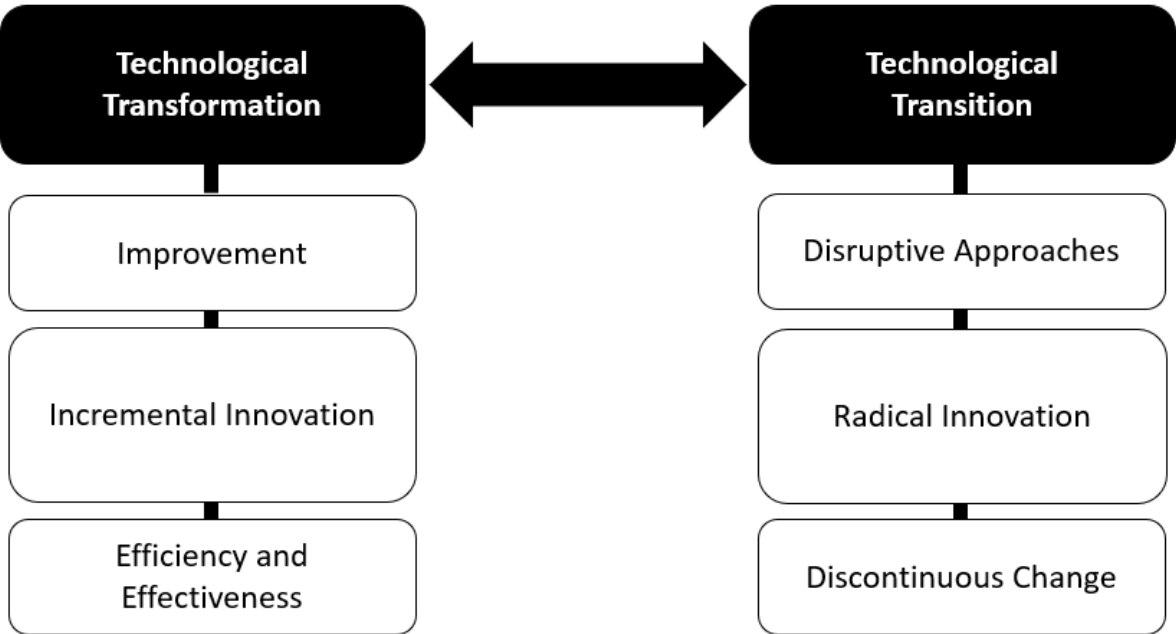


Figure 4: Technological Transformation vs Transition

When these two types of technological change are linked to the position of innovation intermediaries, three main findings emerge that are of great importance for this thesis. First, due to their characteristics, intermediaries act in areas where technological transformations or transitions occur frequently, are in the offing or are to be brought about (Gliedt, Hoicka & Jackson, 2018). Second, innovation intermediaries not only support technological change but are also a direct driver and directly used to accelerate such change. As part of their underlying innovation policies, they often have the task of driving change and developing new technologies (Rossi et al., 2022).

Third, the distinction between transformation and transition alone results in a very different profile of associated determinants. These differences inevitably lead to the conclusion that the intermediaries must deal with various requirements to be able to support the development of new innovations. Thereby, an intermediary organisation can only cover some types of services and issues, as they need to understand the needs of their clients in detail to provide targeted support services (Shapira & Youtie, 2016). However, it is precisely the difference for intermediaries that has yet to receive attention.

Organisations face challenges and opportunities in sectors undergoing effective change (Day & Schoemaker, 2000). Through the support of the intermediaries, which can take place in many ways, the chances of success of their clients are increased, and their risk is reduced by compensating for the lack of knowledge, experience, market information or networks (Howard Partners, 2007; Klerkx & Leeuwis, 2009; Hossain, 2012). This support is critical in the innovation context as assessing the commercial value of an invention, which leads to innovation, is extremely difficult and wrong estimation can stop or decelerate the innovation process (Hoppe & Ozdenoren, 2005). With expertise in the field, innovation intermediaries help to overcome these various barriers by providing support for firms linked to the previously

outlined intermediary functions, such as articulating innovation needs and demands in the context of technology (Klerkx & Leeuwis, 2009). The above demarcation makes it clear that the requirements for the innovation process and, consequently, for these functions differ greatly depending on the objective.

While a strand of literature addresses their role in a specific transition context, these findings differ from the distinction made in this research in two key ways. Firstly, they are outside the field of digitisation but relate either to other thematic areas or to the role of intermediaries in general. Most research papers here look at the roles of intermediaries in sustainable transition (e.g., Van Lente et al., 2003; Kivimaa et al., 2019; Kanda et al., 2020; Sovacool et al., 2020).

The role of transition explored in this area of literature is comparable to that of digital innovation. It is also a hugely important paradigm shift, strongly driven by policymakers, and in the context of which intermediaries play an essential role as accelerators and drivers (Gliedt, Hoicka & Jackson, 2018). It is possible to conclude recognition of digital change from these transition processes, which is why the results of much of this research are taken up and used in the context of this literature review. Nevertheless, this transference is only possible to a limited extent since each transition is different, so it is extremely difficult to make general statements or theories about the role of intermediaries in this context (Kivimaa et al., 2019). In the field of digital technologies and innovation, there are a few papers that deal with the role of intermediaries in the field of digital transformation. These mainly refer to specific types of intermediaries, such as digital innovation hubs, digital platforms, or crowdfunding intermediaries. (Haas, Blohm & Leimeister, 2014; Hossain & Lassen, 2017; Crupi et al., 2020). Due to this intense focus on a specific type of organisation compared to the literature on the role of intermediaries in transition, they only cover partial areas and functions.

2.2.5 Digital Change

After presenting the basic concepts of innovation and technological change, it is necessary to present the concrete context explored in this work - the digital transformation and the digital innovations it contains. As outlined, intermediaries play an essential role in technological change and transition, which is also widely supported in the literature. The thematical context is significant for intermediaries, as they must adapt to the entailed topics. The thematic field of digital technologies dealt with in this thesis has a specific, subsequently outlined characteristic that forces intermediaries and their clients to adapt their interactions and business models (Rossi et al., 2022).

Although the challenges that technological change brings to companies have traditionally always been great, its unique characteristic distinguishes the current technological change from previous ones. The digital character of the current change further catalyses the problems that arise in many areas. On the one hand, digital products usually have a concise product life cycle, which significantly increases the speed of technological change. On the other hand, companies are confronted with a much more complex scope of challenges, as they must cope with the challenges of the physical as well as the digital world (Bilgeri, Wortmann & Fleisch, 2017; Madsen & Møller, 2017; Morrar, Arman & Mousa, 2017).

Fundamentally, the term digital technologies describe combinations of connectivity, communication, and computer technologies as well as information systems that change the business processes of organisations (Bharadwaj et al., 2013; Eidhoff et al., 2016). The process in which emerging digital technologies replace analogue processes is called digital innovation. This procedure has become an essential phenomenon in practice and literature (Khin & Ho, 2019).

Emerging digital technology is an inevitable prerequisite for developing digital innovation (Elverum, Welo & Tronvoll, 2016). At the current state, the industrial internet of things, cloud computing, big data, artificial intelligence, augmented reality, additive manufacturing, blockchain, autonomous robots and cybersecurity are considered the most promising technologies in the context of digitalisation. However, each subsector entails numerous emerging technologies (Alcácer & Cruz-Machado, 2019). The use of these new, increasingly widespread technologies offers companies significant opportunities. Firstly, their use creates strong growth potential for companies, as they and the underlying processes have great scaling potential. Second, digital technologies are often comparatively quick to integrate into existing markets, systems, and business models. Thirdly, the development, integration and further development of new digital technologies enable the opening of new markets and target groups (Yu et al., 2021).

As with analogue processes, a company needs the right capabilities to manage and target digital technologies. Only when these capabilities are in place can an organisation create digital innovations (Khin & Ho, 2019). SMEs, for example, usually have a sophisticated, timely technology orientation, but they need help raising the additional capabilities they need. These issues range from the lack of ability to convert new knowledge into patents to protect them sufficiently to the lack of capacities in marketing and distribution of the developed solutions (Agostini & Nosella, 2017; Haapanen, Hurmelinna-Laukkanen & Hermes, 2018).

Once a new technological opportunity is detected, more is needed to integrate this technology into existing processes and routines. It must be addressed through new processes, structures, or products. In the context of digital technologies, the ability of companies to integrate digital technologies into existing processes and products can be described as digitalisation fit (Eidhoff et al., 2016). In addition, regulations and laws must be complied with, which, especially in the

case of digital technologies, are usually unable to keep pace with their speed of development and thus have a particularly restrictive effect. Especially for products for private end consumers, privacy violations in the context of permanent data collection and enlightenment regarding realistic performance expectations are necessary new fields regarding the market introduction of smart products (Juric & Lindenmeier, 2019).

The current digital transformation is not only driven by market mechanisms. Due to the emerging possibilities and opportunities, innovation policies intensely focus on advancing digital models. Innovation intermediaries are essential at this point, as they are expected to drive and support this transformation through their services (Rossi et al., 2022).

Suppose these requirements are compared with Chapter 2.2 of the technological change. In that case, it can be outlined that many commonalities are attributable to technological change and specific features that have been newly commented on or accelerated and catalysed by digital change. These new attributes translate directly into intermediaries' requirements, as their actions are highly dependent on their thematic context (Backhaus, 2010, Iturrioz, Aragón & Narvaiza, 2015). Consequently, there is a need for closer investigation to understand the framework condition under which innovation intermediaries act in digitalisation.

2.2.6 Spectrum Digital Change

The opportunities and challenges outlined in digital innovation affect all companies active in this field. However, a clearly differentiated spectrum of adopting organisations is essential for distinguishing digital innovation. In principle, digital change involves two distinct processes: the evolution of companies and the emergence of new “digital companies”.

The evolution towards a digital company refers to organisations that actively use digital technologies to gain a competitive advantage within their existing business model (Hennig, 2016). This category further includes companies expanding and developing digital technologies in their processes. These companies are allocated to the area of digital transformation. The best example of this type of company undergoing a digital transformation are manufacturers who are digitalising, automating and linking various processes under the theme of Industry 4.0. The latest technologies are used to optimise the production process in terms of costs and to meet the market's needs for higher quality standards, more specialised offers, and smaller batch sizes. This optimisation may change the business model in the longer term. However, the functionality of the end products will not change fundamentally, which also places these companies in the realm of incremental innovation (Issa et al., 2018; Matos & Godina, 2020).

In addition, some firms emerge as digital companies from the beginning. Their business models are based entirely on digital technologies and are pursuing new approaches that represent a significant change compared to traditional, analogue solutions. One example of such an approach are companies that use blockchain technologies to completely digitalise analogue solutions in the supply chain, thus making the current analogue approach obsolete (Della Valle & Oliver, 2021).

Thus, these companies can be assigned to the area of digital transition. Consequently, there is a wildly divergent field of challenges for the two types of enterprises and, consequently, different demands concerning possible support services that are needed, which is clearly reflected in the various innovation policy approaches to digitalisation (Planes-Satorra & Paunov, 2019).

Although this distinction is vital for understanding digital change and further exploring this area in the context of innovation, the boundary between the two approaches is blurred. On the one hand, the new radical innovations attributed to digital transition often only lead to the incremental further development of existing systems. On the other hand, digital transformation sometimes leads to radical changes in the existing business model and can spread from specific processes to transforming the whole organisation (Matos & Godina, 2020; Della Valle & Oliver, 2021).

Accordingly, this classification of digital companies should be seen more as a spectrum based on the nature of the technological change and the resulting business characteristics that entail a specific set of opportunities and challenges. Based on the opportunities and challenges in the area of digital innovation described in the previous sections are summarised in the following figure. The following figure 5, developed in the context of this study, illustrates the complex context and spectrum in which companies operate in the field of digital innovation and forms the basis for understanding this work in the field of digital innovation. Depending on which side of the spectrum the companies operate on, the factors will be weighted more or less heavily, and the problems may differ beyond the fundamental problems.

As in section 2.2.2, the two boxes on the left and right illustrate the ends of the spectrum. The dark black arrow with two ends symbolises the entire spectrum of digital innovation. The chances and challenges are arranged so that the closer the individual category is to the end of a spectrum, the greater the weight of this factor. Regardless of this focus, it becomes clear that companies in the field of digital innovation share great opportunities but are confronted with very complex challenges that take work to implement or solve (based on Eidhoff et al., 2016; Hennig, 2016; Juric & Lindenmeier, 2019; Khin & Ho, 2019; Yu et al., 2021; Della Valle & Oliver, 2021).

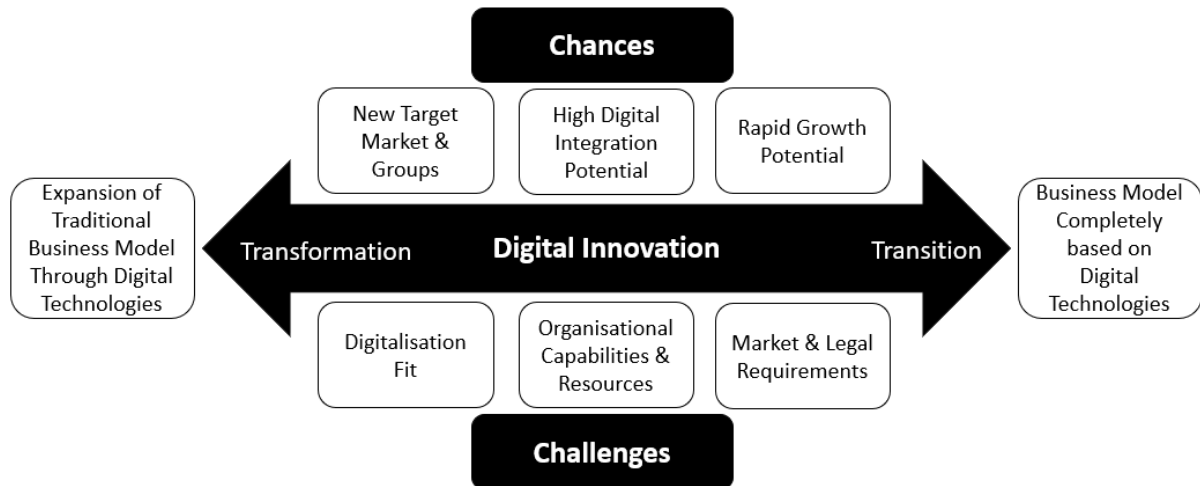


Figure 5: Digital Transformation vs Digital Transition

In order to respond to the outlined changes and new complex requirements, organisations need to introduce new structures, practices, and processes (Khanagha, Volberda & Oshri, 2013). Precisely at this point, the intermediaries come into play, supporting companies in the field of digital innovation with their interactions described in Chapter 2.1.2. This previous point clearly shows that the spectrum of digitalisation is broad and that the difference between digital transformation and digital transition, as presented here, is essential. This difference encompasses the affected companies and their business models to a large percentage and thus also creates different requirements for the intermediaries who support these clients. However, understanding how these challenges affect intermediaries, how they respond to them and how they help companies overcome them is still being determined. This open demand is mainly due to two reasons.

The density of literature dealing with intermediaries in digitalisation could be much higher (Rossi et al., 2021). Especially if digitisation is interpreted as a transition or transformation process, there is still a great need for further insights, as digitisation is a catalyst for many

important areas and innovation intermediaries play an essential role as an interface between the individual stakeholders but also as an important policy tool for accelerating digitisation (Yang, Kim & Yim, 2019). Since digitisation is a transformation whose end is still open and currently in full swing, new insights into how intermediaries act in this context with their stakeholders by mediating, engaging and mobilising them are precious. These insights play an overriding role, especially from a policy perspective, as intermediaries are targets of significant public funding and support, particularly in digitisation. In order to better understand how these can be used even more efficiently, a holistic understanding of intermediaries plays a significant role (Rosca et al., 2022).

In order to answer the research questions of this thesis and thus to better understand how innovation intermediaries act in the field of digital technology, it is crucial to give more importance to this specific context.

2.3 Conclusion

In summary, the first chapter of this literature review outlines the basic concepts of this research and, thereby, a first problem statement. Innovation intermediaries form an independent, overarching class of organisations, including a broad range of enterprises that support firms in innovation (Dalziel, 2010). The critical characteristic of innovation intermediaries is to support other parties in the innovation process (Howard Partners, 2007).

Despite their essential role, their elusiveness makes them challenging to define, and there are very different views on their exact definition (Kivimaa et al., 2019). Therefore, these organisations still need to be noticed or included in studies and reports, and it is difficult to generate meaningful findings (Dalziel, 2010). To provide a research basis, innovation intermediaries are

defined in this thesis as: *“an organisation or a group within an organisation, whose main objective, as a mediating link between public authorities, business organisations and the scientific field, is to carry out innovation enabling interventions, either directly by enhancing the innovativeness of one or more organisations, or indirectly by enhancing the innovative capacity of a system or region.”* (Based on Dalziel, 2010, Vidmar 2018 and Kivimaa et al., 2019).

However, more is needed to explore or understand the scope of the actions of intermediaries. This difficult-to-define characterisation of innovation intermediaries can be derived from their focus on the innovation process. The process of innovation can be traced back to different reasons and contexts. In this context, the understanding that innovation has a comprehensive spectrum, is highly variable and involves a complex character that can take very different forms is fundamental to understanding the perspective that the following innovation research takes.

This broad spectrum makes findings on intermediaries challenging to transfer and generalise precisely, as innovation involves various organisations with different motivations, priorities, funding backgrounds and capabilities (Hodson & Marvin, 2010). Because of this difficulty, it is vital to narrow down intermediaries in terms of their functions and activities (Moss, 2009; Vidmar, 2018). The four most important fields of activity in which innovation intermediaries interact are inter-organisational, research, knowledge, and resource acquisition-related activities (e.g., Howells, 2006; Klerkx & Leeuwis, 2009; Lopez & Vanhaverbeke, 2009; Kilelu et al., 2009; Vidmar, 2018).

However, a classification based on these functions does not solve the problem of a clear distinction, as a single intermediary usually covers the entire or a broad spectrum of these activities. In addition, intermediaries vary significantly regarding their target group, position in the

innovation process, organisational form, and financial background (Mignon & Kanda, 2018). Therefore, a further narrowing down takes place based on these factors. The focus is on intermediaries mainly financed by state-funded projects. They are less constrained than purely public intermediaries and can still offer their intermediary services without profit pressure (Meyer & Kearnes, 2013; Mignon & Kanda, 2018).

In the context of funded innovation projects, however, there are specific challenges beyond independent collaborative innovation processes. Due to the dependency on the funding body, the latter has to be included as an essential element, which the intermediary, who often acts as project manager, has to cope with (Krause-Jüttler, 2011; Calamel et al., 2012; Hartley, Sørensen & Torfing, 2013). In this course the level of interaction of the intermediary is linked to the project characteristic (Kanda et al., 2020). An essential distinction can be made between direct and indirect intermediation projects.

These projects can generate resources and benefits for their clients and themselves (Polzin, Flotow & Klerkx, 2016; De Silva, Howells & Meyer, 2018). However, this two-sided role has yet to be explored, and the benefits for intermediaries are not directly visible (Lopez & Vanhaverbeke, 2009, Knockaert, Spithoven & Clarysse, 2014; De Silva et al., 2022). The added value intermediaries generate for themselves is also significant to fully understanding their actions and is, therefore, explicitly considered in this thesis.

A second important factor that should not be ignored when researching intermediaries is the context in which they operate (Backhaus, 2010, Iturrioz, Aragón & Narvaiza, 2015). This context strongly determines the characteristics and functioning of intermediaries. Intermediaries prefer to operate in thematic fields undergoing significant change (Gliedt, Hoicka & Jackson, 2018). It is essential to distinguish between transformation and transition, as intermediaries

are active in both fields, but the requirements and determinants differ (Jetter, Satzger & Neus, 2009; Taylor and Helfat, 2009 Çalışkan, 2015). Especially in digital transformation and digital transition, these differences and the motives behind them are particularly striking (Eidhoff et al., 2016; Hennig, 2016; Juric & Lindenmeier, 2019; Khin & Ho, 2019; Yu et al., 2021; Della Valle & Oliver, 2021).

Both are an important part of the digital transformation, and intermediaries are critical active drivers and accelerators of this transformation (Rossi et al., 2022). However, as no intermediary can cover all services equally, the individual requirements of the clients of both categories must be addressed (Shapira & You-tie, 2016). The substantial influence of the thematic context in digitalisation on the interactions of intermediaries has yet to be sufficiently researched. In general, the current level of research linking intermediaries and the field of digitisation could be higher and is a need for more literature in this area (Rossi et al., 2021, Bäumle, Hirschmann & Feser, 2023). For this reason, this thematic classification is included in this thesis as an important factor influencing the analysis of intermediaries' interactions in digitalisation.

3. Conceptual Framework Absorptive Capacity

This chapter builds on the outlined characteristic and functions of innovation intermediaries and the intermediation context of digital innovation. It outlines this work's conceptual framework, which serves as the conceptual foundation for the research into the cooperation between intermediaries and their clients. As already argued, the intermediation context influences the intermediaries' interventions and their functioning, which should not be underestimated.

In general, however, the clients of intermediaries must first be able to use the respective intermediary services and offers in a targeted manner. The widespread problem of including external sources in internal processes and routines is essential. This topic concerns both the innovation and the management literature and is therefore dealt with extensively in both branches of literature (Cohen & Levinthal, 1990; West & Bogers, 2014).

Detecting, integrating and exploiting external sources is complex and involves significant difficulties. Based on the different knowledge-building processes, the collaborating firm requires specific integrative capabilities to absorb and benefit from the external aggregated knowledge and resources (Tzabbar, Aharonson & Amburgey, 2013). These capabilities are crucial to the success of collaborating with external sources in innovation processes. This practice nearly always necessitates the merging of, from the firm's perspective, targeted external and already available internal sources of knowledge. To successfully carry out this process, new management strategies and capabilities of the integrating organisation are needed (Bogers et al., 2019). Therefore, a sufficient understanding of these processes requires understanding a firm's ability to integrate external knowledge and the underlying structures, mechanisms, and routines (Vanhaverbeke, Van de Vrande & Cloudt, 2008; Kim, Kim & Foss, 2016).

The management concept that describes the ability to benefit from external knowledge is called absorptive capacity - the availability of capabilities, including the knowledge to understand, apply and assess the gained resources (Cohen & Levinthal, 1990). The concept of absorptive capacity serves to analyse the process of collaborative innovation between firms and intermediaries in a more complex, higher detail of degree and to make the practically oriented research of innovation intermediation more comprehensible through a clear theoretical concept. Therefore, it is discussed and linked to the in Chapter 2 outlined knowledge regarding innovation intermediaries. The concept of absorptive capacity is initially discussed in the theoretical context behind the absorption of external knowledge. After pointing out the basic concept and its importance for the innovation process, the entailed components, underlying antecedents, and different types of absorptive capacity are illustrated. This presentation provides a theoretical framework regarding the absorption of external knowledge in the innovation process. Based on this concept, the connection between absorptive capacity and open innovation is emphasised, and the peculiarity in collaboration with innovation intermediaries is the base for this research's conceptual framework.

3.1. Conceptualising Absorptive Capacity

In order to gain an advantage from external sources in the innovation process, an organisation requires the ability to exploit this knowledge. This competence is based on the availability of innovative capabilities, including the knowledge to understand, apply and assess the gained resources - an organisation's absorptive capacity (Cohen & Levinthal, 1990). In developing this concept, Zahran and George (2002) made a significant contribution to the understanding of absorptive capacity by describing it for the first time as a dynamic capability in the field of

knowledge creation. This capacity directly impacts an organisation's competitiveness and enhances the ability to gain a competitive advantage (Zahra & George, 2002).

The capability-based view of a firm understands the combination of different, specific physical facilities and human skills available within the boundaries of an organisation as the critical component for organisational success (Chandler, 1990). The concept of dynamic capabilities further develops this perspective through the dimension of constant change. The basis of dynamic capabilities is organisational processes that focus on learning and the creation of innovation. A company's dynamic capabilities determine how well it finds its way within an economic system (Teece, 2009). Thus, dynamic capabilities are not directly seen as independent mechanisms but are rather integrated into existing organisational processes. Classical processes are usually more explicit and have a clear structure consisting of a combination of resources. This nature makes them easier to transfer within and beyond the organisation than dynamic capabilities. From this perspective, dynamic capabilities can be described as an organisation's orientation that constantly renews and builds its resources and capabilities. This dynamism is a response to the changing demands of the environment and is essential to gain a competitive advantage in this environment (Wang & Ahmed, 2007). To illustrate the importance of absorptive capacity, the concept and its role in this capability-based view of an organisation must be set out.

Absorptive capacity is classified as a part of the dynamic capabilities of organisations that is directly related to the processing and integration of external knowledge and has a significant influence on these processes. Therefore, it can directly contribute to a higher innovation performance of the organisation or, in addition, stimulate the development of new organisational capabilities that positively impact the organisation and strengthen it in the long term. This statement already shows the vital position of absorptive capacity and highlights its clear scope

of the ability to use external knowledge in an organisation. Figure 6 illustrates the concept and is based on the developed approaches and results on absorptive capacity and dynamic capabilities (Teece, Pisano & Shuen, 1997, Winter, 2003, Teece, 2007; Wang & Ahmed, 2007; Flor et al., 2013). Figure 6 outlines the linkage between absorptive capacity as a dynamic capability that determines the intake of external knowledge and the potential increase of innovation performance as well as organisational capabilities. Thereby it already points out the multidimensionality of the concept and represents the basic understanding of this thesis in terms of the concept absorptive capacity. An organisation's external knowledge to process and needs absorptive capacity is shown in dark black. Absorptive capacity can be understood as a specific dynamic capability with its basic properties due to its fluid characteristics. This connection is represented by the black bar. An organisation can directly transform dynamic environmental conditions into increased innovation performance through dynamic capabilities or achieve this effect through increased organisational capabilities. In absorptive capacity, the organisation can process external knowledge and thus directly generate innovative output or strengthen its existing capabilities. This can also lead to increased innovation output in the medium term.

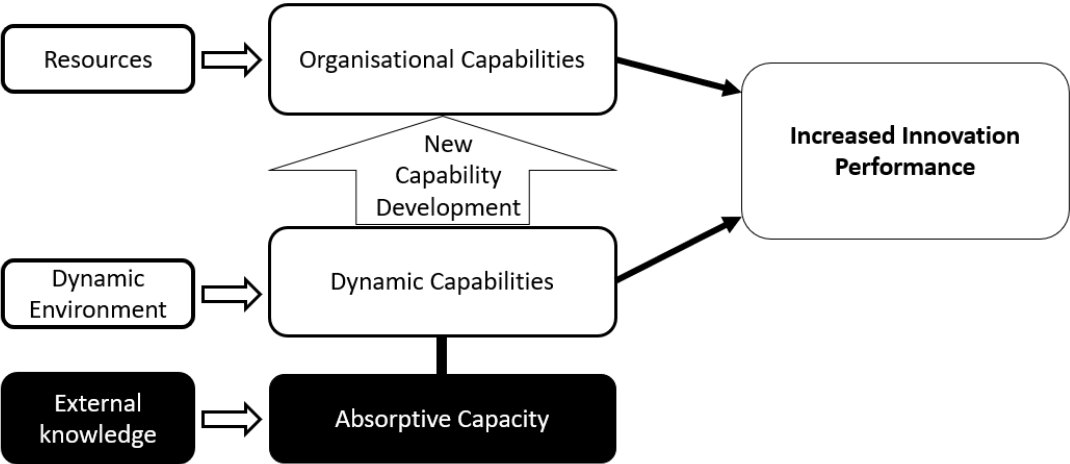


Figure 6: Absorptive Capacity Overview

However, this overview only partly covers approaches to capabilities and absorptive capacity but presents a first overview for classifying the concepts. It is a zoom level one, which shows the organisation in broad outlines. The most important context is that dynamic capabilities shape the company's capabilities and, at the same time, directly contribute to the company's success. The organisational capabilities themselves are the result of a company's available resources in connection with these processes and are the basis for organisational success. The black fields represent respective subcategories. Therefore, absorptive capacity is a part of a company's dynamic capabilities and aims mainly at integrating external, volatile knowledge. This knowledge contributes to the company's performance and, consequently, to its competitive advantage, innovative capacity, and financial performance. It also strengthens the company's core competencies by integrating external know-how.

In this argumentation, absorptive capacity is the mechanism responsible for transforming external knowledge into increased organisational performance (Kostopoulos et al., 2011). To conclude, the dimension of a firm's absorptive capacity relates to the efficiency of external sources for the firm's performance. The generated knowledge can only be absorbed or exploited with the matching capabilities and is closely linked to organisational effort and expenditures (Fabrizio, 2009).

However, the above-illustrated overview hides a critical fundamental property of absorptive capacity. The ability to learn from external sources applies not only to inter-organisational collaborations. Different organisational units can benefit and learn from each other and apply new knowledge processed by other divisions or units. The characteristic of the intra-organisational knowledge access of an organisational unit is comparable to inter-organisational knowledge transfer. For both processes, the network is key to accessing knowledge and, most importantly, helpful expertise. The position inside this network is decisive for the innovative

capability and increases the ability to use the knowledge available in different parts of the organisation (Tsai, 2001). The concept of absorptive capacity includes both the role of the available expertise to process the externally procured knowledge and the distribution of this information inside an organisation

It is the ability to transfer the externally gained knowledge into information that a broader spectrum of individuals or units can understand. This conversion increases the likelihood that the information reaches the recipient for whom it is imperative. To conclude, absorptive capacity is the mediating factor between the environment of an organisation and its ability to adapt to it (Bathelt, Malmberg & Maskell, 2004). This relation between absorptive capacity and knowledge exploration underlies the importance of absorptive capacity to transform external knowledge into tangible benefits in order to develop innovation and commercial success.

Based on these recognitions, the underlying understanding of this thesis regarding the importance of absorptive capacity is that it is the crucial variable that determines to what extent and how successful organisations incorporate external knowledge into their innovation processes. This research focuses mainly on the mediating role of this capacity concerning inter-organisational collaborations. However, it is essential for the understanding also to link the intra-organisational processes concerning the processing of external knowledge with the concept. Only then the scope can be fully understood, and the significance of this capacity becomes obvious.

3.1.1 Components of Absorptive Capacity

Once the concept of absorptive capacity has been explained in its broad outline and accompanying, the implications and the importance for companies become apparent. It is essential to identify its critical components to better understand the concept's nature. This understanding is crucial for the further investigation of this thesis. Since the theory of absorptive capacity was first developed by Cohen and Levinthal (1990) 1990, the main findings of this basic research are very influential. Even though 30 years have passed since its publication, the core of the argumentation has still proved relevant. Cohen and Levinthal base their argumentation on the connection between absorptive capacity and prior knowledge. In this context, they explain the ability to recognise, absorb and apply relevant information (Cohen & Levinthal, 1990).

Based on these fundamental findings, the concept has been continuously developed, refined and adapted. A crucial further development is the inclusion of the dynamic components of the organisational and practical business environment, which are already presented in the basic concept. Van den Bosch, Volberda & De Boer (1999) contributed significantly by developing a deeper understanding of the importance of absorptive capacity as a mediating component of organisational change. They provide the three knowledge-related dimensions: efficiency, scope and flexibility of knowledge absorption. Efficiency includes the identification, assimilation, and exploitation of knowledge from an economic perspective, scope describes the spectrum and degree of component knowledge available to a company, and flexibility indicates the access to additional and the ability to realign existing component knowledge. Thereby, component knowledge can be divided into products or services, market, and process-related knowledge, which already indicates the existence of different absorptive capacities (Van den Bosch, Volberda & De Boer, 1999).

Emphasising the dynamic components of constant change, Zahra and George (2002) made another essential contribution to the refinement of the concept by defining four main patterns - knowledge acquisition, assimilation, transformation, and exploration. These four determinants are divided between the two classes of potential (acquisition & assimilation) and realised (transformation & exploration) capacity. In this term, knowledge acquisition describes the ability of a company to target and acquire relevant knowledge. Knowledge assimilation includes the required capabilities to understand, analyse and interpret obtained knowledge. Knowledge transformation entails the ability to customise external information in order to combine it with the existing knowledge base. Knowledge exploitation refers to the development of existing or the creation of new capabilities based on the absorbed knowledge (Zahra, George, 2002).

This division is based on the argument that although companies can often acquire and assimilate knowledge, they need more capabilities to transform and exploit it into higher earnings. These two categories can be very different, e.g., a company can have a high potential capacity but, at the same time, a low realised capacity, which prevents the development of innovation and processes based on the absorbed external knowledge. Both categories are complementary and equally important for the company's success, as one category depends on the other (Zahra & George, 2002).

Based on the outlined approaches, Lane et al. (2006) define the concept in three complementary processes: "*(1) recognising and understanding potentially valuable new knowledge outside the firm through exploratory learning, (2) assimilating valuable new knowledge through transformative learning, and (3) using the assimilated knowledge to create new knowledge and commercial outputs through exploitative learning.*" (Lane et al., 2006, p. 856).

This process-oriented refinement of the concept allows an extended model of the concept, recognising the reasons and drivers for absorptive capacity as equally as the meaningful results. This multidimensional perspective thus appreciates external factors and inter-firm processes (Lane et al., 2006).

By returning to the concept of Cohen & Levinthal (1990), Toroviral and Durisin (2008) argue for reintroducing a component one step ahead of the knowledge acquisition dimension. They refer to the importance of being able to evaluate external knowledge and thus reintroduce recognising the value as a component. Furthermore, their concept is based on considering transformation and assimilation as an alternative, not a consequence of one another. In doing so, they also counter the two-part framework of Zahra and George and argue against a division into realised and potential absorptive capacity. Their conceptual frame of AC entails recognition, acquisition, assimilation, transformation and exploitation (Todorova & Durisin, 2008).

Beyond these most influential studies, only some articles deal with the exact definition of the concept. This soft focus may seem surprising, but it is due to the sophistication of the arguments presented and the focus of existing research. Most of the research use one of the presented perspectives as a basis for their further argumentation. Consequently, newer definitions are very similar to those presented.

A beneficial division for understanding the concept is classified into potential and realised absorptive capacity. This distribution is particularly fruitful when both categories are distinctly different - furthermore, it emphasises the connection of the sub-dimensions. Although the argument against splitting the concept into two sub-categories by Todorova & Durisin (2008) is understandable, this thesis follows the reasoning of Zahra & George (2002). This decision has the following two main reasons. Firstly, the characteristics of the individual dimensions

differ so much that a subdivision into more visual demarcations is very useful. Secondly, there is no danger of getting lost in the sub-categories, as an excellent rough outline divides the concept into two significant parts instead of looking at each point separately. However, the paper by Todorova & Durisin (2008) is followed by another sub-category: recognition of knowledge. This category is located in potential absorptive capacity but represents an essential factor that should not be ignored. Especially in the present time, when the amount of available knowledge is constantly increasing, the ability to understand, evaluate and classify external knowledge is of great value.

Figure 7 illustrates the understanding of this work towards the different dimensions of the concept. Thereby it is strongly influenced by the work of Zahra & George (2002). However, the importance of recognising external knowledge is stressed by adding a third dimension to the potential absorptive capacity. The figure shows the basic understanding of this work concerning the theoretical concept of absorptive capacity. Based on the capacities of an organisation with the five different components of recognition, acquisition, assimilation, transformation, and exploitation, it is decided whether an organisation has the internal capabilities to absorb external knowledge. Suppose the components are present in an acceptable form. In that case, the successful processing and implementation of the externally supplied knowledge can lead to a development process for new organisational capabilities and, as a result, to an increased performance of the business organisation. Therefore, absorptive capacity is understood as the mediating variable between the input of external knowledge and the benefit that can be drawn in capability development and increased firm performance.

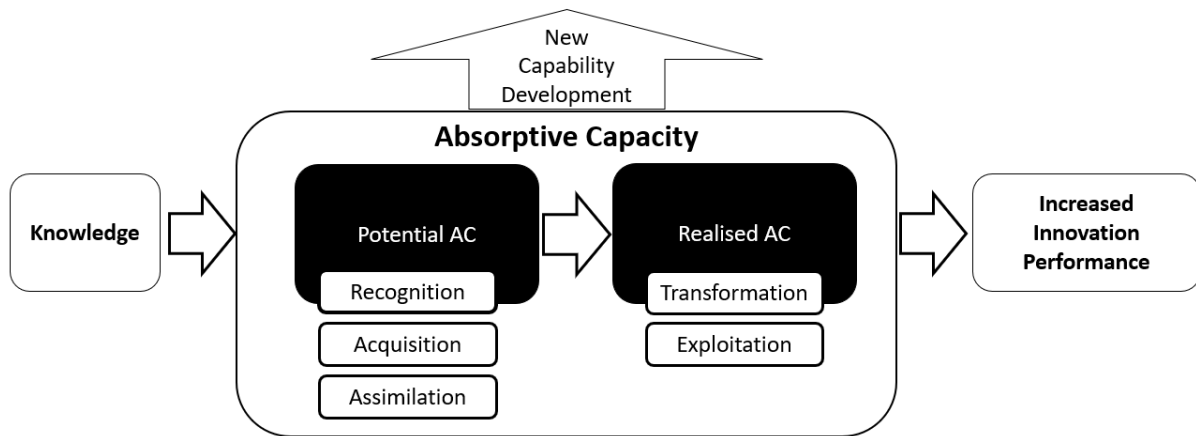


Figure 7: Components of AC

These five outlined components of absorptive capacity, divided into potential and realised absorptive capacity, are the core of the concept and build the foundation for further argumentation.

3.1.2 Antecedents of Absorptive Capacity

After pointing out the fundamental nature of the concept of absorptive capacity and defining its underlying dimensions, it is essential to establish a clear link between organisational antecedents and this characteristic to understand which mechanisms and factors influence the absorptive capacity of a company. Cohen and Levinthal (1990) again provide the basis here. This early paper already contains two essential features necessary for further elaborating the concept - it is multidimensional and considers different groups of organisational influences. These antecedents can be grouped into two clusters: prior related knowledge and internal mechanisms (Cohen & Levinthal, 1990; Van den Bosch, Van Wijk & Volberda, 2003).

However, this distinction only entails firm-level factors. In order to outline a comprehensive set of antecedents is essential to consider the inter- and the intra-firm level (Zahra & George,

2002). This distinction, considering internal processes and structures, as well as interactions with the environment, can sufficiently describe the concept's determinants. Thereby, the inter-firm level comprises the nature and distribution of knowledge and external communication mechanisms, wherefore the inter-firm level entails the two above-outlined clusters (Lewandowska, 2015). Because absorptive capacity comprises different levels, there are also various classifications. For example, Van den Bosch, Volberda & De Boer (1999) presents the antecedents with the help of intra-firm, firm and interfirm levels. Volberda, Foss & Lyles (2010) use managerial, inter-organisational, intra-organisational and prior knowledge relevant antecedents for their model (Van den Bosch, Van Wijk & Volberda, 1999; Volberda, Foss & Lyles, 2010).

Therefore, the following table provides a brief overview of the most widely processed antecedents and their level of investigation. The different levels of intra-firm and interfirm were combined, as these two are sufficient to show the holistic picture. Further distinctions can be helpful for a more detailed view but can be considered sub-categories (Based on Van den Bosch, 2003; Lane et al., 2006; Volberda, 2010). The table, which lists several important antecedents that can be attributed to either inter-firm or intra-firm factors, already shows that the factors that determine the occurrence and level of the respective absorptive capacity are very diverse.

Level of Analysis	Antecedents for AC	References
Intrafirm	Organisational Form	Van den Bosch, Volberda & De Boer, 1999
	Combinative Capabilities	Van den Bosch, Volberda & De Boer, 1999, Jansen, 2005
	Unit R&D Intensity	Tsai, 2001
	Similarity of Attributes	Gupta & Govindarajan, 2000
	Strategy	Lane et al., 2006
	Informal Networks	Dhanaraj et al., 2004
	Dominant Logic	Mom et al., 2007
	Prior Related Knowledge	Cohen & Levinthal, 1990, Van den Bosch et al., 1999
	Internal Mechanisms	Cohen & Levinthal, 1990
	Knowledge Complementary & Experience	Zahra & George, 2002
	Characteristic of External knowledge	Lane & Lutbakin, 1998, Lane et al., 2006
	Characteristic of Relationship	Lane et al., 2006
Interfirm	R&D Cooperation	Fosfuri & Tribó, 2008
	Experience with Knowledge Search	Fosfuri & Tribó, 2008
	Similar Practices and Structures	Lane & Lutbakin, 1998
	Similar Knowledge Base	Ahuja & Katila, 2001
	Environmental Conditions	Lane et al., 2006

Table 3: Antecedents of AC

The table contains a selection of the most important sources dealing with antecedents in absorptive capacity. It goes back to the presentations of Van den Bosch, Volberda & De Boer, (1999), Lane et al. (2006) and Volberda, Foss & Lyles (2010) (Van den Bosch, Volberda & De Boer, 1999; Lane et al., 2006; Voberda, Foss & Lyles, 2010). This overview of the basic theory provides insight into the diversity of the various determinants of the concept. Based on the

outlined table, it becomes clear that the multidimensional concept of AC has many influencing factors that determine it. These need to be considered to understand how companies build AC and how this capability is critical to processing external knowledge. However, this research's approach goes opposite to the literature on these antecedents. As explained above, these factors are sometimes decisive for the extent to which firms' absorptive capacity is pronounced. The best way to explain this is with an example. Prior related knowledge and R & D cooperation are two substantial intra- and inter-firm antecedents (Cohen & Levinthal, 1990; Van den Bosch, Volberda & De Boer, 1999; Fosfuri & Tribó, 2008).

All Antecedents of absorptive capacity can also be interpreted inversely as absorptive barriers. Whether prior knowledge relates to new external acquired knowledge depends on firmly on the type of knowledge supplied. Only if the firms have knowledge related to the externally supplied knowledge it does lead to a higher AC. The same applies to R&D cooperation. Only if firms already have experience with R&D cooperation it does lead to a higher AC. In the context of this paper, the antecedents presented are called absorptive barriers for this reason, as the focus of this research is not to find out which existing factors strengthen the AC of firms but which obstacles they must overcome to overcome and strengthen their AC.

If one compares the antecedents presented, or by extension, the barriers, with the factors presented in point 2.1.5 regarding the funded collaboration project, it becomes clear that they overlap strongly. Challenges in the context of a heterogeneous consortium relate, for example, to the interfirm antecedents. A lack of experience with funded projects is clearly to be found in intra-firm barriers. In addition, the knowledge-related antecedents already suggest that the thematic context and the associated know-how also play a clear role here. For example, companies need specific knowledge in digital technologies to successfully absorb knowledge from this area. This example already shows that AC might differ according to the

subject area. The outlined antecedents refer to a broad range of different factors, all of which influence the AC. This variety suggests that AC can be understood very broadly.

3.1.3 Types of Absorptive Capacity

Despite this recognition, most research assumes only one type of absorptive capacity. Logically, the inverse conclusion of this argumentation is the recognition that organisations can absorb every kind of external knowledge as far as the absorptive capacity is sufficiently developed (Murovec & Prodan, 2009). From a practical point of view, this seems rather unlikely, and some previous antecedents indicate that the knowledge base should show certain similarities (e.g., Lane & Lubatkin, 1998; Ahuja & Katila, 2001). Therefore, there is strong evidence for different types of absorptive capacity dependent on the transferred knowledge. Schmidt (2005) underlies this argumentation by pointing out the differences between the employment of scientific and business-related knowledge. Based on the divergent impact of determinants on different kinds of transferred knowledge, a distinction between knowledge from a similar industrial background, knowledge from different industries and research-related knowledge occurs. Based on this classification, the determining antecedents and their importance are changing, wherefore a consideration of the specific type of knowledge is expedient for a more detailed evaluation of the concept (Schmidt, 2005).

In contrast, Murovec & Prodan (2008) classify absorptive capacity based on the two innovation types - science-push and demand-pull. Therefore, they propose scientific-based science-push absorptive capacity and market-based demand-pull absorptive capacity. By providing empirical evidence, a statistical significance of the determinants of internal R&D, attitude towards change, training of personnel and innovation cooperation is provided. However, their

importance differs for both types of absorptive capacity. Furthermore, the study contains two countries, but this fact of the different backgrounds only has little effect on the results (Murovec & Prodan, 2008).

Lim (2009) provides more evidence for this relation. Through the conduction of an in-depth case study, the existence of three different major groups of absorptive capacity is emphasised: disciplinary, domain-specific and encoded. Like Schmidt's argumentation, the classification is based on the underlying types of knowledge a firm wants to include. The first category is linked to general scientific knowledge, the second deals with specific technical problems and their solutions, and the third engages with knowledge embedded in processes or tools (Lim, 2009). Supplementary, firm-specific barriers include obstacles that occur within the organisation's framework. These include, for example, a lack of organisational structures, a poor flow of knowledge within the organisation, an obstructive organisational culture, or a lack of strategies regarding integrating external knowledge (Singh & Kant, 2008; Leal-Rodríguez et al., 2014).

These findings highlight the multidimensionality and depth of the concept. The characteristic of absorptive capacity is strongly dependent on various determinants mostly linked to the type of knowledge or its domain. However, it is equally dependent on organisational structures and processes. Both knowledge-specific and firm-specific attributes shape AC equally.

Figure 8 illustrates the understanding of this work towards the different dimensions of the concept. Thereby it is strongly influenced by the work of Zahra & George (2002). However, the importance of recognising external knowledge is stressed by adding a third dimension to the potential absorptive capacity. The figure shows the basic understanding of this work concerning the theoretical concept of absorptive capacity. Based on the capacities of an organisation

with the five different components of recognition, acquisition, assimilation, transformation, and exploitation, it is decided whether an organisation has the internal capabilities to absorb external knowledge. Suppose the components are present in an acceptable form. In that case, the successful processing and implementation of the externally supplied knowledge can lead to a development process for new organisational capabilities and, as a result, to an increased performance of the business organisation. Therefore, absorptive capacity is understood as the mediating variable between the input of external knowledge and the benefit that can be drawn in capability development and increased firm performance.

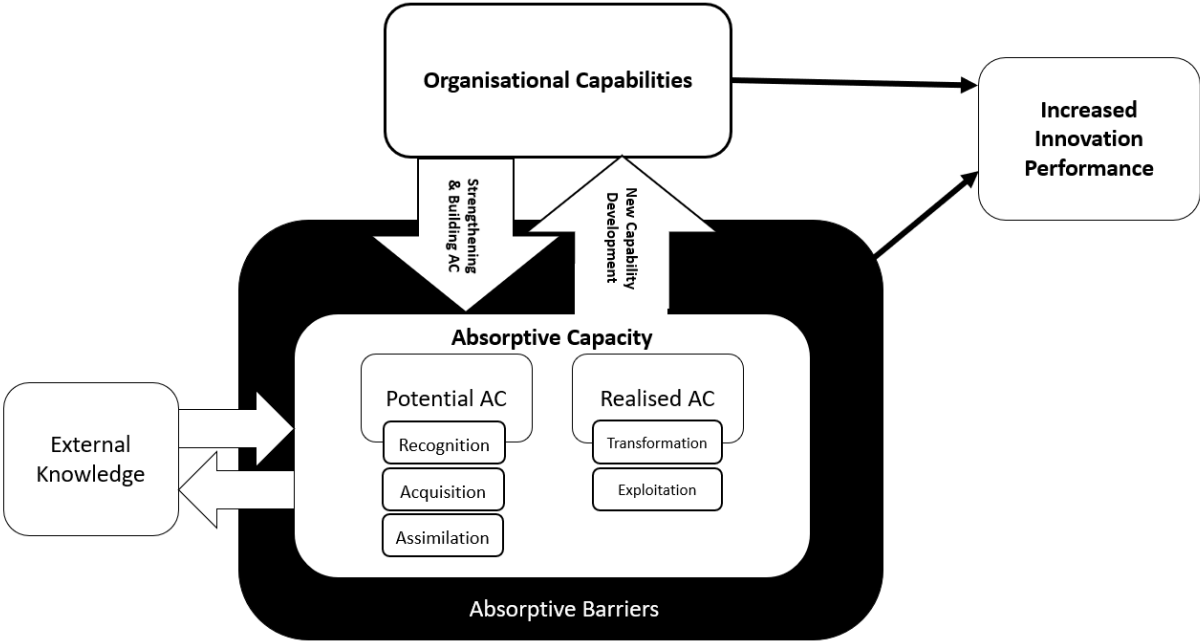


Figure 8: Conceptualising AC

In order to better understand the concept and to include the various influence factors, especially those relevant to practice, a layer of AC barriers related to AC antecedents were added. Only if the AC of the companies can overcome these barriers is it possible for them to benefit from external knowledge.

3.2 Absorptive Capacity and Open Innovation

The previous sections outlined the concept of absorptive capacity, its components, and its specific types or barriers. The concept presented with its components belongs to the field of management literature and refers to the firm context in which one organisation absorbs external knowledge. Building upon this theoretical foundation, the next part outlines the theory of collaborative innovation processes to link the research focus of this work - innovation intermediaries, with the previously outlined management concept of AC.

The previous points have shown that AC is the decisive concept for successfully implementing external knowledge. The closely related concept from innovation research that describes the increase in innovation capacity through the incorporation of external sources is known as open innovation (Enkel, Gassmann & Chesbrough, 2009).

This problem-solving approach focuses on integrating external sources into the innovation process to create better access to required innovation capabilities and synergies with the partners to increase their innovation capacity (Enkel, Gassmann & Chesbrough, 2009; Felin & Zenger, 2014; West & Bogers, 2014).

Based on increasingly complex requirements, as discussed in Chapter 2, there is an ongoing shift in the innovation process towards opening the innovation process to increase the innovation potential of companies (Gassman & Enkel, 2006).

This change from the 'closed' to the 'open' innovation (OI) process with a focus on the interaction between business organisations and their environment to optimise the innovation process is a paradigm shift in the understanding of innovation (Chesbrough, 2012). The founders of this concept, Chesbrough, Vanhaverbeke & West (2006), therefore, define open innovation as *"the use of purposive inflows and outflows of knowledge to accelerate internal innovation*

and expand the markets for external use of innovation, respectively. [This paradigm] 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" (Chesbrough, Vanhaverbeke & West, 2006, p.1).

Since this early definition of the term open innovation, this part of the innovation literature developed into a notable and detailed investigated research area. Thereby, the existing literature focuses mainly on the innovating company. This perspective particularly includes the areas of R&D, technology, and knowledge, with the primary objective of explaining how OI processes are adopted and how they impact the company's performance (Randhawa, Wilden & Hohberger, 2016). Erroneously, in the practical context, there is still a typical negative associated with open innovation, the outsourcing of company parts. However, this differs from the intention and the impact of open innovation. Instead, it is the creation of positive effects based on collaboration on innovation (Lichtenthaler, 2011).

The holistic open innovation approach can be divided into three main categories. The outside-in process describes expanding the companies' capabilities and increasing innovativeness through integrating external sources (Enkel, Gassmann & Chesbrough, 2009). In contrast, the inside-out process focuses on the benefits of open innovation for externalising knowledge and innovations and generating profits by bringing technologies, intellectual property rights or ideas to the market's outside environment. The coupled process includes alliances, cooperation and joint ventures based on co-creation and combining the previously outlined processes, the input and the use of knowledge and innovations (Enkel, Gassmann & Chesbrough, 2009). Although the inside-out process has to be considered separately, the other two processes point out an essential field of innovation research: external origins as a vital source of innovation (Gumusluoğlu & Ilsev, 2009).

Therefore, the nature of this process requires a closer investigation. In the context of a company's properties, there are several reasons not exclusively to focus on in-house resources and developing own ideas (Bogers et al., 2019). In the context of this literature, two primary motivations for firms to include external sources in the innovation process can be highlighted: better access to needed innovation capabilities and improved efficiency based on scale economies. In order to fulfil these aims, firms must be able to detect relevant external innovation sources and, in a second step, include the entailed knowledge (West & Bogers, 2014). However, integrating external knowledge is challenging and cannot be reduced to identifying relevant sources of knowledge (Arrigo, 2012). OI processes can be understood as a problem-solving approach in which input has to be organised so that profitable output is generated. Two main factors play an essential role: the complexity and structure of the problem and the transferred knowledge, which is necessary to solve the problem of the innovation process (Felin & Zenger, 2014).

Open innovation and AC focus on the same problem – sourcing external knowledge. In the context of open innovation, especially concerning the outside-in and the coupled process, success depends on how well organisations can use or implement the knowledge and resources they have received from external sources for their innovation process. For this, however, the receiving organisation needs specific integrative capabilities to absorb and benefit from the externally aggregated knowledge (Tzabbar, Aharonson & Amburgey, 2013). Only then can the goal in the definition of open innovation be achieved, namely the targeted use of knowledge inflows to accelerate innovation processes. Therefore, these integrative capabilities are crucial regarding the success of inbound external sources to improve innovation processes (Chesbrough, Vanhaverbeke & West, 2006, Enkel, Gassmann & Chesbrough, 2009).

These required capabilities or capacities are very much in line with the definition of absorptive capacity, the ability of an organisation to benefit from external knowledge (Cohen & Levinthal, 1990). Referring to the mediating character of absorptive capacity regarding inter-organisational collaborations, the logical conclusion is that absorptive capacities also significantly determine the success of open innovation processes.

Especially from a practical point of view, they deal with the same processes and approaches, and open innovation implies absorptive capacity. However, they are rarely linked in the literature, as open innovation is practice-oriented, and AC is a rather abstract concept from a more theoretical-driven part of the literature (Vanhaverbeke, Van de Vrande & Cloudt, 2008). Nevertheless, absorptive capacity and open innovation concepts are closely linked, even complementary in their nature. However, the impact of absorptive capacity is closely linked to the quality and the spectrum of the organisation's prior knowledge. Inbound open innovation strongly focuses on the quality and spectrum of externally acquired knowledge (Lewandowska, 2015). This differentiation again shows the partly different focus but, simultaneously, the close linkage of the concepts. The concluding finding of linking the two concepts is that open innovation is only possible with some form of absorptive capacity (Vanhaverbeke, Van de Vrande & Cloudt, 2008).

3.3 Special Case Innovation intermediaries

Building on this important finding, however, innovation intermediaries' unique role creates a case requiring a deeper explanation. As described before, open innovation is based on opening a firm's innovation process to external inputs. These inputs can consist of a broad range of external mechanisms, collaborations or contributions that help the organisation increase their

innovation potential (Chesbrough & Bogers, 2014). Inter-firm cooperation is the most common way to create knowledge inflow to strengthen innovation activities (Lyu et al., 2019; Cassiman & Veugelers, 2006).

In this case of cooperation, the knowledge to be absorbed depends on the partner company. The previously described determinants decide whether the capacity of the absorbing company is sufficient to use the acquired knowledge to its advantage based on the domain- and firm-specific capabilities of the receiving company to identify, acquire, assimilate, transform, and exploit significant knowledge.

However, a remarkable phenomenon occurs if the cooperation does not occur in previously outlined OI processes between cooperating companies but with service providers in the knowledge environment. With this type of client and knowledge provider collaboration, the provider is intent on packaging the information to make it as easy as possible for the receiving company to absorb it. In this case, both parties, primarily the provider, actively contribute to the collaboration's success by actively involving the practices of the client company (Gronroos & Voima, 2013).

This changed setting is powerful in cooperation with innovation intermediaries. While in OI processes between firms, the knowledge-receiving firm needs to have sufficient absorptive capacities, collaborations with innovation intermediaries mainly include building required capabilities (Katzy et al., 2013). As outlined in the chapter about the role of innovation intermediaries before, the creation and support of inter-organisational networks is one of the most critical and frequent functions innovation intermediaries take over (e.g., Howells, 2006; Klerkx & Leeuwis, 2009; Lopez & Vanhaverbeke, 2009; Kilelu et al., 2011; Agogué et al., 2017; Vidmar,

2018). Especially following the understanding and definition of innovation intermediaries in this thesis, this function is an essential part of their characteristics.

This argumentation questions the basic view of whether a company must have an absorptive capacity to act as a prerequisite for the open innovation process since innovation intermediaries can develop the required capacity for the firm.

This relates, above all, to the area of potential absorptive capacity and the entailed knowledge recognition and assimilation process. Even if a certain level of absorptive capacity is at least argumentatively justifiable, there is evidence that innovation intermediaries can accelerate and develop an organisation's absorptive capacity (Kokshagina, Le Masson & Bories, 2017). This is based on their nature of providing services that help create needed competencies to enable knowledge transfer (Spithoven, Clarysse & Knockaert, 2010).

Figure 10 points out the focus of this research. Through the unique role of innovation intermediaries, these organisations provide companies with the knowledge they need to absorb external knowledge. Through their services, they compensate the necessary organisational capabilities needed for absorption. To be able to examine this particular type of open innovation process in more detail, the focus is on understanding the process itself and, in contrast to the vast majority of literature, on the collaboration results. The intermediaries not only have a connection to the host company in the sense of providing external knowledge, but they also work directly to increase the absorptive capacities of the companies so that they can better absorb external knowledge (Kokshagina, Le Masson & Bories, 2017).

Compared to Figure 8, Figure 9 forces the absorptive capacity concept to be extended by the unique position of an innovation intermediary. This intermediary influences the collaboration partners and, thus, the external knowledge that flows into the organization and the existing

absorptive capacities through interactions. In addition, the intermediary itself provides external knowledge to the organization. The finer black arrows represent this interrelationship, while the direct influence on the absorptive capacity is shown as a dashed arrow.

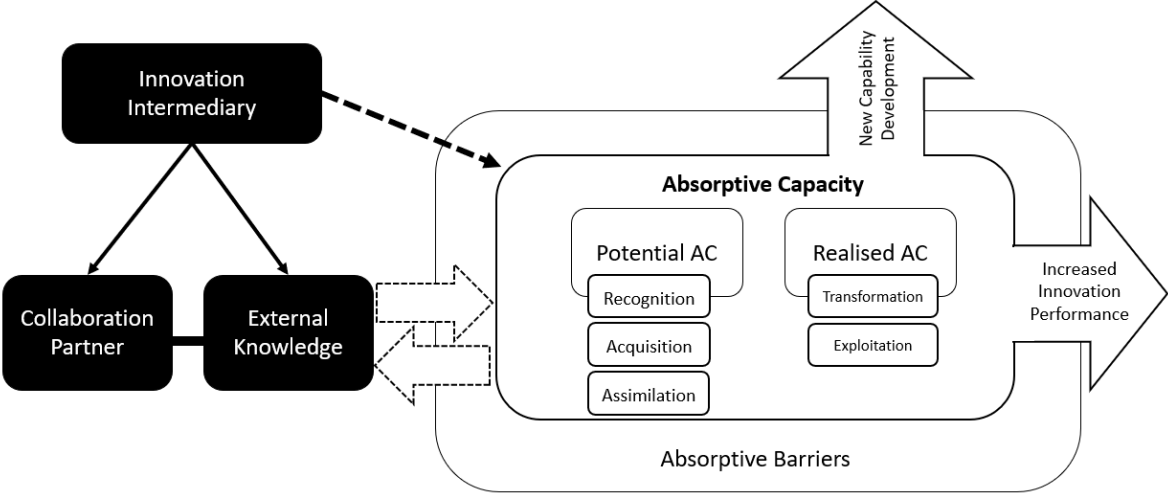


Figure 9: Innovation Intermediaries and AC

However, the involved innovation intermediary is missing the internal perspective of the client organisation which lead to a lower awareness of organisational processes, rules and routines. In addition, the intermediary may lack a deep understanding of the underlying technology of a project (Keinz & Marhold, 2020). Thus, the ability of intermediaries is not simply to bring in their professional advantage, but it allows to conclude that the strengthening of companies is a complex and delicate process.

In order to transform the collaboration process between intermediaries and their clients into a less abstract representation, another influencing factor is of great importance. Intermediaries usually do not only operate with one client, they operate in a network with several stakeholders. In innovation research, this network perspective has traditionally been of great importance, as innovations usually emerge from alliances with several stakeholders (Szeto,

2000). In this context, the role of innovation intermediaries is not limited to a direct interaction with an organisation, they are part of a system of actors and contribute to an innovation system through direct and indirect relations and interactions. To outline these important activities, not just a single interaction, but whole system must be considered and analysed (Stuck, Broekel, Revilla Diez, 2016). To generate this understanding in relation to the activities of innovation intermediaries, research must take a more systemic perspective than the framework outlined above regarding the interaction of firms and intermediaries. Following an innovation system perspective, intermediation is not considered from a micro-level company perspective, but rather, on a macro-economy level (Inkinen, Suorsa, 2010). However, the literature presented above in relation to absorptive capacity is aimed precisely at the micro-level and the associated problems (Martinkenaite & Breunig, 2016).

Consequently, the conceptual absorptive capacity framework outlined in Figure 10, which provides the basis for further research into the collaboration processes of intermediaries with their clients, has a micro level focus. It looks at the process structures and determinants in the intermediation process between an intermediary, the absorbing organisations and collaboration partners who provide the external knowledge. To use the previously developed absorptive capacity framework to analyse the collaboration processes of intermediaries and their clients, the full scope of their intermediary role must be taken into account. Only then is it possible to fully capture the interactions and the impact that intermediaries exert (Kanda et al., 2020).

To achieve this, the two influencing factors highlighted in Chapter 2, namely the project context and the thematic context, are incorporated into the conceptual framework of this thesis. By taking these two factors into account, various external influencing factors can be added to the micro-level perspective adopted by the developed Absorptive Capacity

framework. As pointed out in point 3.1.2, the thematic and the project context are closely linked to the barriers that must be overcome to absorb external knowledge successfully.

Within the framework of these two determinants, all thematic challenges concerning digitalisation, the interaction level of intermediaries or the characteristics of the cooperation partners within the projects are entailed. Figure 10 pictures these factors in the context of the absorptive barriers. This definition completes the conceptual framework of this thesis and forms the basis for further analysis. Compared to Figure 9, the absorptive barriers are further subdivided into thematic and project absorptive barriers based on this argumentation and outlined in a dark-black frame.

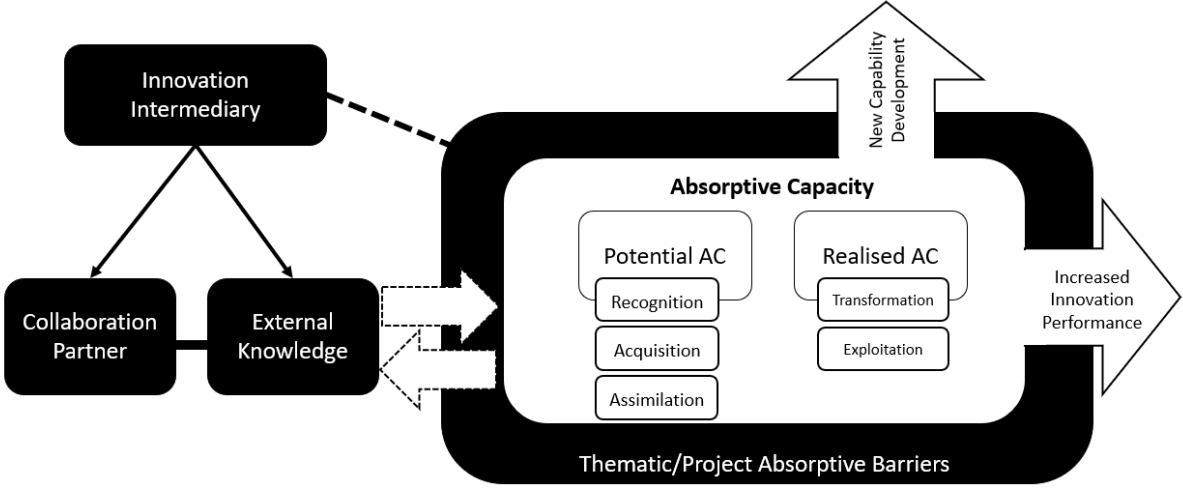


Figure 10: Conceptual Framework

Together with the theoretical recognitions of Chapter 2, the absorptive capacity framework is used to research the collaboration process of innovation intermediaries and their clients in this thesis.

3.4 Conclusion

To explore the innovation process with external sources, specifically innovation intermediaries, in more detail, the third chapter of the literature review introduces the concept of absorptive capacity. It develops a conceptual framework to outline what organisations need to benefit from external knowledge for innovation (Cohen & Levinthal, 1990). This ability, which can be classified as a dynamic capability, directly influences organisations' performance and competitive advantage (e.g., Zahra & George, 2002; Teece, 2007; Flor et al., 2013). It directly influences how efficiently companies can use and benefit from external sources in the innovation process (Fabrizio, 2009).

Consisting of potential and realised absorptive capacity, the concept can be divided into five subcomponents - recognition, acquisition, assimilation transformation and exploitation (Zahra & George, 2002; Todorova & Durisin, 2008). Due to its intangible nature and multidimensionality, it is often difficult to define specific factors influencing a company's absorptive capacity. In this course, various individual inter- and intra-firm factors can be identified that are related to the absorptive capability of an organisation (e.g., Van den Bosch, Volberda & De Boer, 1999; Zahra & George, 2002; Lane et al., 2006; Fosfuri & Tribó, 2008). The influence of these is referred to as absorptive capacity barriers in the context of this thesis. These also give weight to the factor that absorptive capacity can be divided into different types to enable a more precise analysis and classification (Schmidt, 2005; Murovec & Prodan, 2008; Lim, 2009).

Because of this specification of the capabilities a firm needs to exploit external knowledge, the concept of absorptive capacity is closely related to open innovation, which draws on the characteristics of user knowledge (Lewandowska, 2015). While potential absorptive capacity has a direct effect on the recognition, acquisition and assimilation of externally supplied

knowledge in the context of the open innovation process, realised absorptive capacity determines the process when companies are already involved in the process (Lichtenthaler & Lichtenthaler, 2009, Robertson, Casali & Jacobson, 2012).

Despite the direct contact, open innovation processes and absorptive capacity are rarely researched in detail, as the focus of the literature on the latter is mainly based on quantitative correlations (Zobel, 2017, Flor, Cooper & Oltra, 2018).

Consequently, a detailed conceptual framework for the absorptive concept was developed step by step to allow this linkage. This framework is the core element of the subsequent analyses and divides the collaboration process between intermediaries and clients into different factors. Absorptive capacity is particularly suitable as a basic concept for analysing intermediaries, as they provide external knowledge and, unlike normal collaboration partners, actively support and enable the formation of these capabilities (Katzy et al., 2013, Kokshagina, Le Masson & Bories, 2017). For this reason, the framework that has been developed is the basis for enabling intermediaries to facilitate transfers between several parties (Spithoven, Clarysse & Knockaert, 2010).

Thereby, this research follows the conviction that approaching an established framework from a new perspective can be a purposeful way to strengthen and transfer the framework's application (Eidhoff et al., 2016). As the impact of innovation intermediaries can only partly be considered in isolation, several actors must be included in the analysis (Cunningham & Ramlogan, 2012). In contrast to most work, this thesis focuses on more than just the intermediary organisation itself (Randhawa et al., 2017). To do justice to the activities of intermediaries in collaborative projects, more is needed to analyse one-to-one interactions (Calamel et al., 2012). To consider the various external influence factors, absorptive capacity barriers entailed

in the thematic and project context are an important building block and complete the conceptual framework.

4. Research Methodology

In the broadest sense, research is seeking knowledge, a systematic and scientific search for relevant information on a selected topic. The main objective of a research project is to find answers to posed questions by applying scientific processes. Each research aims for different objectives, which requires different approaches to fulfil them (Kothari, 2004). For this purpose, a suitable research methodology enables the researcher to undertake and preserve a scientific investigation and build the core of the research (Crotty, 1998). To fulfil the claim of academic research as a replicable and reliable process which expose, state, and define problems within clear boundaries, the research process depends on a thoughtful and appropriate approach regarding the research methodology. This approach is the prerequisite to contributing to generalising knowledge (Kumar, 2022). Furthermore, this process requires accurate recording and reporting. To conduct a comprehensible research project, each step taken and the associated benefit and limitations must be transparent (Kumar, 2002).

Therefore, this chapter outlines the methods and approaches to investigate collaboration activities between client organisations and innovation intermediaries in the context of funded collaborative projects in the field of digital technologies. The following chapter points out the underlying assumptions that determined the selection of the research methodology. These methods selected to amend, amplify and assess the information developed through the literature review are discussed in detail and critically scrutinised. In order to take a more structured approach, this methodology follows the guideline of a methodological framework which is outlined and discussed in the first section of the methodology. The next point discusses and states the underlying research philosophy and the accompanying assumptions. Based on this presumption, the underlying research approach is presented in detail and delimited. On this basis, the research purpose of this project and the selection of a suitable research strategy are

outlined. The description of the sampling strategy and the analysis approach conclude the methodology section.

4.1 Methodological Framework

The previously outlined complexity and potential to lose sight of the research objectives require a particularly rigorous approach to research methodology (Ibrahim, 2008). For this reason, Saunders, Thornhill & Lewis (2009) introduced the concept of the research onion. This approach visualises different steps of a research methodology as onion layers to provide a step-by-step guide from the outside to the inside to create a research methodology. The outer layers include the underlying issues of the research, the philosophy, and the approach. The subsequent three layers, the research strategies, research choices and time horizons, build the research design process and the general plan to answer the research question. Finally, the sixth layer includes the data collection techniques and the analysis process (Saunders, Lewis & Thornhill, 2009).

However, as figurative as the metaphor research onion illustrates the layer principle of the methodology, the comparison should not be taken too literally. In contrast to a real onion, the outermost skin is not less important or even waste, but the outer layers are the fundamental concept, the root of the research. They represent the researcher's understanding and derived considerations and choices. Therefore, they are distinctive for selecting and elaborating an appropriate research design, a coherent approach to answer the research questions and fulfilling the interlinked research objectives (Sahay, 2016).

Following the detailed explanations of the meaning and importance of the different shells, the concept of the research onion is a very detailed guide that allows a step-by-step development

of a research methodology. The concept’s popularity reflects this comprehensibility, especially among early career researchers. However, the concept should not be misunderstood as simplistic for conducting a research methodology for students. The strength of this framework lies in its applicability to different types of research (Bryman, 2012).

The research onion explains the individual layers of a methodology and presents different approaches. The difficulty of selecting the appropriate concepts and methods is up to the researcher’s assessment based on detailed explanations. For this reason, it serves as a guideline for this project. Although the research onion framework provided the direction for the methodology of this thesis, an adapted methodological framework was developed for this thesis based on numerous sources. Figure 11 highlights the main areas of the methodological framework used for this thesis, that builds the foundation for the data collection and analysis.

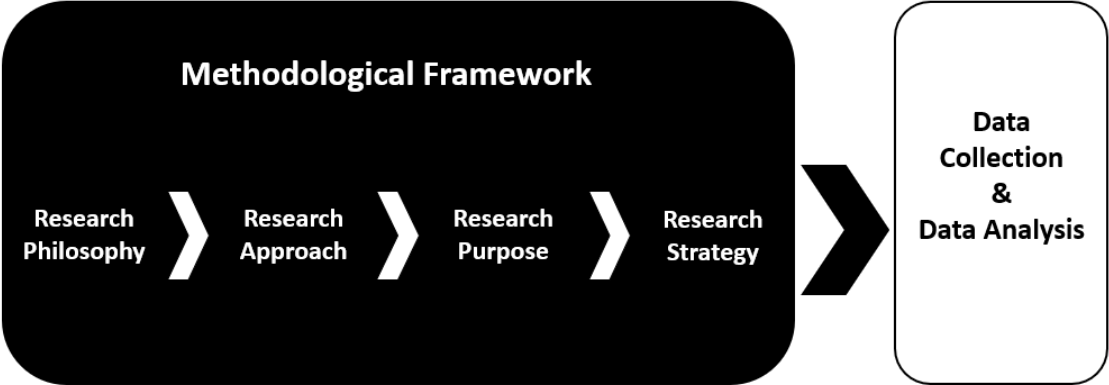


Figure 11: Methodological Framework

Regardless of the underlying frameworks and the associated decision support tools, it is still impossible to find a guarantee for the perfect methodology. Each different way of exploring a theme has certain advantages and disadvantages that must be weighed carefully in the project (Choy, 2014). Weighing this decision is ultimately up to the researcher, as he or she

determines the direction of the project and the associated decision. To keep all methodological choices as transparent and comprehensible as possible, chapter 4 outlines the thoughts and justifications behind all methodological choices.

4.2 Research Philosophy

The underlying philosophical issues regarding the research are of great importance for selecting an appropriate research methodology. First, the underlying philosophy supports the consideration of the evidence to answer the research question. Second, philosophy is the theoretical background of the different research approaches. Therefore, it helps to determine and recognise the function of different research designs. Third, by providing this underlying theory, the philosophy leads to creating and identifying new research approaches (Easterby-Smith, Thorpe & Jackson, 2012).

This paper mainly follows an interpretive approach based on several reasons. By answering the outlined research questions:

RQ1: What are firms' main absorptive barriers to funded collaborations projects in digital technologies, and how are they influenced by thematical and project contextual factors?

RQ 2: How can innovation intermediaries compensate for missing internal absorptive capacities of collaborative organisations to process external knowledge?

RQ3: How can innovation intermediaries benefit themselves from their interactions in collaborative projects?

This research aims to deepen the understanding regarding the role of innovation intermediaries in this specific type of collaboration.

From an ontological perspective, human involvement in creating innovation leads to a dependence on human meanings and actions and is, therefore, not as fixed as the physical reality (Johannesson & Perjons, 2014). The concept of understanding “*verstehen*” is the underlying idea of interpretivist research and is clearly delimited from the positivist concept of explaining “*erklären*” (Schwandt, 1994). Additionally, human interaction in the innovation process determines the investigation issue, wherefore, it is impossible to gain completely objective knowledge. Human meanings and understandings are highly relevant to this research (O’Reilly & Tushman, 2008).

The epistemological approach of the interpretive paradigm is subjective and based on the belief that social phenomena depend on knowledge (Grix, 2010). Thereby, human experiences and interactions create knowledge (Weber, 2004). The perspective of this research shares and underscores this understanding. While the existing research on innovation intermediaries may produce specific results based on an organisation-focused or quantitative perspective, this research examines the perspective in a thematically focused collaboration process, which may lead to a different outcome.

Traditionally, the interpretivist paradigm is closely linked to a qualitative research design based on the subjective interpretation and understanding. This research directly contacts participants using a qualitative methodology, which leads to a better understanding of the reasons behind phenomena based on the awareness of their interpretations and experiences (Carson et al., 2001). However, the linkage of qualitative research and an interpretivist paradigm is noticeable but not mandatory. Therefore, the interpretivist basic orientation of this research may lead to a qualitative research design, but the underlying philosophy is not enough to determine the research design (O’Reilly & Tushman, 2008). Accordingly, Guba and Lincoln (2011) argue that any research method may be used sufficiently with every research

paradigm. However, the underlying paradigm outlines the perspective that guides the whole project in a fundamental way (Lincoln, Lynham & Guba, 2011).

4.3 Research Approach

Before a suitable design for the research project can be sought and determined, it is crucial to justify the underlying research approach. In social science, the answer to research questions consists of theories. These theories can vary widely in their level of abstraction, complexity, and scope. Fundamentally, research projects dealing with theories can form two main groups corresponding to their objectives. The first group is dedicated to theory testing and pursues deductive reasoning, while the second category aims at theory building and pursues this through inductive reasoning (De Vaus, 2001). The development of a theoretical framework, which is tested through the subsequent use of data, is the basis of deductive research (Saunders, Lewis & Thornhill, 2009). Deductive research is constructed 'top down', from theory to hypothesis building, via data, to finally add new or refuse old theory (Creswell & Plano Clark, 2007). Therefore, deductive research and the positivist approach are mainly linked, which permits the statement of one or more hypotheses and the statistical testing of gained results (Snieder & Lerner, 2009). Deductive concepts outline elements included in the deductive process but do not give information about the causes of the occurring phenomena. However, it is possible to use deductive approaches to investigate the relationship between universal theories and empirical observations (Ormerod, 2010).

In contrast, exploring data and developing new theories form the base for an inductive research approach (Saunders, Lewis & Thornhill, 2009). Inductive research is conceptualised from the "bottom-up". The meanings and views of the participants build themes and, as a

result, theory based on the linkages of these themes (Creswell & Clark, 2007). For inductive research, one question is crucial - are the results part of a specific occurring phenomenon, or do the observations fit into a story or pattern (De Vaus, 2001).

Furthermore, the research approach is closely linked to the available literature type. Typically, the progressive depth of understanding a phenomenon is related to the stepwise development from initial theory development to theory testing. At the same time, the focus of research continues to change. While in an initial work, conceptualising during and especially after the data collection is the main task to work out patterns to explain the data - in mature research, conceptualising before the data collection to define the hypothesis takes most of the time (Edmondson & McManus, 2007).

To gain a deeper insight into the character of inductive research approaches, Wall & Stokes (2014) have compiled a list of properties that inductive research possesses – relatively small samples, specific research methods, the avoidance of hypothesis, subjectivity, and reflexivity (Wall & Stoke, 2014).

4.3.1 Avoidance of Hypothesis

A hypothesis is the proposed answer or solution to a meaningful research question or significant problem in scientific research. In deductive research, such a hypothesis must be tested to get valid research results. This approach is closely linked to a positivist understanding since it aims to ascertain the truth about a phenomenon (Park, Konge & Artino, 2020). In contrast, inductive research starts by investigating the research area, relationships and the importance of phenomena are determined later. Consequently, the aim is to gain and deepen the understanding, not prove or disprove a statement (Silverman, 2015). At this point, this research on

intermediaries is challenging to classify and takes two positions. On the one hand, this research aims not to examine statements concerning innovation intermediaries but to explain the cooperation, its character and its influence on companies and to understand these relationships in detail. On the other hand, by using the concept of absorptive capacity as the basis of the conceptual framework, a general topic is used to classify and categorise the results, not a completely new approach, but a known phenomenon explored from a new perspective and content.

4.3.2 Subjectivity

In contrast to most deductive approaches, inductive research introduces the concept of subjectivity. From a positivist perspective, the results of inductive research are contestable. They are not measured but somewhat subjectively associated with an investigated phenomenon (Gasson, 2004). In contrast, inductive approaches accept and acknowledge the presence and role of subjectivity within research. The 'subjective' perceptions, opinions and perspectives of humans are distinctive to fully permeate the investigated phenomenon (Wall & Stokes, 2014).

Nevertheless, in inductive research, the subjectivity of the project and the researcher are treated with special care and transparency to meet the research requirements (Hinshelwood, 2013). By researching a timely subject, this project relies on the opinions and expertise of people involved in the cooperation of companies with innovation intermediaries. Primarily their subjective assessment and experience offer potential new insights and knowledge in this area.

4.3.3 Reflexivity

The conduction and design of the research are directly shaped by the underlying mental models and the frame of the references, organising the observations and reasoning (Bhattacharjee, 2012). The background and environment of a researcher are decisive for the subject of investigation and its angle, the selection of the most promising methodology to answer the research question, the assortment of the most meaningful results and the dissemination of the project outcomes (Malterud, 2001).

For inductive research, recognising the role and the underlying research philosophies are of outstanding importance for the quality and meaningfulness of the research results (Johnson & Duberley, 2015). Therefore, reflexivity is the recognition that the choices and actions the researcher takes directly impact the context and meaning of the experience being explored. It is a vital part of the research (Horsburgh, 2003). The personal background of the researcher unavoidably impacts different elements of the research process. From the recruitment of the participants to the drawing of the research conclusion, preloaded perceptions influence the research. They need to be considered and balanced between the advantages of this initial in-depth understanding of the phenomenon and the danger of projecting the researcher's own experiences to maintain the credibility and reliability of the research (Berger, 2015).

In researching a phenomenon in which the researcher is directly involved, reflexivity plays a crucial role in this thesis. The researcher pleads emphatically for the fact that the prior understanding and knowledge of the object of research affect the study results and the way of answering the research questions. However, according to Finlay (2002), the researcher has to pay attention to how strongly his own experiences and expertise influence the methodological provision of this research (Finlay, 2002). As the author of this thesis is active in the same field

in which the research takes place, the confrontation with possible prejudices and biased results was a factor that was addressed. For this reason, special attention was paid to ensuring that this influence was limited to maintaining a particular practical relevance of the research. To support a neutral position, the data analysis is based on the previously defined framework, which enables a much more neutral position than a completely unguided data analysis.

4.3.4 Allocation of the Research

As the aforementioned factors indicate, this research project is assigned as an inductive approach. This allocation is further based on its character of developing theory, and it aims to understand a particular phenomenon. However, the division into inductive and deductive approaches is flexible and generally accepted. Above all, using a framework derived from theory, as already discussed under the avoidance of hypothesis, means that the project cannot be fully classified as inductive research.

In a traditional view, this categorisation also leads to the selection of a quantitative (deductive) or qualitative (inductive) research approach (Soiferman, 2010). Thereby, the quantitative theorists are located: *“in a single reality that can be measured reliably and validly using scientific principles, while qualitative theorists believe in multiple constructed realities that generate different meanings for different individuals, and whose interpretations depend on the researcher’s lens”* (Onwuegbuzie & Leech, 2005, p. 270).

Following this assessment, this project follows a qualitative research approach. This choice is also indicated by the nascent characteristic of this research, based on the focus on interactions and connection between subjects and the open-ended nature of the research questions, which leads to a qualitative research design (Edmondson & McManus, 2007).

However, in exceptional cases, inductive research is quantitative and deductive research is qualitative (Saunders, Lewis & Thornhill, 2009). Since this project can be categorised and pursues the classical goals of inductive, qualitative research, the consideration of exceptions plays a subordinate role. In addition, it may be noted that despite a broad spectrum of different opinions regarding the quality of each approach, both should be seen as complementary rather than competing strategies (Soiferman, 2010).

4.4 Research Purpose

A suitable research design directs the research activities, including the data collection, in the best possible direction to achieve the research aims and objectives. It is decisive for the subject of research and the way of its investigation. The research design justifies and explains the collected data, determines where from and how. Furthermore, it explains the data analysis and how this process will contribute to answering the underlying question of the research (Easterby-Smith & Jackson, 2012).

The selection of an appropriate research design ensures that the obtained evidence enables the researcher to answer the research question as clearly as possible. Fundamentally, based on the developed research question, a research design must determine the proper evidence to answer the research question in the most convincing way (De Vaus, 2001). Therefore, data theories vary considerably due to the chosen sociological approach (Rex, 2006). Often, however, the researcher's fixation on a particular research concept is solid and needs more consideration of the strengths and weaknesses of the respective design. As a result, the choice made may no longer be appropriate for the research's direction (Robson & McCartan, 2016). Therefore, it is essential to have a clear overview of the subject and the purpose of

investigating a specific phenomenon (De Vaus, 2001). This direction is determined by how the research question is posed and classified as exploratory, explanatory or descriptive research (Saunders, Lewis & Thornhill, 2009).

Descriptive research aims to outline a specific phenomenon and point out its characteristics accurately. The main concern of descriptive research is "what" rather than "why" or "how" the subject of research took place. Consequently, survey tools and observations are the most common instrument for gathering data for descriptive research (Gall, Gall & Borg, 2007). Descriptions can differ from relatively concrete issues as a population change from abstract subjects to more abstract questions, such as increasing inequality (De Vaus, 2001).

In many cases, descriptive research is complementary to explanatory or, in less frequent cases, exploratory research projects and should therefore be seen less as an end in itself and more as a means to an end (Saunders, Lewis & Thornhill, 2009).

In contrast, exploratory research focuses on intentional, broad-ranging data collection to outline a maximum of generalisations based on a phenomenon's direct understanding and descriptions (Given, 2008). The underlying problem exploratory research aims to investigate develops from the research stage (Bhat, 2020). The character of the discovered generalisations can entail different elements and vary from descriptive facts to concepts, social processes, beliefs, structural arrangements, or activities. The main feature of exploratory research is flexibility in gathering data and allocating possible participants (Given, 2008).

Explanatory research entails research questions that aim for an explanation rather than the description of an investigated subject (Given, 2008). In contrast, this explanation aims to "why" a specific subject or phenomenon takes place, changes or evolves compared to the seeking for the "how", the centrepiece of many social science projects. Explanatory studies

establish a logic relationship between different variables to provide a sophisticated explanation for this relationship (Saunders, Lewis & Thornhill, 2009).

This research has an exploratory nature aiming to investigate and understand a current, practical phenomenon. Its objective is to develop a theory out of a practical problem by answering the three research questions. The main focus is discovering and developing new insights and ideas. Therefore, the research design needs to be flexible enough to cover different aspects of the research problem based on the possible transformation of the examined subject during the research (Kothari, 2004).

4.5 Research Strategy

To conduct a research study, an overall plan is needed – the research strategy. This strategy is the guideline for planning, fulfilling and monitoring the research project. Correctly and thoughtfully selected, a research strategy provides a clear, well-thought-out guide for the study. This thread is strategically valuable at a relatively low level of detail (Johanesson & Perjons, 2014). A suitable research strategy is closely linked to the research approach. However, a predominant rigid classification is too simplistic (Saunders, Lewis & Thornhill, 2009). Each research strategy entails specific strengths and weaknesses. The appearance of these properties depends on three primary conditions: (a) the type of research question posed, (b) the extent of control a researcher has over actual behavioural events, and (c) the degree of focus on contemporary as opposed to entirely historical events (Yin, 2009).

Furthermore, the different strategies and research approaches must fit together to select an appropriate research strategy that fulfils the research requirements (Saunders, Lewis & Thornhill, 2009; Yin, 2009; Sevilla, 1992).

4.5.1 Case Study Research

A research strategy involving cases-based empirical evidence to create a theory is case study research. The underlying concept of case studies is the logic of replication. Studying a specific case in its real-world context makes it possible to draw a conclusion and develop an applicable concept for further investigation (Eisenhardt, 1989). Case study analyses focus on holistically studying events, decisions, policies, persons, projects, institutions or entire systems by at least one method. The main challenge entailed in conducting a case study research is to determine a specific case, or several cases, that are significant for answering the research question. Furthermore, the clear statement of the included context and required approaches to exploit its full potential (Crowe et al., 2011). Case studies are suitable for a broad field of research, including many areas and research characteristics (Thomas, 2011).

Although the primary goal of inductive research is to create a generalisable theory, this objective can be interpreted slightly differently in combination with a case study strategy. In this context, the concept of transferability is more suitable since it highlights the extent to which the outcome of a study is transferable and linkable to other contexts. In most cases, the case study findings are not limited to this one case, so it makes sense with this strategy to look at other examples where the outlined findings may be relevant (Cresswell & Poth, 2016).

4.5.2 Justification Case Study

The justification of an inductive research approach is significant for the decision for the case study strategy. The nature of a case study is less objective, rigorous, and precise compared to deductive, hypothesis-testing approaches. Therefore, convincing argumentation of why the

researcher has chosen an inductive approach is critical to convince the reader that the case study is the right strategy for the research project (Eisenhardt & Graebner, 2007).

Dyer and Wilkins (1991) outline that the number of cases or the amount of written material does not indicate the case study's key issue. It is the researcher's ability to fully understand the case's context. Consequently, this allows the comprehensible transmission of these general conditions to the reader. It is the fundament of generating theory based on this relation. However, neither a single-case nor a multiple-case strategy guarantees meaningful theoretical recognition (Dyers & Wilkins, 1991).

Following this understanding, case study research is a meaningful research strategy when meeting several preconditions. First, the nature of the research phenomenon is wide-ranging and complex. Second, the main objective is to answer 'how' and 'why' questions. Third, the availability of existing theories is not very strong. Fourth, the research context is crucial (Dul & Hak, 2007; Yin, 2003).

All of these four points are matching with the nature of this research in a very comprehensive way. The research of the collaboration process between innovation intermediaries and their clients is an extensive area of research. Although this research focuses on the interactions of innovation intermediaries in the context of digital technologies, a wide range of essential factors still arise in the course of the question. On the one hand, there are numerous different branches regarding the technological frame. On the other hand, the collaboration process entails various ways of more and less apparent interactions. This diversity, together with the complex technical business environment, results in a highly complex subject area that is largely unknown.

The nature of the included research questions fulfils the second condition, as these are 'how' questions and aim to understand the interaction process between intermediaries and their clients holistically.

Based on this project's inductive, exploratory characteristic, the extent of specific literature in the field is limited. As outlined in the previous literature review, there is a broad literature regarding different components that shape the theoretical frame of the project. However, the number of comparative research which undertakes the same theoretical and practical perspective needs to be increased. Particularly the perspective and the nature of this research differs from existing projects. Although this outlines the availability of the first three conditions, particularly the fourth prerequisite, the importance of the context distinguishes the case study approach as a promising research strategy for this research.

Case study research aims to study a phenomenon in its 'real-life' context. This focus entails the occurrence of the research subject without any manipulation in a practical, real-world environment. To make this possible, however, it is crucial to select a subject for whom the context is essential and to clearly explain its role and the understanding that underlies it (Crowe et al., 2011).

Most business research studies treat context as a homogeneous, one-dimensional construct. However, a few significant contributions outline the advantages of understanding context as a complex, multi-dimensional part (Poulis, Poulis & Plakoyiannaki, 2013). As detailed outline in the literature review, the core of this research is that various factors strongly influence the collaboration process of innovation intermediaries with their clients. Furthermore, the nature and origin of the collaboration process are crucial. Therefore, the data collected during this research and the achieved results are strongly context-driven. These criteria, together with

the interpretivism research philosophy and the explorative, inductive character of the research, have led to the selection of a case study methodology.

4.5.3 Unit of Analysis

The unit of analysis is of crucial importance when conducting a case study. Typically, this unit consists of an action system rather than a group or individual. The primary purpose of case studies is to present a selective rather than a general picture. In order to create an understanding of the phenomenon or system under investigation, one focuses on a fixed number of decisive factors and issues (Tellis, 1997). This entity requires clear boundaries; therefore, the availability of intrinsic delimitations is essential. Otherwise, the researched phenomenon cannot be considered a case (Merriam, 1998). By designating a unit of analysis, the focus of the case study is clearly on this subject and possible sub-units. All data collected should therefore be clearly within the boundaries of the unit of analysis (Rowley, 2002). There is an ongoing discussion regarding the difference between the unit of analysis and the outlined cases, which is mainly based on the need for clear guidelines for this differentiation. This missing clarity is an issue regarding the credibility and transferability of possible case study results (Grünbaum, 2007).

Patton (2002), for example, argues for the equality of both terms – ‘cases are units of analysis’ (Patton, 2002). In contrast, various arguments exist for the clear separation of both synonyms. Following this understanding, the unit of analysis is the studied subject by answering the research questions. The unit of observation, in this instance, the cases are the analysed item to gain insights regarding the unit of analysis. Consequently, both terms can entail similar or different subjects (DeCarlo, 2018).

This thesis follows the understanding that the case and the unit of analysis are closely connected. In the context of this research, the unit of analysis are funded digitalisation projects with intermediary involvement. The main objective of this project is to understand the holistic role in the collaboration process of intermediaries and their clients. Therefore, a process-oriented analysis is helpful to obtain a high level of detail regarding this and thus derive insights for the organisation itself.

Individual cases involving different projects with innovation intermediaries and clients are analysed to investigate this topic.

4.5.4 Single vs Multiple Case Studies

The main subdivision for case studies is between single and multiple designs, whereby the content and the characteristic of the study can vary widely (Gustafsson, 2017).

The choice between a single and a multiple case study design depends on several factors. Both approaches have certain advantages and disadvantages that determine their application. By conducting a case study, the distinction between a single and multiple case design requires a clear justification and delimitation. Single case studies are comparable with the conduction of a single experiment. This approach may be most appropriate when the case is unique or entails a particular characteristic (Rowley, 2002).

In contrast, multi-case studies enable a situation-related and cross-situation data analysis. It enables the researcher to analyse within and across each case (Baxter & Jack, 2008). By comparing several cases, the research can outline similarities and differences between the investigated cases, adding value to existing theories. A central goal of a multiple-case study design is to replicate cross-case findings. Based on the comparative nature of this approach, a

selection of cases is required that allows equal or opposite results to be projected based on the underlying theoretical assumptions (Yin, 2003).

Consequently, multiple case studies can be compared to conducting a series of experiments- the more case support or disprove a theory, the more resilient the results (Rowley, 2002). Therefore, results gained through conducting multiple case studies are more evident and reliable than single cases. Consequently, this approach can make a more convincing contribution to theory, provided that a broader empirical field is covered (Gustafsson, 2017).

Based on this description, the distinction between the two case study approaches is quite apparent. However, the boundary between the two concepts is blurred in most cases. Remarkably, the consideration of the two subcategories - holistically embedded case studies, complicates the clear distinction.

A holistic case study treats the whole case as one unit. This design may deal, for example, with a wide range of patterns of business strategy or organisational culture. Thereby the research takes a superior position and views the case holistically 'from above'. This view ensures good transparency. However, it entails the risk of being superficial and potentially overlooking changes in the unit of analysis that could affect the appropriateness of the original research design.

In contrast, an embedded approach entails various sub-units (e.g., locations, events). Each of these units is researched individually and linked to identifying a big picture of the phenomenon. This step is the most difficult in conducting an embedded case study since compiling a comprehensive picture based on the sub-units is often challenging (Rowley, 2002).

Nevertheless, the question above is the clear distinction between a single embedded case and multiple cases. The context of the cases, one of the most critical factors of the case study, is

the crucial difference. An embedded single case study enables understanding a single meaningful case. In contrast, in a multiple case study design, the context of each case is different and enables the researcher to gain insights based on individual and comparative analyses (Baxter & Jack, 2008).

Based on the previously outlined importance of the different context patterns, this argument is decisive for selecting a multiple case study design as a research strategy for this project. Two main objectives are achieved by analysing multiple project cases in different contexts. On the one hand, the different project contexts of every case may determine the influence of the external framework conditions for the collaboration process between innovation intermediaries and their clients. On the other hand, it outlines the influence of the thematic context digitalisation.

Furthermore, the unit of observation, collaboration projects are hardly mappable in one case. The unit of analysis would then change to a company or an innovation intermediary running several projects to conduct a meaningful single case study.

However, this would change the focus of the work from the actual research subject, the collaboration process, to more organisational-based research. To conclude, the possibility to create findings across different cases and the increased robustness of the findings for theory-building makes the multiple case study design the most promising for this project.

4.5.5 Comparative Case Study

A comparative study examines two or more contrasting cases to point out their differences and similarities. This approach aims to better understand a phenomenon and its context. Comparative work is methodologically unbound and primarily used in transnational or

transcultural studies. However, it is suitable for different contexts or organisations (Walliman, 2010). The difference between comparative research compared to non-comparative work is that it attempts to draw a conclusion which exceeds single cases and points out similarities and differences between the analysed objects.

Furthermore, it outlines relations between phenomena concerning their contextual conditions. In the broadest sense, a comparative analysis aims to combine several crucial interlinked functions. The main objective of a comparative study is to understand a specific problem by comparing its routines and structures against the processes of another comparable system (Esser & Vliegenhart, 2017). Therefore, a comparative case study is particularly suitable for understanding the impact of context patterns on the researched subject (Goodrick, 2014). A comparative case study including various organisations might aim to systematically compare and replicate the outlined subjects across each other in the context of different research goals (Rowley, 2002).

Based on the possibility of a comparative case study to gain results based on this cross-case analysis, it is particularly suitable to the unit of analysis and the cases of this research. By analysing the collaboration process through different projects, it is possible to select cases with similar characteristics but in different settings to investigate and compare the influence of changing patterns on the process. However, there are two main issues with comparative studies. The selected cases need to consider issues regarding case independence. By conducting a comparative study, it is essential to avoid selecting cases that are too closely connected and influenced by each other. This problem mainly depends on the level and nature of potential dependencies (Gerring, 2001). The second main problem with comparative research is to ensure the comparability of the data, and the situation studied. Thereby the difficulty is not to neglect the specific context of each case too much to achieve comparability.

If these issues are considered, this approach offers the chance to form theories from different investigations, which can serve as a starting point for further detailed investigations (Walliman, 2010). Based on the possibility of a comparative case study to gain results based on this cross-case analysis, it is particularly suitable to the unit of analysis and the cases of this research. Analysing the collaboration process through different projects makes it possible to consider the influencing factors that determine the intermediation process outlined in the literature review. Particular attention was paid to ensuring that the projects influence each other as little as possible and that there is a high degree of comparability.

4.5.6 Level of Analysis: Cases

Due to the centrality of the unit of analysis described above, selecting suitable cases is particularly important. It concludes the four factors influencing the case study presented above. There are three main things to consider for a sampling strategy in qualitative research. First, who should be selected? Second, what kind of sample should be selected and third, what size should the sample have (Cresswell & Poth, 2016)? In contrast to a research strategy with a large sample, the selection and the subsequent analysis process of a case study research are much stronger interlinked since the selection already determines the agenda for the analysis (Seawright & Gerring, 2008). The research question, objectives, and theoretical context highly impact the suitable case selection and directly determine the selection strategy (Rowley, 2002).

The case selection entails different difficulties. To provide the transferability of the findings, the units of analysis need to be representative of a large population of cases. Additionally and far less recognised, the outlined entities need to entail an acceptable range of variation about

the relevant research measures. Furthermore, 'background' cases are often essential to the case study. These are not named or handled as 'real' cases; however, they informally affect the analysis and blur the boundaries between the investigated cases and their associated population (Seawright & Gerring, 2008).

Beyond that, in a real-life research project, other factors shape the case selection and the purpose-oriented criteria outlined above. The main issue is the accessibility of potential cases. Potential cases can only be considered if it is possible to collect the required data from the relevant persons or organisations. This prerequisite requires a reasonable basis of trust and the interest of the parties involved to contribute to the research. Furthermore, the availability of any required resource requires clearance in advance. Especially in a doctoral research project, where the researcher takes care of data selection, collection and evaluation by himself, the needed expense in terms of time, money or other prerequisites are critical. These factors often determine the case selection process similarly strongly as the theory-related determinants (Rowley, 2002).

In order to explore the defined unit of analysis, funded digitalisation projects with intermediary involvement, it is crucial to select cases that reflect the real-life context of the collaboration. Further, they need a delimitation as independent units by clear boundaries containing the unit of analyses and must be accessible.

As outlined in the literature review (Chapter 2.2.2), the system in which intermediaries operate is essential to fully understand the intermediation process. In the delimitation of a system, there are various approaches and possibilities. However, making an introductory statement about which approach is best suited is impossible. The decisive factors for the choice of perspective and the demarcation made are, instead, the purpose of the investigation and the

underlying research question. Even more, the initial selection of the system boundaries significantly influences the study results. This decision directly contributes to the quality of the study. In addition, technical demarcation is almost always accompanied by spatial demarcation (Markard & Truffer, 2008).

Therefore, the research perspective is aimed primarily at the systemic interactions of intermediary organisations. Taking this systematic perspective, the proper delineation of the system under study is significant. An appropriate delimitation was found in the roots of innovation policy - funded joint research projects. There is a consensus that collaboration in research is generally seen as positive and needs structured support. Collaborative, funded innovation projects meet all criteria for a sophisticated case selection. As explained, they represent the real-life context of the interaction between firms and intermediaries, are delineated, and the collaboration process takes place within their framework. The federal framework makes them comprehensible, comparable, and reproducible to a high degree and representative for a population. Therefore, funded collaborative innovation projects in the context of digitalisation are analysed as cases in this research. The next step is to narrow down the type of cases selected and the sample size.

5. Research Data and Context

Building on the previous findings and explanations of the underlying methodology of this research, chapter 5 outlines the process of data collection, data interpretation and the context of the collected data. The latter is particularly significant in this work, as it strongly influences and contributes to the results. Further, the context is essential for the classification of the later results. The data collection and interpretation provide an overview of the cases involved in the project and how the previously developed AC framework helps to analyse the collected data. Figure 12 illustrates the close connection to the methodology and highlights the main topics outlined in chapter 5.



Figure 12: Data Collection & Analysis

5.1 Case Selection

As argued in 4.5.6, the data sample is essential to achieve meaningful results in line with the chosen research strategy. Access to relevant data plays a significant role, especially in research projects with considerable time and resource constraints, such as PhD research. Thus, not only the number of cases is limiting, but also their accessibility an exclusion criterion. Since this study is limited to a particular topic, funded collaborative projects in the digital context, the pool of potential cases was limited from the beginning. The focus was on a selection that was broad enough and deep enough to answer the three research questions of this thesis. In principle, it was essential to select comparable but also diverse cases. A fundamental requirement was access to project information and a sufficient number of potential interview participants per project. To meet both criteria, potential projects had to fulfil the following six conditions to be considered potential cases. Especially the access was of central importance. In compliance with the established and defined ethical considerations of this research, contacts were used, which were available through the researcher's workplace. However, particular importance was attached to the fact that the cases outlined in 5.2 did not have interdependencies on each other to draw comparisons as independently as possible. Table 4 outlines the six criteria each case had to fulfil to be suitable for this research. Each case is part of a representative funding program, focuses on digital technologies and has at least one innovation intermediary involved. Further, each project case is located in Europe and comparable to the others regarding its framework conditions. As outlined, access to project information and at least four interview participants per case were necessary prerequisites for the case selection.

Necessary Prerequisites Case Selection	
Content Related	Related to External Conditions
Representative funding program	Access to Project Information
Focused on digital technologies	European Area
Involvement of Intermediaries	Access to min 4 Participants per Project
	Comparable to other cases

Table 4: Prerequisites Case Selection

Public databases, including funded European projects in digitalisation, built the starting point by identifying relevant cases. After applying this pre-sorting, the outlined factors gradually reduced an extensive list of potential cases. In the last step, the access criterion was secured through personal contact with the relevant organisations and project participants.

This procedure was the preselection of the cases, which served as the basis for the comparative case study.

In the context of comparative case studies, Bartlett & Vavrus (2016) define different relevant axes in the case selection process. The horizontal axle deals with the impact of similar or contrary factors, e.g., social and technological influences - the impact of the same approach for different cases. Horizontal comparisons aim to prevent the wrong imposition of factors that emerged only from one case to other entities. In order to deal with this issue, there are two approaches: the homogenous and the heterogeneous. The homogenous approach compares units of analysis with the same structure or settings, e.g., two software SMEs. By selecting homogenous cases, the focus is on comparing and contrasting processes to outline how a phenomenon results in comparable or different results. In contrast, the heterogeneous approach

includes cases with a distinctive nature (e.g., SME vs MNE). This inequality outlines the subject of interest and highlights their 'hidden' connection (Bartlett & Vavrus, 2016).

To achieve a horizontal comparison, the selected project cases for this thesis entail a different spectrum of digital innovation. The projects included in this study are all assigned to the digital transformation or transition spectrum, as introduced and discussed in detail in chapter 2. This horizontal comparison reveals the impact of the thematic context on the project cases. The comparison highlights differences and similarities based on the spectrum of digital change outlined in chapter 2.2.6.

By comparing these topical different, same-scale cases, there is a risk of disconnecting the case from its socio-political context. However, to outline similarities and differences in the cases, the vertical comparison of the case characteristic and structure is essential to understand the influence of the case settings. The influence of any observed pattern might be very different through these factors. It is essential to outline detailed case backgrounds and appreciated upcoming framework conditions to reduce this risk of disconnecting (Bartlett & Vavrus, 2016).

This thesis highlights the project context of each case to achieve a vertical comparison of the selected cases. It considers the project framework conditions, the intermediaries' specific roles, and the involved project partners. The role of intermediaries and their connection to clients is essential for this thesis research focus. Consequently, the project cases are vertically compared based on whether intermediary clients are directly or indirectly involved in the project consortia and consequently direct or indirect intermediation take place. This spectrum allows the presentation of the project structure and a systemic classification of the

intermediary's role. In addition, this spectrum considers different framework conditions, as highlighted in chapter 2.2.2.

These two axes are used in this research to select and compare different project cases to obtain a rich and robust data source for the selected comparative case study methodology. Figure 13 pictures the two outlined axes in a coordination system to show how they classify potential project cases.

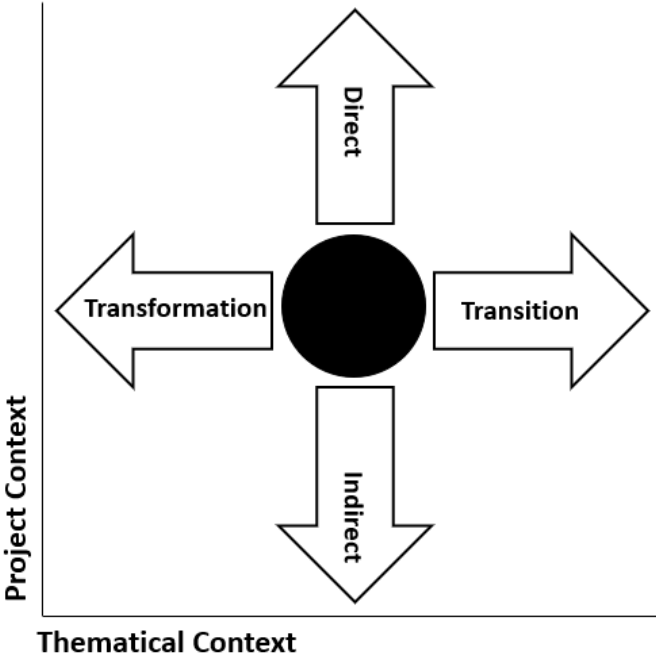


Figure 13: Horizontal and Vertical Comparison Axis

In addition, it is necessary to define a sample size to provide a framework for the data collection process. The sample size plays a vital role in the research project's success. It must be large enough to cover the most important perspectives and perceptions and manageable to avoid redundant and superfluous data (Glaser & Strauss, 1967). If the number of cases in a comparative case study is too small, the results will be less meaningful and robust. Too many cases prevent information from being adequately analysed and processed within the

framework of the project. For these reasons, comparative case studies usually contain 4 to 10 cases (Stake, 2013). Based on the limited resources available in a Ph.D. project and the requirement to integrate enough data per case to obtain a broad database for the analysis, the target sample size is at the lower end of this scale and contains five cases.

5.2 Data Collection

As with most existing case study research, this thesis entails different data collection methods. Conducting interviews with intermediaries and client organisations forms the data basis of this thesis. Further, to outline details regarding the cases and provide the relevant context, public and accessible non-public documents were analysed. Table 4 outlines the five collected cases and provides an overview of the respective project context and the conducted interviews. In total, these five cases include 27 semi-structured interviews. In addition, the collected data for case E includes the analysis of 15 qualitative questionnaires to reflect and acknowledge the large number of participants in the project. For the selection of the cases, their fit into the presented evaluation axes played an important role. Selecting projects with important federal frameworks gives the results additional transferability, as the cases represent many comparable projects.

Case	Description	Consortium	Interviews
A	R&D network focussing on secure solutions for Industry 4.0	9 SMEs, 5 research institutes, 2 cooperation partners and 1 innovation intermediary	5 2 Firms 2 Research Institutions 1 Intermediary
B	R&D network with a focus on the development of sustainable mobility & energy solutions	10 SMEs, 6 Research Institutions, 1 cooperation Partner and 1 intermediary	6 3 Firms 2 Research Institutions 1 Intermediary
C	Cross-cluster project providing services in the field of artificial intelligence	4 Regional innovation intermediaries	5 5 Intermediaries
D	Acceleration programme focusing on the use of blockchain technologies	12 Innovation intermediaries from different countries, various Start-ups	7 3 Intermediaries 4 Firms
E	Central Europe project aiming to increase the capacity of industrial businesses to innovate.	Innovation intermediaries from 8 different countries, various firms for each collaboration partner	4 4 Intermediaries 15 Firm Surveys

Table 5: Cases Overview

5.2 Data Interpretation

The chosen research methods must fit the project's aim and objective and its framework (Saunders, Lewis & Thornhill, 2009). The thematic analysis is the most suitable research strategy for this project based on its flexible characteristic.

The aim of thematic analysis is the determination of themes. These are basic patterns in the collected data that can contribute to answering the chosen research question or outline issues of the research. Thematic analysis is more than just the simple summarising and shortening of the dataset. Understanding and interpreting the collected data enable the identification of different themes. Braun and Clarke (2006) outline a six steps framework to conduct a

successful thematic analysis (Braun & Clarke, 2006). This thesis follows the framework to guarantee a meaningful thematic analysis.

The starting point of the research analysis is a detailed engagement with the collected data with a focus on the chosen topic of the research. This process entails the active reading of the transcribed data. It includes the search for meanings and patterns to build the base for the next step in the thematic analysis, the data coding. The coding process describes reducing the data into smaller, reasonable pieces to organise the data in a systematic and meaningful way (Braun & Clarke, 2006). Thereby, the coding process is dependent on the chosen approach. Codes can be data-driven, or they can develop from the theory and existing concepts of the field (DeCuir-Gunby et al., 2011). The election of a suitable coding method is linked to the research question and perspective (Maguire & Delahunt, 2017). The coding of this research was partly theory-driven, as the two axes obtained through the literature review and the conceptual framework on absorptive capacity build the base for this research and its data analysis. The research followed the three principles of successful coding. First, contradictions in the data must be addressed. Second, the coding should lead to a broad spectrum of potential themes and terms. Third, the context of the data needs to remain unchanged to avoid losing the codes' meaning. After finishing the data coding, all codes are sorted into potential themes and afterwards collated within the themes. The foundation of this step is the relationship of the codes, which is distinctive if a code can be sorted-out or form a sub or central theme. All codes not summarised in themes are collected in their theme, as they can also be helpful (Braun & Clarke, 2012).

For this process, a detailed understanding of the data is essential to assess the importance and significance of the different themes. These themes are modified, reviewed and refined in the following process based on analysing the relationship between the data and the theme

(Braun & Clarke, 2006). This process builds the basis for comparing the different themes and their association with the relevant context (Maguire & Delahunt, 2017). Finally, they are put into a theme map for further refinement and analysis, and a detailed analysis is outlined for each theme. (Braun & Clarke, 2006). However, compared to other research strategies, using a thematic analysis also entails some areas for improvement. Based on the flexibility of the thematic analysis, inconsistencies can occur, and there may be a need for more coherence regarding the emerging themes (Holloway & Trades, 2003).

In order to counteract this weakness and to obtain a possible transferable and repeatable result of the data analysis, the conceptual framework for the topic of absorptive capacity developed in chapter 3 and the axes obtained through chapter 2 was the basis for the thematic analysis. By analysing the data in terms of the five categories of absorptive capacity: recognition, acquisition, assimilation, transformation and exploitation and the associated absorptive barriers, a framework was created within which emerging themes are presented and analysed for each case. Each category was compared with the other after the thematic analysis to obtain the most complete and meaningful analysis of the collected data. Figure 14 illustrates the applied conceptual framework and the included components instrumental in interpreting the collected data as developed and described in detail in chapter 3.

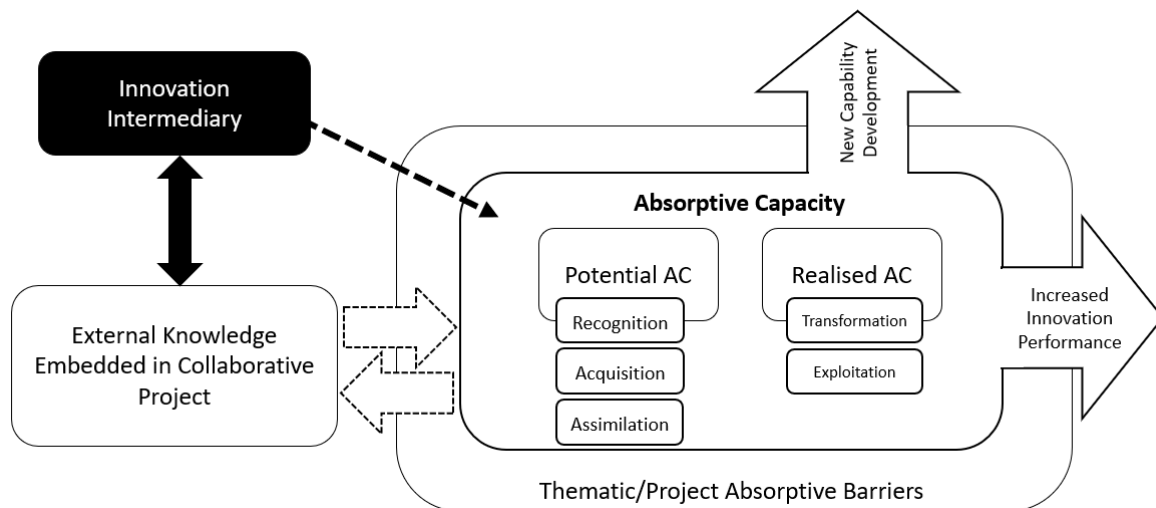


Figure 14: Applied Framework

The first category of absorptive capacity of the individual collaboration partners concerns the potential absorptive capacity of the respective participants. As explained in chapter 3, the recognition part aims to recognise the value or use of external knowledge. It analyses to what extent the collaboration partners involved in the cases were already able to recognise the projects', and its entailed knowledge, potential value before the actual implementation.

The second dimension of absorptive is the ability of organisations to acquire external knowledge. In the context of the cases presented, this dimension is about facilitating joint projects that provide the basis for access to external resources. It focuses on which factors were decisive in making a federation project possible and how companies gained access to these projects.

The third dimension in the area of potential absorptive capacity refers to the assimilation of knowledge, i.e., the ability of companies to understand external knowledge in the course of the projects and how they can interpret the acquired knowledge to learn from it.

The next outlined section refers to the realised absorptive capacity of the project partners. The first category in this context is the transformation of knowledge. Because the individual participants have different backgrounds and expertise, it is often difficult to transform the knowledge so that it advances one's, business model.

The last category involves the exploitation of received knowledge. In the project context, this is closely linked to the extent to which the companies were able to benefit from actual projects. In this context, it is also crucial to what extent the project leads to the participants forming new capabilities from which they can also benefit beyond the pure duration of the project. Therefore, it analysed how the companies and the intermediaries benefited from the projects and how they contributed to maximising the benefits.

This framework and the five entailed components are the base for the thematic analyses of the cases. The project data and interviews of five different collaboration projects of intermediaries and companies were analysed to represent the practical context in which these actors operate obtain transferability, reliability, and validity of the results. For a more straightforward presentation of the data, the programme MAXQDA was used to support the analysis. However, the researcher did the data analysis and the thematic analysis manually to obtain the most accurate and detailed results possible.

5.3 Data Context

The data context of the individual cases plays a major role in this research, as explained in methodology chapter 4.

When exploring collaborative projects and their entailed project management structures, the unique characteristics of each project must be carefully considered (Chin, Yap & Spowage,

2011; Vom Brocke & Lippe, 2015; Abu-Rumman, 2020). These entail internal project factors and organisational factors such as the type of parties, their structure and size, their environment, and the thematic context (Fernandes et al., 2016). In order to cover a broad spectrum of these structures and requirements, the comparative case study of this research consists of three national and two supranational-funded projects with different project structures and thematic orientations. For more information on the respective federal guidelines and the underlying policy, appendix 3 includes a more detailed description of the underlying funding policy and the respective funding programmes.

5.3.1 Cases A & B

The first two selected cases represent nationally funded projects with direct involvement of the clients in the project consortia. Case A and B are networks funded by the Central Innovation Programme for SMEs (ZIM). More information regarding ZIM can be found in Appendix 4.

Figure 16 illustrates the interaction structure of Case A and Case B. It illustrates the role of an innovation intermediary as a lead partner, which interacts as a link between the funding agency and the project consortium. This exemplary scenario with three collaboration partners displays the dual functionality innovation intermediaries entail in this process. On the one hand, the intermediary is directly involved in the project and exchanging knowledge between the respective parties. On the other hand, the intermediary acts as a link between the federal sources in the form of various government institutions.

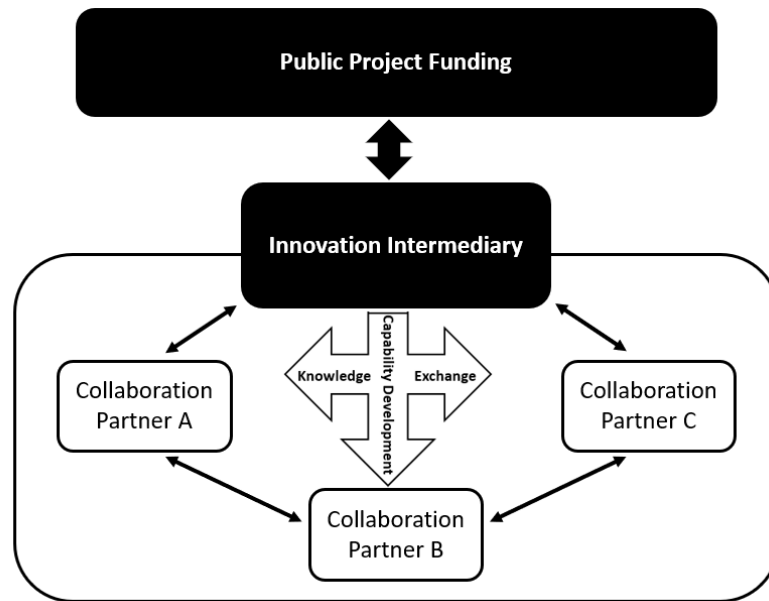


Figure 15: Project Structure Case A & B

5.3.1.1 Case A

Case A focuses on solutions for digital transformation in the field of Industry 4.0. These are to be implemented in existing structures to improve production processes. The companies are directly involved in the project, which results in a direct intermediation process. Figure 16 outlines the classification of Case A regarding the comparative axes presented in the methodology chapter.

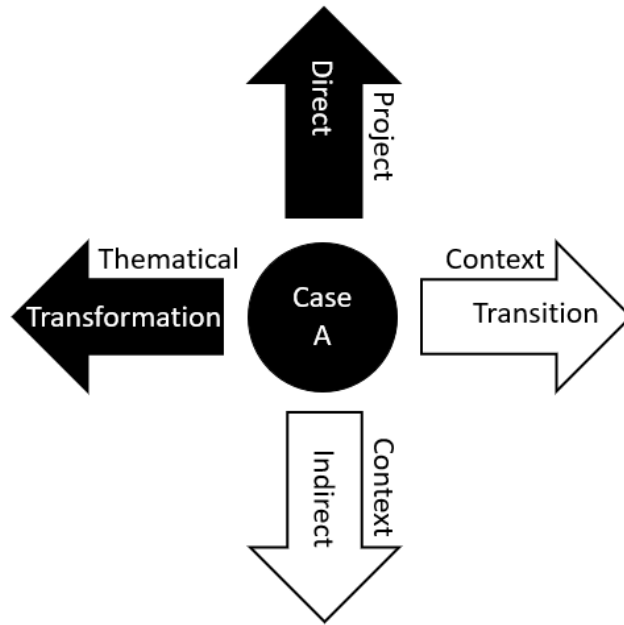


Figure 16: Classification Case A

Through the developments of Case A it is possible to securely record data from industrial sensors, classify it semantically, and make it available in a secure cloud environment. The goal here is traceability and indisputability. Outsourcing the information to a secure cloud environment result in tangible advantages: Data is aggregated and stored centrally, accessed at any time, from any location, and can be profitably processed and analysed using artificial intelligence methods to optimise production processes. Furthermore, the digital mapping of the devices in the sensor cloud infrastructure should make it possible to simulate processes and thus optimise them in advance. Figure 17 summarises the specific project structure, the involved partners, and the individual development lines.

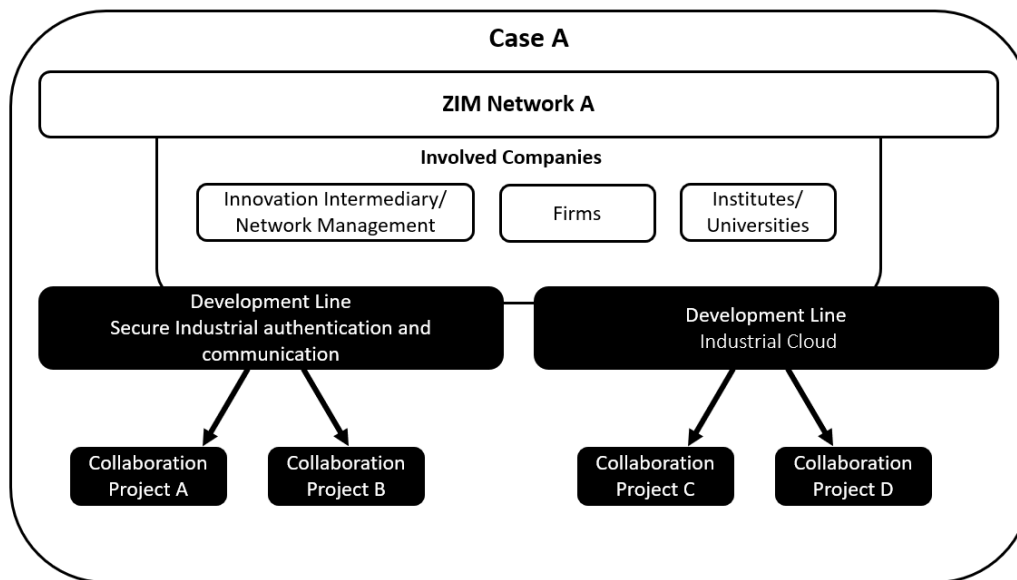


Figure 17 Structure Case A

Within the framework of Case A, five semi-structured interviews were conducted. Table 5 introduces these participants, including their position and the subject area. The participants and their respective organisations are renamed to meet the ethical consideration of this research. These new synonyms offer a possibility of differentiation and guarantee the participants' anonymisation.

Interviewee	Position	Organisation	Subject area
Participant A	Solution Architect	Firm A	Manufacturing/Automation
Participant B	CEO	Firm B	Data Security
Participant C	Researcher	University A	Business Informatics
Participant D	Researcher	University B	Applied Computer Science
Participant E	Project manager	Intermediary A	IT-Logistics

Table 6: Participants Case A

5.3.1.2 Case B

Similar to Case A, Case B is an R&D programme funded by the national ZIM federal programme. Case B focus on digital solution for the areas of electromobility and sustainability to enable a digital transformation of this industry. Equally, in Case B, all organisations are directly involved. Figure 18 shows the case classification in the comparative axes presented in the methodology chapter in the methodology chapter.

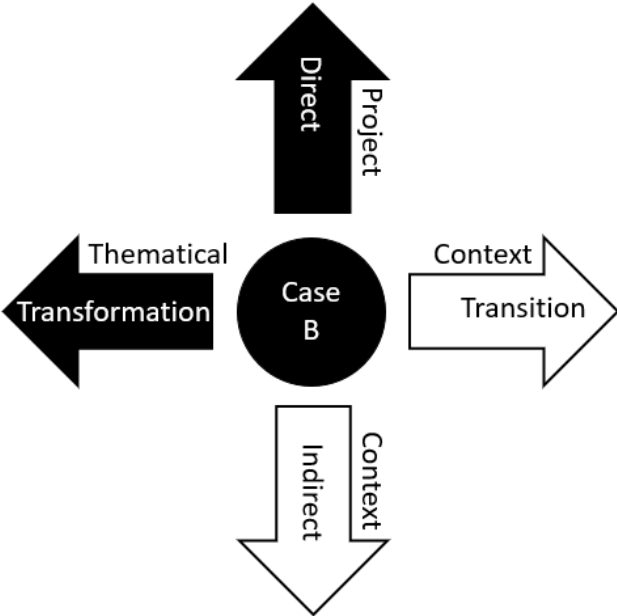


Figure 18: Classification Case B

In contrast to the industry 4.0 focus of Case A, Case B is located in the field of electromobility. The focus here is on improving the electricity grid infrastructure to create the necessary structural conditions for the widespread use of electrically powered vehicles. In order to compensate for the inconsistent, sometimes very high, electricity consumption by electric vehicles, intelligent, digital solutions developed in the project that network and coordinate the electricity grid and its consumers, generators, and storage options more efficiently with each other

in order to avoid grid instabilities. Figure 19 shows the case classification in the comparative axes presented in the methodology chapter in the methodology chapter.

Case B contains three different lines of development. Line 1 deals with topics in energy storage and generation. Line 2 includes smart contracting approaches based on blockchain technologies, and line 3 includes the development of dynamic simulation environments for control systems in a microgrid. The following figure shows the project structure and the lines of development mentioned. The following figure illustrates this structure, which is identical to Case A, except that Case B is thematically different and has three different lines of development.

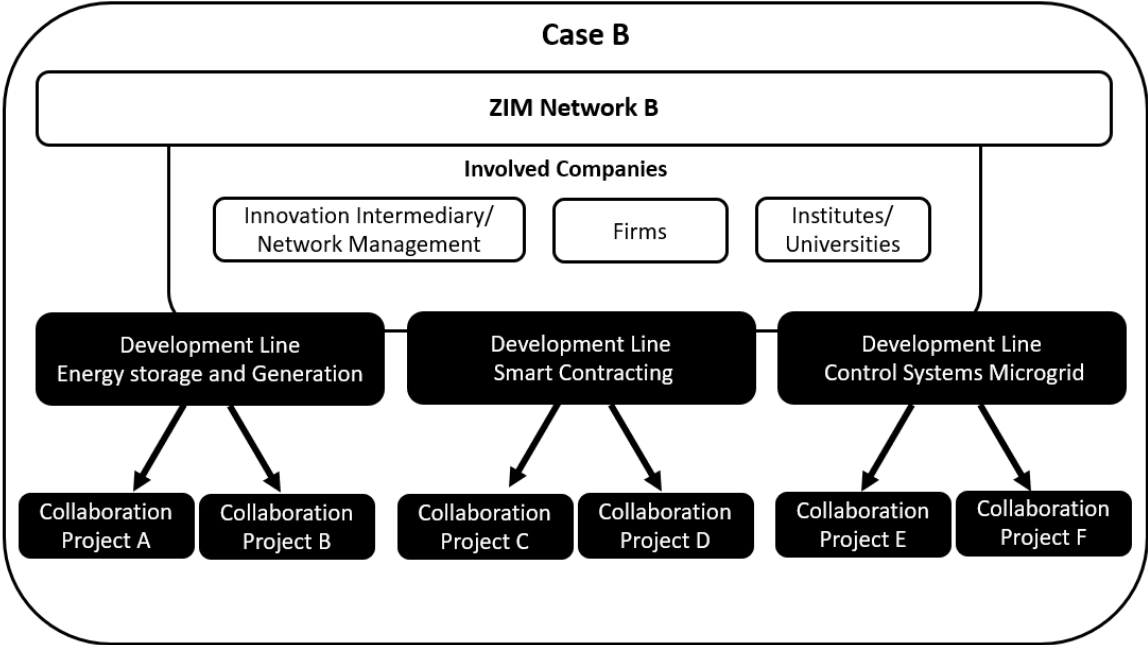


Figure 19: Structure Case B

Table 6 provides an overview of the six interviewed participants for the analysis of Case B.

Interviewee	Position	Organisation	Subject area
Participant F	CEO	Firm C	Energy Systems
Participant G	CEO	Firm D	Renewable Energy
Participant H	CEO	Firm E	Energy Systems
Participant I	Researcher	University C	Energy Research
Participant J	Project manager	Intermediary B	Electromobility
Participant K	Researcher	University D	Data Science

Table 7: Participants Case B

5.3.2 Case C

Case C is a regional cross-cluster project funded by the German go-cluster initiative. The go-cluster funding programme is a national cluster policy measure of the Federal Ministry for Economic Affairs and Energy. The measure aims to support and promote cluster management organisations' further development (Clusterplattform, 2023). Appendix 5 contains more detailed information regarding the go-cluster initiative.

5.3.2.1 Case C

Artificial intelligence is considered one of the most critical technologies of the future and an essential building block for ensuring German companies' competitiveness and innovative strength. Case C aims to strengthen the regional ecosystem of artificial intelligence by working closely with its stakeholders. It generates insight into how artificial intelligence can

fundamentally change previous approaches and processes, which is why Case C belongs to the field of the digital transition. Thereby the intermediary's clients are indirectly involved in the project.

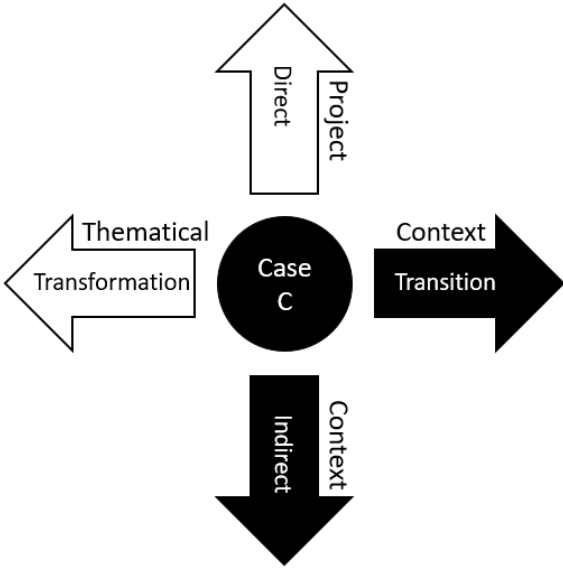


Figure 20: Classification Case C

Case C develop a cross-cluster and cross-domain service portfolio for artificial intelligence as a cross-cluster project of clusters for health science, sensor technology, cyber security and mobility & logistics. In this way, the mobility, sensor technology, biotechnology and IT security sectors are connected across sectors in the technology field of artificial intelligence. The result is a unique service portfolio for the members of the cluster and thus also added value for the cluster organisations. As mentioned, the consortium consists of four partners, with no lead partner in the project. The project lasts over a year and involves four joint thematic work packages and one specific work package per partner. Figure 21 illustrates the structure of Case C.

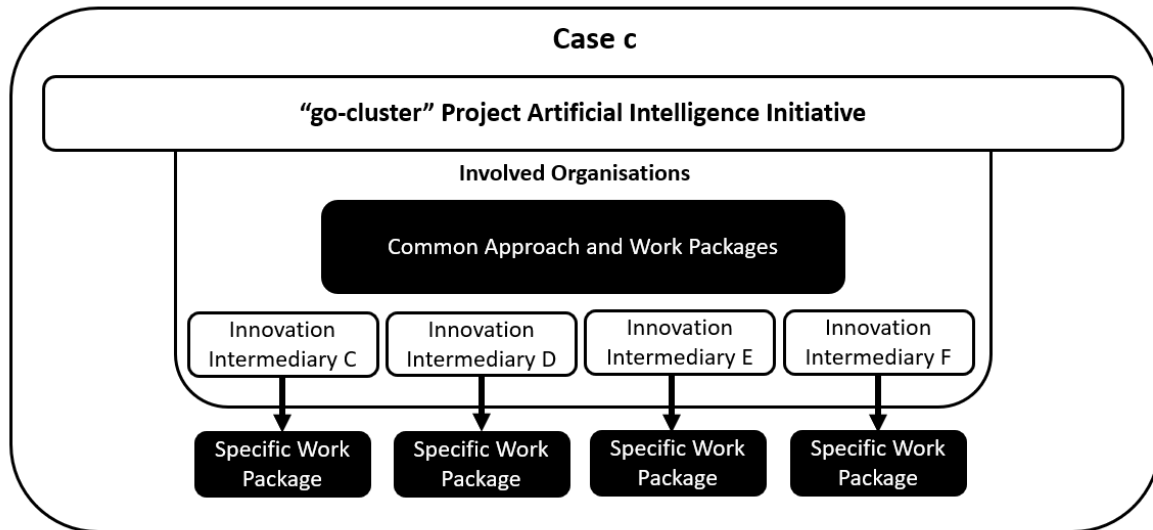


Figure 21: Structure Case C

Table 7 outlines all participants and their positions interviewed in the course of Case C.

Interview	Position	Organisation	Subject Area
Participant L	Cluster Manager	Intermediary C	Health Economics
Participant M	Cluster Manager	Intermediary D	Sensor Technology
Participant N	Head of R&D	Intermediary E	IT-Security
Participant O	Research Assistant	Intermediary E	IT-Security
Participant P	Project Manager	Intermediary F	ICT & Mobility

Table 8: Participants Case C

5.3.3 Case D & E

In contrast to the first three cases, Cases D & E are not nationally but European-funded collaborative projects. They are funded through the Interreg programme. More information about this funding can be found in Appendix 6. To present the context of the individual

projects, the respective federal framework is presented before the analysis. For both cases, the consortium consists of several innovation intermediaries. These communicate in the consortium with the funding agency and usually appoint a lead partner who takes over the organisational organisation as described above. Their clients are not directly involved in the consortium but are supported as external partners within the project with resources, knowledge, and other incentives. Figure 22 illustrates this general project approach.

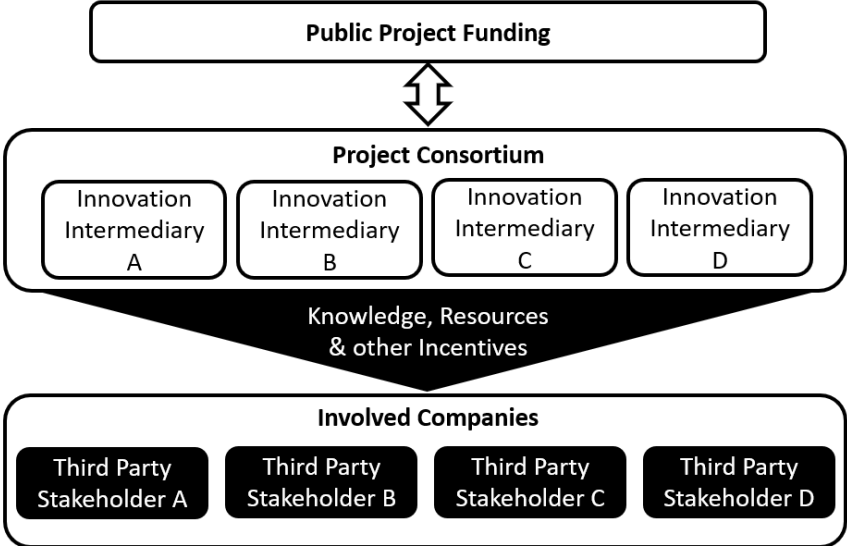


Figure 22: Project Structure direct Intermediation

5.3.3.1 Case D

Case D is an international European project based on the Interreg funding frame. It aims to build an open and collaborative cross-border, cross-sectoral innovation ecosystem that fosters using cutting-edge digital technology in three vital sectors of the European economy: agrifood, logistics and finance. Through a strong focus on the disruptive use of blockchain technology, it is based in the area of digital transition.

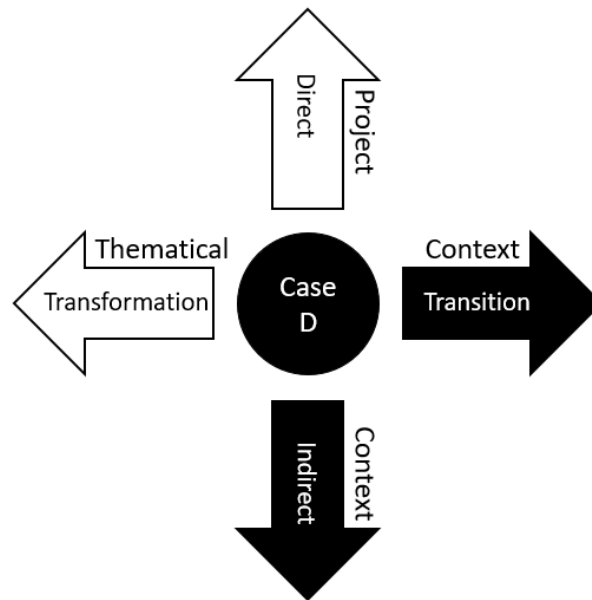


Figure 23: Classification Case D

Case D bring together actors (with an emphasis on SMEs and clusters) from these three heavily interconnected sectors, with SMEs/ innovators, to catalyse their cooperation towards innovation-driven and mutual growth (boost). The catalysation aims at networking the members of the ecosystem, raising understanding of the benefits of blockchain technology, and stimulating the creation of new blockchain-based solutions - Cluster Missions and Clusters-Innovators Assembly. Further, Case D supports innovators (SMEs) from ideation to commercialisation, offering them tailored business and technical support and direct funding through a novel funnel approach - Innovate > Experiment > Commercialise acceleration programme. Figure 24 illustrates Case D's project structure and the companies' particular involvement. This involvement makes Case D a cascade funding project, as the intermediaries receive funding for the project, which they can redistribute to the participating companies.

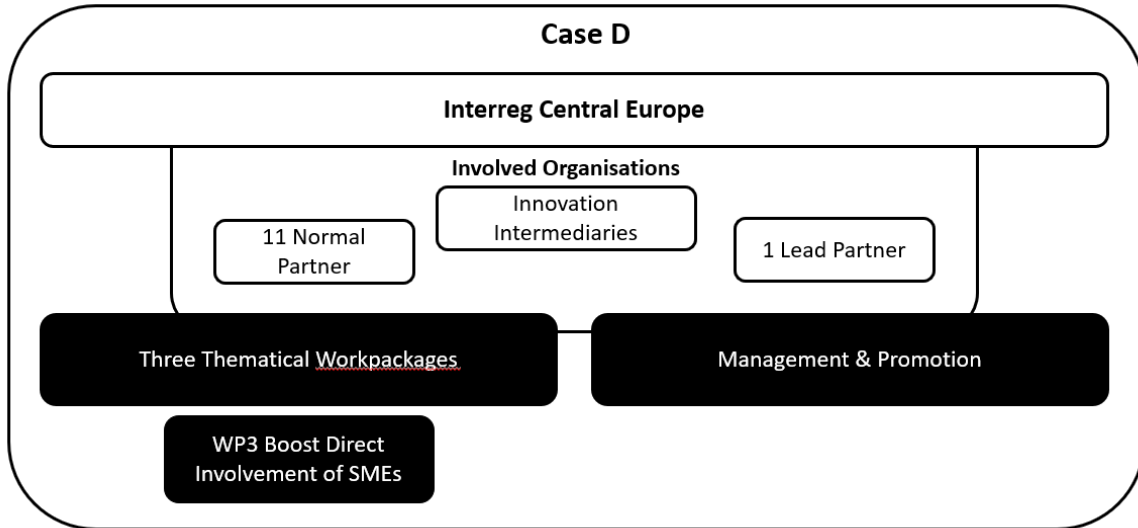


Figure 24: Project Structure Case D

Table 8 list all interviewed Participants for the analysis of Case D.

Interviewee	Position	Organisation	Subject Area
Participant Q	CEO	Firm F	Blockchain Logistics
Participant R	Head of Communication	Firm G	Software Development
Participant S	CEO	Firm H	Digital Agriculture
Participant T	Project Manager	Intermediary G	Digital Implementation
Participant U	Project Manager	Intermediary H	AI, Blockchain
Participant V	Project Manager	Intermediary I	Business Support
Participant W	Project Manager	Intermediary J	Digital Technologies

Table 9: Participants Case D

5.3.3.2 Case E

Case E addresses the challenge for industrial regions not benefitting from innovation activities from large leading corporations to increase regional capacity to absorb new digitalisation knowledge and turn it into a competitive edge and business value. Thereby the focus is on integrating digital solutions to improve the existing processes of the firms and consequently increase the potential of the entailed ecosystems. Thereby the focus is on digital transformation.

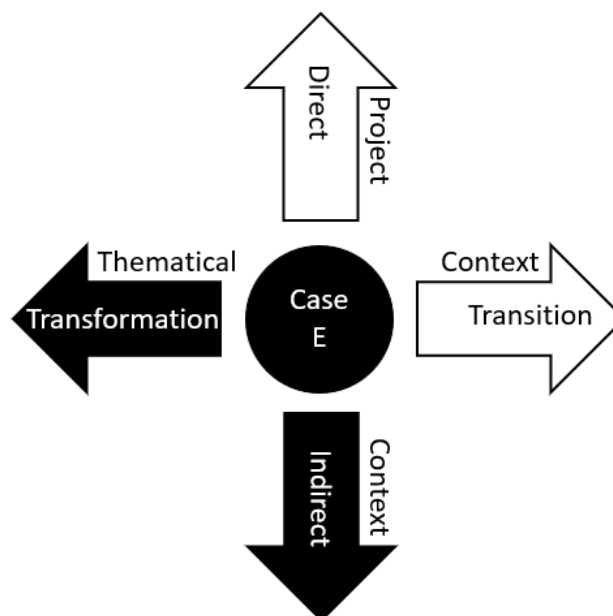


Figure 25: Classification Case E

There is a strong need to help SMEs to overcome capacity shortages for innovation through digital solutions and integrating them into transnational value chains. The project aims at empowering regional ecosystems with the knowledge and tools to help businesses overcome those barriers and generate sustained growth through value chain innovation. Case E focuses on modern approaches considering value chains and their complex developments rather than linear technology transfer approaches. The framework of value chain innovation builds on

Porter's five forces framework (new entrants, substitutes, customers, suppliers and rivalry) and transversal innovation drivers: critical enabling technologies, resource efficiency, digital transformation and service innovation. The focus is on key sectors: advanced manufacturing, ICT and electronics, energy and environment, health and bioeconomy, following their S3 priorities. The focus is on developing practical instruments to measure innovation potential and capacity, supporting businesses to apply the innovation drivers and instruments to foster and support value chain innovation processes. Figure 26 highlights the structure of the project.

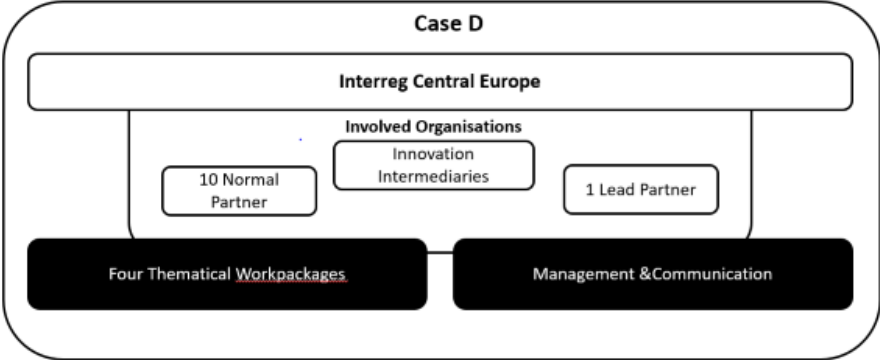


Figure 26: Structure Case E

Table 9 summarises the individual participants and their position interviewed in Case E.

Interviewee	Position	Organisation	Subject Area
Participant X	Managing Director	Intermediary K	Business Development
Participant Y	Business Developer	Intermediary L	Finance
Participant Z	Project Manager	Intermediary M	Mobility & Logistics
Participant A2	Project Manager	Intermediary N	Agri-Food
Questionnaire B2	Mix	Firms/Intermediaries/Universities	Mix

Table 10: Participants Case E

6. Findings Absorptive Barriers & Influential Factors

The previous chapter 5 presents the context of the collected, project-related data and its interpretation. It already indicates the importance of this context for analysing the data and classifying the results. Chapters 6, 7 and 8 highlight the findings of the data analysis. The structure of these chapters reflects the objectives of this thesis. Therefore, there is one respective chapter for each research question.

As stated earlier, the main objective of this thesis is to better understand the collaboration process between innovation intermediaries and their clients in the context of digitalisation. The three research questions have three complementary objectives to achieve this main goal holistically. The first underlying research question aims to understand the requirements and associated barriers of the collaborative innovation processes in funded digitalisation projects. A particular focus is on the influence of the thematic and project context as factors influencing the absorptive barriers. The answer to this question forms the first chapter of the findings section. To illustrate the division in three findings chapters, figure 27 highlight this structure. Further it outlines the involved components and the influential factors.

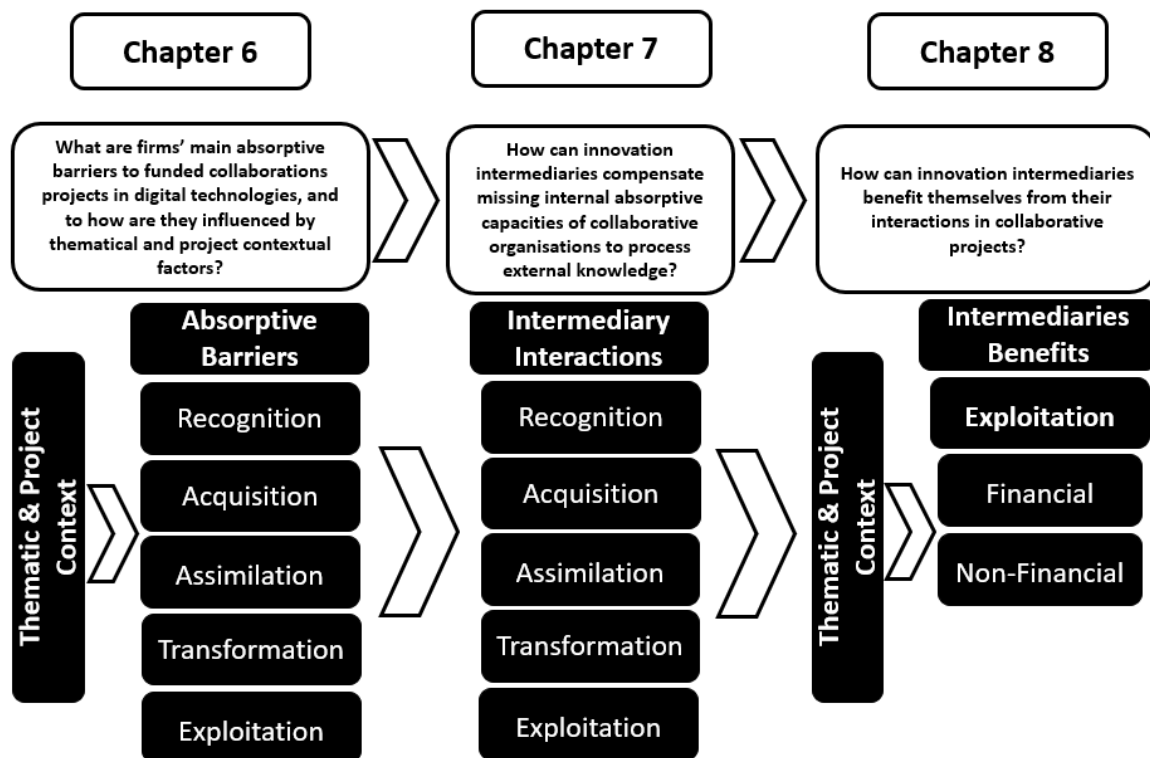


Figure 27: Overview Findings Structure RQ1

Before outlining findings on how intermediaries help companies through their specific interactions, it is crucial to understand the context in which organisations interact and the different barriers and challenges they face in the field of digital technologies, as highlighted in the literature review. Therefore, the five components of the absorptive capacity framework form the basis for the subdivision of the various emerging absorptive barriers. Chapter 6 outlines the observed barriers for each component and highlights the influence of the two factors, thematic and project context. These factors entail the spectrum of digital transformation versus digital transition as well as direct versus indirect intermediation projects.

As outlined in chapter 5, the selected project cases cover a broad spectrum of different influencing determinants to understand and present their influences in the best possible way. The following table provides a brief overview of the individual cases and their classification in

terms of the thematic digital context and project context. This table serves as an overview before presenting the findings about the absorptive barriers and the influencing factors.

Cases	Description	Thematical Context	Project Context
A	R&D Network Industry 4.0	Transformation	Direct Intermediation
B	R&D Network E-Mobility & Renewable Energies	Transformation	Direct Intermediation
C	Cross-Cluster Project Artificial Intelligence	Transition	Indirect Intermediation
D	Blockchain Project	Transition	Indirect Intermediation
E	Industrial Innovation Capacities Project	Transformation	Indirect Intermediation

Table 11: Case Comparison

6.1 Recognition

The first category of examined barriers relates to the first component of the absorptive capacity framework, recognition. Before organisations can even enter the process of absorbing external knowledge, they must recognise the opportunities for new knowledge, assess its value and thus show a willingness to take an interest in these opportunities (Cohen & Levinthal, 1990; Todorova & Durisin, 2007). The recognition component is a first prerequisite for further processing external knowledge, in this case, in funded collaboration projects.

When analysing the data concerning the challenges and barriers in the area of recognition, four determinants could be identified, which were decisive for whether the organisations could recognise and evaluate the value of the projects and the associated knowledge. It became apparent that the absorptive capacities of the organisations differed significantly in

these determinants. One factor that was particularly important and impacted all of the following factors was the participants' experience concerning collaborative innovation projects.

It became clear that organisations that had already contacted funding agencies in a collaborative project had a much stronger sense of new opportunities and their chances. Consequently, there was a strong correlation between the experience of the individual project partners with funded projects and their ability to identify opportunities independently. The more inexperienced the companies were in this field, the less familiar they were with the possibilities of implementing funded projects, especially on a collaborative scale.

The first specific barrier that emerged in the area of recognition was a need for more awareness on the part of the organisations regarding the possibilities of participating in funded projects and the opportunities and advantages that could arise for them through participation. Only when this awareness was present the organisations themselves had the drive to engage further with the topic of funded collaborative innovation projects.

Despite or building on the awareness the companies were confronted with the second barrier in the area of recognition, finding suitable funding opportunities. The selection of the funding framework greatly influences the requirements and characteristics of the whole project. It largely determines whether such a project is interesting for the organisations.

Often, bad experiences with past funding projects with poorly fitting funding frameworks led to the third barrier, the lack of interest in collaborative projects. Due to these previous bad experiences or other concerns such as the burden of resources, some organisations were aware of the possibility of a collaborative funded project but firmly rejected it because they assumed the disadvantages would outweigh their benefits.

The fourth barrier in the recognition area was the onboarding of potential partners. A collaborative innovation project requires suitable partners. This requirement often deterred the clients, which is why they assessed the chances of a successful project as very poor and refrained from further efforts. Table 11 shows an overview of the absorptive barriers identified. In order to make these more comprehensible, it highlights representative quotes and the individual cases in which they occurred. Within the framework of this thesis, we will present such a table with representative quotations for each analysed category to clarify the origin of the finding. This table contains particularly representative citations, which does not mean that the factors appear exclusively in the context of these. Rather, the tables serve as a compact and comprehensible overview.

Absorptive Barrier	Illustrative Quotations	Cases Findings Occurred
Missing Awareness	<p><i>“As start-ups, we are always on the lookout for joint, best-funded projects, firstly because we are convinced of their benefits, and secondly because we are somewhat dependent on such opportunities.” (Participant R)</i></p>	D
Suitable Funding Opportunities	<p><i>“For us as a small SME, funding is of course always interesting, but the barriers are without support are always high.” (Participant F)</i></p> <p><i>“You need to find the way to integrate some blockchain components, and that depends on having the right funding and the time to integrate and test this.” (Participant S)</i></p> <p><i>“The companies almost always fail because they cannot find the right federations, even though there are so many of them.” (Participant L)</i></p>	B, C, D

Lack of Interest in Collaboration	<p><i>“The topic of research, development in the context of funding or even participation in projects was not on our agenda in the past, let’s be blunt” (Participant G)</i></p> <p><i>“For us as a small SME, funding is of course always interesting, but the barriers are always high, this is why we are very cautious here.” (Participant B)</i></p>	A, B
Onboarding Potential Partners	<p><i>„The biggest difficulties are actually always finding partners, finding suitable partners who a) fit thematically, who b) also want to have something to do with funding.” (Participant K)</i></p> <p><i>We find it particularly difficult to link specifically with other partners.” (Participant R)</i></p> <p><i>“You need a certain amount of experience in the field to be able to recognise which partners fit together, what a sensible consortium is and how you could build one.” (Participant Z)</i></p>	C, D, E

Table 12: Absorptive Barriers Recognition

The project context had an evident influence on the challenges posed in recognition. In the two projects with direct intermediation, Case A and B, all organisations were involved in the project consortia. Therefore, on paper, they were equally responsible for the project from the beginning, which means that all partners had equal obligations, and all partners had to participate in the project from the beginning.

Consequently, the partner organisations had to realise the project’s added value from the beginning, as they were directly involved, which required an early use of resources and knowledge. It turned out that especially organisations with no experience in funded projects

could only assess the benefit and performance ratio with great difficulty, which initially strongly reduced the interest of some organisations in such a project. Other participants also needed to recognise the opportunities a funded collaborative project offered and thus would not have initiated it themselves for intrinsic reasons.

This distrust was strongly related to the companies' lack of ability to recognise suitable funding frameworks for themselves or to scan the funding landscape to discover suitable funding opportunities themselves. Furthermore, choosing a suitable funding framework is always linked to determining a suitable consortium of partners. In addition to the criteria mentioned above, the compilation of such a consortium represented a significant barrier for the companies, which strongly discouraged the smaller organisations from independently developing a funding project.

In contrast, in the projects with indirect client involvement, the problem of recognition arose later in the project, and the characteristics differed significantly from cases with direct involvement. The organisations involved did not need such pronounced recognition skills, as they were not directly involved at the beginning of the project and were included at a later stage. This later entry point obliterated some of the previously highlighted barriers to a large extent. This correlation made it clear that participation in a funding project with indirect involvement requires a significantly lower recognition capacity from the organisations than in the case of companies directly involved in the project as equal partners from the start.

Case D is an exception or hybrid case. In this project, the client organisations were not directly involved but were later directly integrated into the project through a cascade funding system. This approach meant that the companies had to have recognition skills, like in direct cases A & B, to gain access to the project. However, less pronounced capacities were necessary here,

which significantly reduced the barriers and requirements since the companies did not participate as equal partners, but as project participants directly in the project. Figure 28 summarises the influence of the project context on the absorptive recognition barriers.

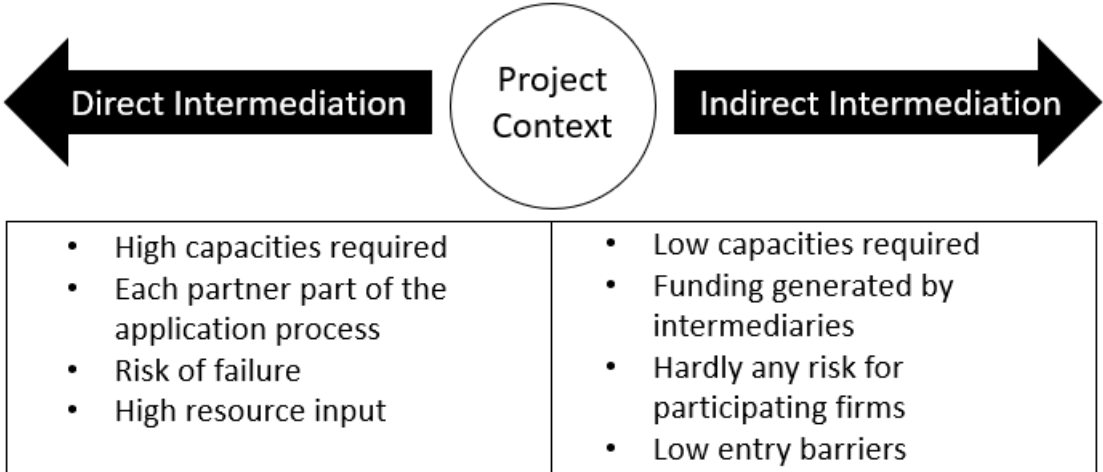


Figure 28: Influence Project Context Recognition

Interestingly, the companies in case D all had very high recognition capacities. It was possible to justify this strong presence with two findings. First, these firms were all start-ups whose business model focuses on external resources. Consequently, recognising opportunities that enable access to external knowledge and financial resources is mandatory for these organisations. Second, these blockchain start-ups operate in a fast-changing market driven by change and disruption, which requires them to exploit all opportunities beyond their internal capabilities to have a better chance of displacing existing solutions with their approaches.

“The project provides support from both the financial perspective but also giving the chance to expand our network because not only money is the motivation, but as well, the possibilities to expand the business network from the perspective of finding new

customers, pilot sites, but also business support organisations in different countries which go to support us in entering the market.” (Participant R)

Case C, located in the artificial intelligence field, confirmed the technical orientation’s influence. Although the indirect involvement in this project does not require too high recognition capacities, it became clear that the organisations in this area also have precise knowledge regarding the opportunities offered in the area of funded collaborative projects.

There is an excellent awareness in this area that it is only possible to generate marketable innovations in this emerging field by acquiring external resources. This awareness was also demonstrated by the project’s cross-cluster approach, which focuses on thematic intersections for using artificial intelligence.

In contrast, the companies in the digital transformation-driven cases A, B & E had significantly lower recognition capacities on average. This low availability could be justified by the fact that the business models of the companies involved do not have an acute need for external resources. Therefore, they classified them as optional. This understanding resulted in a divergence between high demands in recognition and low existing capacities, especially in cases A & B. The research institutions and universities must be excluded from this observation, as they all had high recognition capacities. These strong capacities are due, on the one hand, to their essential need for funding and, on the other hand, to their high demand for business partners without whom they would not be able to carry out their research activities or only to a limited extent. Consequently, these institutions already had much experience with funded collaborative projects.

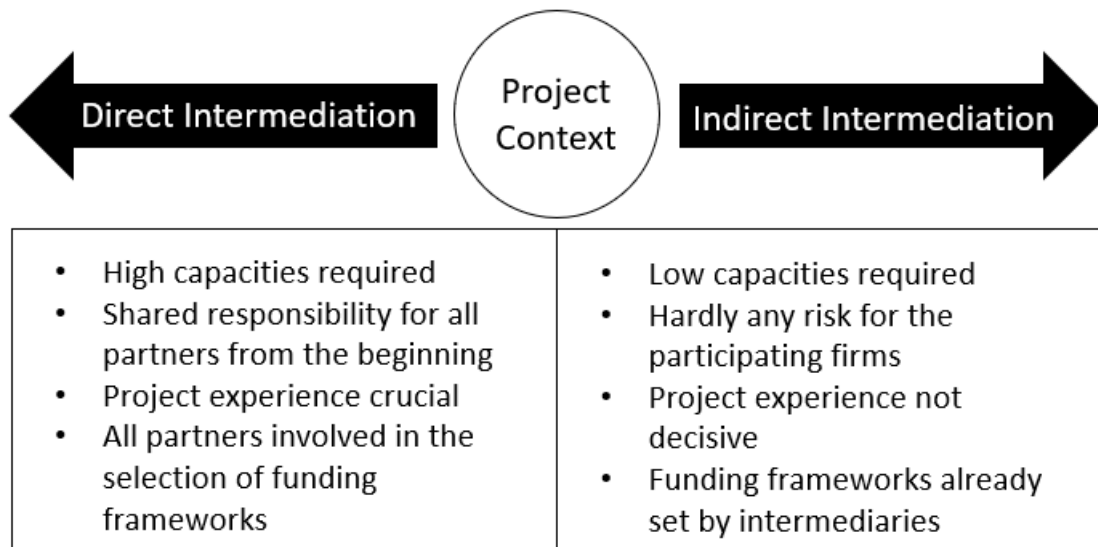


Figure 29: Influence Thematical Context Recognition

6.2 Acquisition

The acquisition component forms the second category, building on the first component of absorptive capacity and the framework of this thesis. Assigned to the area of potential absorptive capacity, it describes the ability of organisations to acquire the external knowledge identified in the recognition category and thus gain access to them (Zahra & George, 2002). The acquisition component is particularly crucial in the context of the project cases chosen in this thesis. In addition to the requirements of accessing external knowledge, it requires the ability of the organisations to acquire the funding needed to start the collaborative projects studied.

Absorptive capacity commonly refers to external knowledge, no other resources. However, it is not possible to consider these separately because access to external knowledge requires access to resources in these cases. Access to the projects and, consequently, the acquisition of the entailed knowledge was generally a big challenge for all organisations involved. Resources had to be dedicated, and all project partners had to be clear about what they could provide in order to avoid being overburdened later on in the project, to obtain it.

All project ideas had to be prepared and processed according to the funding body's requirements to obtain a project outline that enabled the funding and start of the projects. This elaboration of ideas was the first barrier to overcome in acquisition. Especially the sometimes-high formal requirements at the beginning of a project were a great challenge for the companies, as they had only limited resources and thus quickly reached their limits. It was essential to merge the existing products and plan further developments with the project to achieve the highest possible synergy effect and to keep the subsequent effort within a manageable framework.

For many participants, the most critical factor was the composition of a balanced project consortium, a mix of universities, companies and, in the best case, regional partners. They provided the input or the questions and, as scientific partners, made a supplementary contribution to the existing know-how. Especially the different ideas and perspectives of the individual partners had to be linked. Depending on the background of the organisations, they pursued different goals and had different strengths and weaknesses, which blended into a joint project proposal.

At the beginning, the main task was to develop a shared idea with which all partners could agree but also technologically attractive for the individual partners.

Particularly in digitalisation, false ideas and expectations had to be set right at the beginning to arrive at a realistic line. If false or unrealistic promises are made in the project application, it will lead to a negative evaluation. Nevertheless, the project goals had to be ambitious to convince the funding agency of the project's merits.

Absorptive Barrier	Illustrative Quotations	Cases Findings Occurred
<p>Idea Presenting and Processing</p>	<p><i>“The project outline idea has to be brought to the point where there is a common thread and where everyone feels at home and knows exactly what they are doing, then the thread is spun further and at some point the project is submitted and started.” (Participant J)</i></p> <p><i>“At the beginning, the biggest challenge is to formulate it in such a way that the idea you have yourself is translated in such a way that the funding body understands it and ultimately accepts it and says that it is worthy of funding or eligible for funding.” (Participant H)</i></p> <p><i>“When submitting an application, the ratio of resources made possible by the project and the required effort is always the decisive factor. Only when this is right does a call become interesting.” (Participant L)</i></p>	<p>B, C</p>
<p>Balanced Consortium</p>	<p><i>“A consortium must fit. Once unequal partners start a project, this mistake can hardly be avoided.” (Participant R)</i></p> <p><i>“Even if you have found potential partners, which is already difficult, this does not mean that the partners already make a consortium, here strengths and weaknesses must be complementary.” (Participant F)</i></p>	<p>D</p>
<p>Different Interest and Perspectives</p>	<p><i>“It is particularly important not to focus too much on the particular interests of one’s own company, but above all to develop a common idea and vision in order to create a promising project.” (Participant A)</i></p> <p><i>“A special situation has arisen in the network that was rather unplanned. Although they we were members and have already been involved in projects, no suitable project has emerged for us the current round. However, we were in-tently involved in the application</i></p>	<p>A, B C</p>

	<i>phases. However, in the end, unfortunately, no suitable consortium was found for our project.” (Participant F)</i>	
Excessive Demands and Promises	<p><i>“The criteria for a successful project application are very high, almost unrealistic, which easily leads to empty promises that cannot be implemented.” (Participant A).</i></p> <p><i>“We applied for the project in the second call, as at that time the technology of their development project was at a somewhat advanced stage, still very much at the beginning, but the vision was clear and the feasibility checked.” (Participant R)</i></p>	A, D

Table 13: Absorptive Barriers Acquisition

Similar to the previous component, the acquisition component highlighted that the projects with direct involvement of the companies placed significantly higher demands on the capacities of the collaboration partners in the acquisition area. Since they are already heavily involved in preparing the project proposal, their skills determine whether the project idea is accepted by the funding agency and supported with funding. Depending on the funding programme and the funding amount, this process can be complex and requires a lot of know-how and resources from the partners involved. On the one hand, the project ideas and solution approaches must fulfil the required formal and written form. On the other hand, the specific requirements of the respective funding guidelines must include innovation content, market and competition potential, and contribution to social and ecological issues. Furthermore, depending on the number of applications, each submitted project is in direct competition with other projects, as they compete for the available funding pots.

In contrast, in indirect intermediation projects, intermediaries have already overcome these hurdles.

In projects with indirect client participation, the intermediaries have already acquired funding in advance and have a project structure aimed at client support. Particular emphasis is placed on keeping client access barriers as low as possible to achieve the greatest possible added value. However, these are mainly knowledge-based services, as the funding of external organisations in these projects is subject to strict rules in the EU (see Appendix 2 on EU funding).

Again, Case D's cascade funding offered an exception. Although acquiring funding was identical to the indirect intermediation Cases C & E, the project provided direct financial support for their clients. To gain access to the project, they had to submit an application, which is interpretable as a kind of project proposal light in terms of requirements.

"It's a lot easier for start-ups because you know, we have to worry a lot about other things and if we want to get some grant from the European commission, we have to expend significant resources for reporting." Participant Q

Consequently, one of the major barriers, the composition of a consortium, was absent for the clients, as they applied alone. However, this process was still quite demanding for the companies, as they could only provide a minimal number of resources for the acquisition process and thus had to work in a very targeted manner.

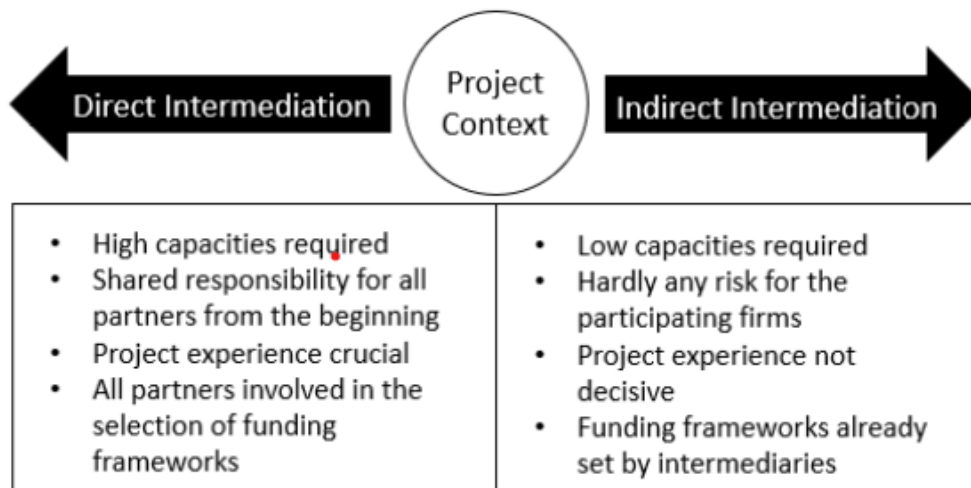


Figure 30: Influence Project Context Acquisition

The similar picture to the recognition component also continued concerning the thematic context. It became apparent that the organisations operating in the area of digital transition had significantly higher capacities in the area of acquisition, particularly about funding projects, but also generally with external sources of knowledge.

These were needed because the funding landscape in digital transition areas is generally much more volatile than that of digital transformation. The companies must act quickly and flexibly here and therefore need strong capacities to act as soon as suitable funding opportunities arise. The reasons for this volatility are the big general changes regarding new emerging digital technologies. Funding programs are geared more closely to current trends, resulting in significant changes in direction. Combined with business models strongly oriented towards external resources and the more substantial need for external sources, these firms need strong capacities to acquire funding.

What also emerged in the area of digital transition is that the companies need more robust capacities of their own to present their ideas in such a way that the often-enormous demands on their emerging technological approaches are met to a sufficient degree. However, at the

same time, they must not make unrealistic promises that cannot be fulfilled during the project. While this problem was generally evident in digital projects regarding excessive demands and promises, this challenge was even more significant in the digital transition. The companies generally had the problem that the funding possibilities and requirements were difficult to manage with their technical means and prerequisites.

“It seems that it is still deeply rooted that software and hardware are inseparable. However, this problem does not only affect policymakers, but also established companies, especially medium-sized ones. Often, they are expected to develop something physical, which is simply very difficult as a pure software operation. In the future, it would be desirable if the federal landscape were more strongly oriented towards software and real customer requirements in this area.” (Participant B)

Funding opportunities in upcoming innovative technologies must catch up to the state of the art. In the case of artificial intelligence, for example, it has changed so quickly in recent years that very different types of funding were needed and available depending on the area. These changes made it even more difficult for companies to access suitable projects.

“Despite the difficulties in the past, funding for simple digitisation topics such as AI has improved significantly recently, especially at the Bavarian level. Here, the funding pots have been streamlined and the offer improved.” (Participant M)

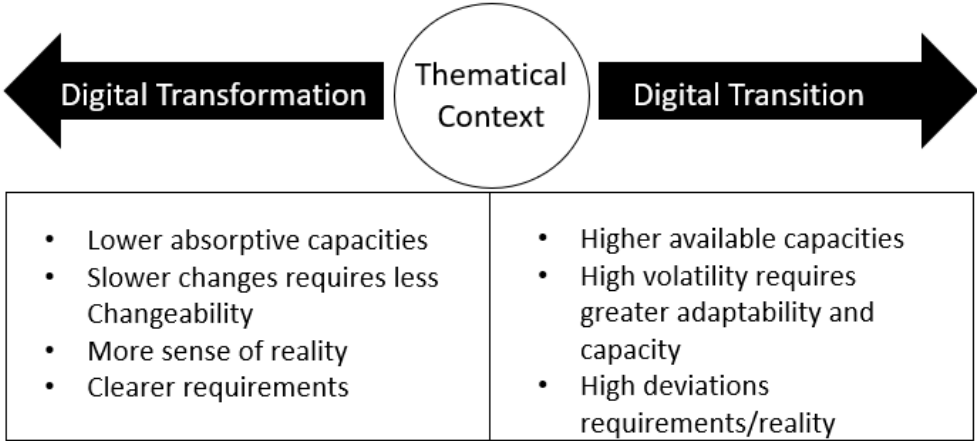


Figure 31: Influence Thematical Context Acquisition

6.3 Assimilation

The third component of the absorptive capacity framework of this thesis relates to the assimilation of externally acquired knowledge. The focus here is on understanding and processing this new knowledge (Zahra & George, 2002). The main focus is on understanding how the externally generated knowledge fits into the existing internal structures and processes and thus provides real added value (Todorova & Durisin, 2007).

In the concrete project framework, this is the first component directly aimed at the exchange in the ongoing project since the funding has been acquired and the actual project work started. The basis of a joint project is the pooling of resources. The different characteristics of the individual partners made this process very complex, as the essential starting points and foundations differed significantly. While companies often wanted to outsource research activities in terms of the analysed cases, research institutions were looking for a demonstration project to apply their theoretical know-how. However, this dispersion of intentions can quickly prevent successful cooperation or at least make it more difficult. The partners involved often found it difficult to put themselves in the other perspective or sometimes lacked the know-how to do so. The exchange between protagonists with different professional backgrounds often led to difficulties in finding common ground. Problems emerged here, for example, between scientists and entrepreneurs.

These difficulties outlined the first barrier in the assimilation area, the need for a common denominator, including the project goal, handling the project results and the way to get there.

The second barrier to the assimilation of external knowledge was the general communication between the project partners or the need for more functioning communication. Only if the partners had a good exchange about the transferred knowledge, it was possible to understand

the acquired knowledge. Therefore, a common language in cultural and technical terms was vital for all partners.

The third barrier of different cultural and geographical backgrounds compounded this challenge.

The fourth barrier was the incorrect self-assessment of the project participants. Only when they could correctly assess their strengths and weaknesses and their existing capabilities, they were able to put newly acquired knowledge into context and understand it. After a project, the consortium has come together, and the first application phase has been completed, there is a more concrete exchange in which everyone contributes their thematic strengths. In this process, it is often the case that problems arise that still need to be clarified to some of the partners. Thereby, it was often difficult to convince the companies that support in certain areas was necessary. These difficulties mainly concern the legal area and the fulfilment of standards and approvals. Many companies needed to be made aware of what they needed for approval, e. g., in the area of logistics for medical goods, to be able to offer their product here. Also, possible penalties for non-compliance with the requirements were unknown. Another topic was IP protection, as many companies developed so quickly and agilely that they need to consider whether development or intermediate stages should be protected. Moreover, how this is possible without a highly high expenditure of resources.

Absorptive Barrier	Illustrative Quotations	Cases Findings Occurred
Lack of / Non-functioning Communication	<p><i>“Communication is one of the biggest stumbling blocks, because when communication is disrupted, one partner no longer understands the other.” (Participant M)</i></p> <p><i>“Communication is essential in all areas for a common</i></p>	C, D

understanding. There are usually problems here between scientists and natural scientists on the one hand, and computer scientists on the other. They have to speak a common language. It is a constant challenge to link these two fields.” (Participant L)

“Communication is a very important point to get the different participants in the project on the same page and to stimulate the exchange between the partners. In the project, there were several changes in the project management that were communicated rather little, which was not so good for the participating companies, as there were uncertainties about the actual contact persons. It is always very important that the project managers can be reached at any time with questions and problems. Even if the firms needed specific contacts, etc. That is an important point and is definitely not a matter of course in a project like this, unfortunately.” (Participant R)

Uncommon Denominator

“It is quite important that we can have different domains coming together, different areas coming together, but of course that also leads to some different views that the intermediary has to reconcile without taking sides.” (Participant P)

C, D, E

“What is of great importance with topics like blockchain is that all parties involved are at the same level of technology and are aware that the topic needs even more development than, for example, classic software development. The programming languages, for example, are much less advanced. For this reason, everyone should also see themselves as a developer rather than a user of the technology. This approach is very important for successful cooperation. Sponsored projects help companies to stay up to date and to exchange information.” (Participant S)

	<p><i>“It takes a common understanding, otherwise the parties will not come together. Only when the ideas overlap there can be goal-oriented cooperation.” (Participant Z)</i></p>	
<p>Different Geographical & Cultural Backgrounds</p>	<p><i>“The focus of Case E is clearly on more transnational cooperation, which made it very difficult to work out the status quo and identify issues where support would be useful, as these are very different from region to region. But it is always crucial to find a consensus so that everyone in the project can benefit.” (Participant Y)</i></p> <p><i>“The requirements of the companies are very different depending on the sector but also on the country of origin and have to be taken into account in order to offer support services. Especially in more traditional areas such as agrifood, there are traditionally many barriers.” (A2)</i></p>	<p>E</p>
<p>Incorrect self-assessment</p>	<p><i>“Many of the participating companies were not aware of their strengths and weaknesses at the beginning. Especially when young enterprises are part of a project, experience shows that it is always similar. Almost all of these companies can be divided into two categories. Either they are economically very well positioned and have only average technical competences, or they are excellent in the technical area and economically very poorly positioned or have little interest in the economic processes. For these companies to benefit from the project, the consortium have to find a way to present them with solutions that above all improve their weaknesses.” (Participant U)</i></p>	<p>D</p>

Table 14: Absorptive Barriers Assimilation

Especially regarding the project context, the picture is entirely different from the two components described above. While the required capacities in the area of recognition and acquisition were higher in the direct projects, it became apparent that the barriers in the assimilation area are similarly high but very different. In projects with direct intermediation, for the understanding of external knowledge, a common denominator and a target image that all partners support is decisive in achieving a high level of general understanding.

This clear picture includes direct knowledge and the characteristics and objectives of the other project partners. This additional information increases the own understanding of the knowledge coming from these partners. It has been shown that functioning communication within the project and between the partners is a crucial building block that enables and dramatically improves the assimilation of the knowledge received.

This finding is different in projects with indirect intermediation. The knowledge conveyed in these projects comes directly from the intermediaries and is processed or controlled by them. This means that organisations do not need the capacities required in cases with direct involvement since the intermediaries have already developed a communication strategy.

The knowledge is comprehensibly prepared but does not come through a direct exchange between the clients. The knowledge obtained in this way often has a rather abstract form, and, in some cases, the practical usability is much more difficult for the clients to understand.

“When we have European Court of Auditors and big international European organizations, they always come to us to Hungary because they can see something tangible that we have 3D printers everything and honestly marks many of them from interact funds. And then they are happy that there is something they can touch, they can see that it's not just paper that was created but also something tangible.” (Participant Y)

Thus, they need capacities to understand this abstract and mostly theoretical knowledge and put it into their processes' context. However, this turned out to be a hurdle that many organisations should consider.

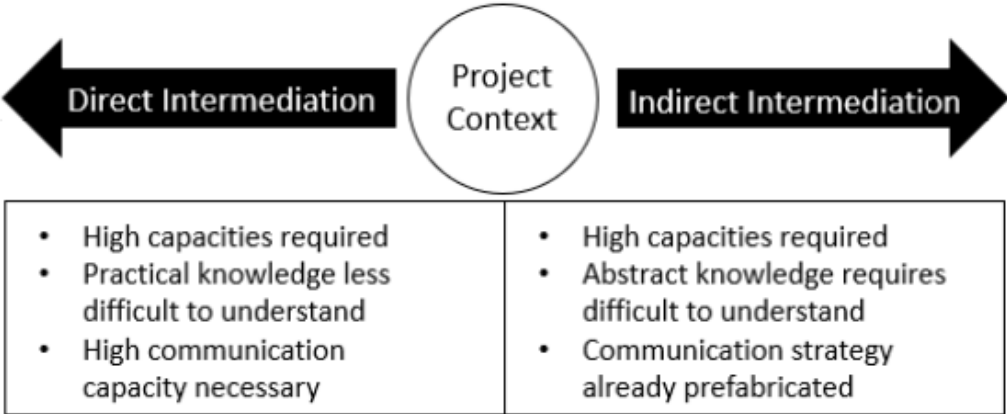


Figure 32: Influence Project Context Assimilation

In contrast, the results for the thematic orientation did not differ so much from the two components explained above. The organisations that were active in the areas that focused more on transformation and incremental innovation had a higher ability to assess themselves. In addition to understanding the partner organisations, this was an enormously vital ability to link external knowledge with their base. In contrast, they needed to be more open to external knowledge. They, therefore, found it difficult to relate this knowledge, especially if it was at first sight rather abstract or not project-appropriate, to them and their challenges and goals.

“The topic of software security is already further advanced than many companies recognise. If you look at the nearby university, for example, the topic is omnipresent and the problems and approaches to solving them are also consistently communicated. Here it is about using secure languages, coding properly, etc.” (Participant N)

The situation was almost the reverse for the organisations that were active in the digital transition field. Since these companies, in most cases, overgrew, they needed more balanced organisational structures and were unaware of their strengths and weaknesses.

“The start-ups do know somehow that these issues exist, but it's not their sphere of primary interests.” (Participant W)

Consequently, they needed help understanding what was outside their strengths. Interestingly, they were very open to this but put more effort into processing the knowledge they received and linking it to their existing processes and capabilities. An additional barrier, that emerged during the projects but cannot be attributed to the two evaluation axes, are geographical and cultural barriers. In the context of international projects, it became clear that these make a common understanding much more difficult. This challenge is not due to languages but rather to different requirements, needs and, to a certain extent, the state of knowledge in the individual regions. Particularly with digital solutions, it has become clear that it is often difficult when the companies offering the solutions are active in countries other than the target markets and customers, as problems arise in correctly classifying and understanding the knowledge received.

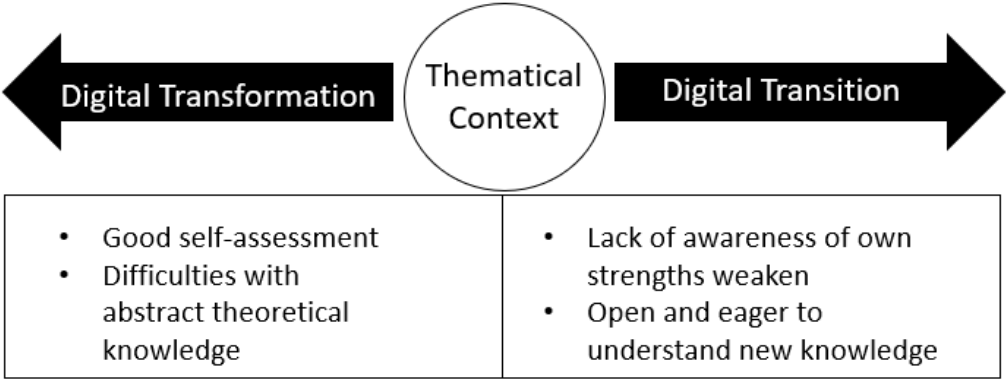


Figure 33: Influence Thematical Context Acquisition

6.4 Transformation

The fourth component of the absorptive capacity framework relates to transformation. This component refers to the ability of organisations to combine newly acquired and assimilated knowledge with their processes and routines. It includes processing the received knowledge to link it to the existing structures (Zahra & George, 2002).

After the projects started, the main task was to transform the existing knowledge so the companies could use it. There was a shift in focus between research institutions and companies. While the former mainly worked on the theoretical fundamental research part, such as developing algorithms or new software, the industrial partners usually tested them under actual conditions or put them into operation in a practical context. The transfer of academic approaches into practice was a significant difficulty in collaborative projects and formed a critical thematic focus of the cases.

“In many areas, the gap between theoretical scientific knowledge and practice is currently still huge. Many companies in this area are not even aware that there is the possibility of exchanging information with universities and that there are contact points for solving specific problems. However, there are also many companies from the same area that make great use of this offer and have already had very good experiences with collaborations with universities or research centres. This has led to good relationships that in turn facilitate the transfer of knowledge and access to new projects. But in general, this transfer still functions far too unbalanced.” (Participant A2)

As described in the brief description of the transformation component, transformation summarises two essential mechanisms. On the one hand, the adaptation of one’s capabilities to external knowledge and, on the other hand, the adjustment of the acquired external knowledge linked to the existing capabilities.

Therefore, the transfer of scientific and practical knowledge was the first absorptive barrier in the transformation field.

Besides this transfer, the specific adaptation of theoretical knowledge was a high barrier for the companies. During the projects, the challenges mostly came from the companies, and the universities provided solutions and theoretical approaches. They had the know-how in the theoretical field and applied research, and they tried to solve the problem or develop the projects further. The focus of the companies was naturally on bringing the product to market sooner or later, and the universities tended to concentrate on developing their competencies and capacities. In general, however, the discrepancy between research and practice was a frequently mentioned problem that posed significant challenges for the companies, especially regarding knowledge transfer. The companies often had concrete questions about problems and hoped to solve these in the projects.

The third barrier has mainly affected the companies involved. It involves the difficulty of adapting the knowledge obtained in the projects so that it is possible to enable practice-oriented applications.

“Research is often very far removed from practice, as practice simply doesn't function at an academically correct, super-high level at the moment. Research must also be interested in the practical needs in order to simply break down barriers in implementation, as the interest in research must also be there and the companies must be picked up with the topics. The transfer of knowledge just doesn't work enough at the moment.” (Participant O)

This barrier included, on the one hand, the adaptation of the theoretical knowledge with a view to a target-oriented application and, on the other hand, the development of concrete use cases, pilot projects and demonstration projects that illustrate the results and make them

tangible. Especially organisations had difficulties that were relatively new to the conceptual-methodological approaches taught in the context of the projects. For them, it was often uncharted territory to enable the transfer of knowledge from the projects and their participants to the company.

Absorptive Barrier	Illustrative Quotations	Cases Findings Occurred
<p>Transfer Scientific & Practical Expertise</p>	<p><i>“However, in order to enable the transfer of knowledge from the project to the company, it is important for companies to adopt the new conceptual-methodological approaches that are taught in the context of a project, like Case A, and to get involved with them, even if it is often new territory. The great advantage of such a project is that it represents a platform in which companies are introduced to new methodologies and concepts that, although not all of them can be utilised in practice, due in part offer considerable added value for day-to-day business. This approach is not possible in innovation projects in a practical environment, because the client is not interested in iterative, experimental approaches but expects pragmatic solutions.” (Participant B)</i></p> <p><i>“There's just so much room for manoeuvre in between and simply because the transfer of knowledge just doesn't work enough at the moment.” (Participant O)</i></p>	<p>A, C</p>
<p>Adaption of Theoretical Knowledge</p>	<p><i>“The results of the projects are sometimes a little too academic to be used in a practical project context without major effort. However, this discrepancy is more of a fundamental problem than a project-specific one, especially in the digital field such as machine learning. At the moment, there is a big difference between what is possible in theory and artificial conditions and what can be implemented in practice, as the dynamics are much greater there, as the systems and products are constantly changing, which cannot be depicted with a static model developed under academic considerations, as the preparation and test phases are much too long.” (Participant A)</i></p> <p><i>“The questions in the project usually come from the companies and with the know-how</i></p>	<p>A, B</p>

	<p><i>of the universities, which is very strong especially in the theoretical area and applied research, attempts are made to solve the problem or develop the project further. The company's focus is on getting the product ready for the market sooner or later, of course, and the universities tend to focus on increasing their own competences and capacities. In this way, algorithms or network models are refined in the projects that were developed in the research institution, especially in the digital field.” (Participant I)</i></p>	
Practical Implementation	<p><i>“One of the major difficulties in the field of AI is the transferability of models. Since a very broad field of sectors and topics must be addressed in the area of sensor technology, the models here are kept relatively generic, which works well in some fields and less so in others. It works quite well in image processing in particular, since the technology is already quite established there. In this field there is a wide pool of training data, but also models that can identify and match objects. These are also used in practice. In other areas, this is not possible at the moment. On the one hand, the models are not yet available and on the other hand, there are many obstacles to the technology. The aforementioned black-box aspect plays a major role here, and systems must function not only 99 per cent but 100 per cent correctly.” (Participant M)</i></p> <p><i>“One of the main problems with European projects is that there is always a big gap between the specifications and theoretical requirements and the actual needs of the companies working in practice. This leads to problems especially when it is not only a matter of developing an idea, but also of scaling it. The main problem is that the start-ups often need more support in how they can really turn technical ideas into something profitable.” (Participant T)</i></p>	C, D

Table 15: Absorptive Barriers Transformation

The type of knowledge acquired consequently plays a significant role in this process. In the projects with a direct intermediation, the knowledge exchanged was, as already explained under the point assimilation, clearly more practice-oriented and specific than the other three

cases. Because the knowledge was passed on directly from one partner to the next, problems arose in adapting the knowledge received to one's processes, routines and capacities. Especially the transfer from universities to companies involved great difficulties, whereas the other direction, the transfer of more market-based knowledge from the companies to the research institutions, also involved difficulties. The organisations needed distinct capacities to manage this newly received information so that it could be linked to their existing structures.

This process was different in the projects with indirect intermediation. Here it became clear that the organisations mainly had to adapt their capacities to the received knowledge to achieve a linkage. This result was due to the more abstract nature of the knowledge transfer, as explained earlier. These projects imparted much stronger general economic and technical knowledge. For example, organisations were generally trained in using a specific digital technology or dealing with digital transformation. For this knowledge to be successfully linked to their organisations, they had to adapt internally it, not vice versa, as was the case in the projects where specific project-related knowledge was passed on from one partner to the next.

One of the main problems with projects with indirect intermediation was, that there was always a big gap between the specifications and academic requirements and the actual needs of the companies working in practice. This gap led to problems, especially when it came to developing an idea and scaling it. The main problem was that the start-ups often needed more support to turn technical ideas into something profitable. Especially when it came to finding early adopters or pilot partners, the support often ended, and excellent technological ideas were lost because the companies needed support to turn them into economically viable products.

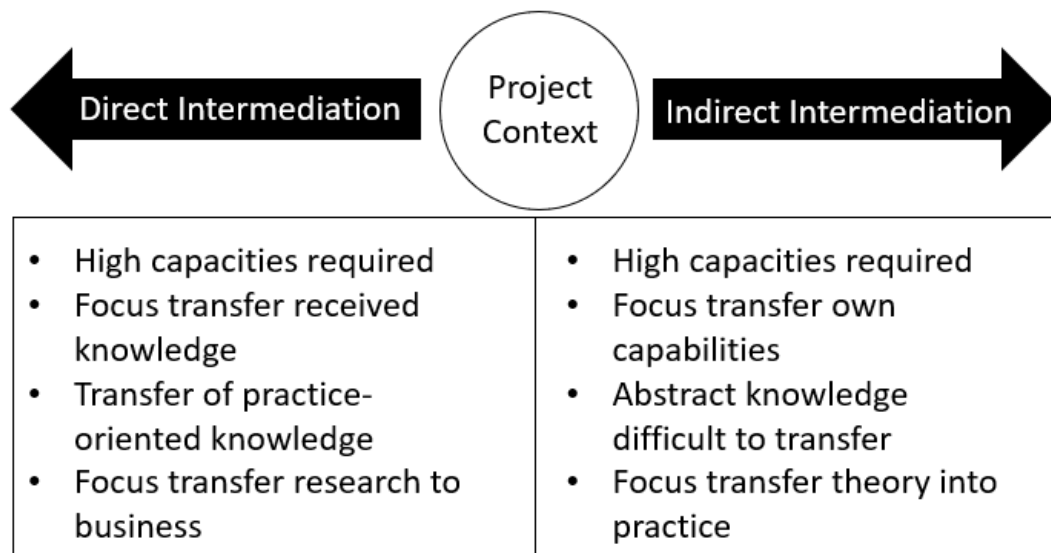


Figure 34: Influence Project Context Transformation

Within the thematic context, the picture was also divided. The projects in the area of digital transformation had a strong focus on technical solutions, as this was one of the challenges for the companies. Although these companies already had functioning business models, they had to adapt to digital transformation.

“The main difficulty in the area of Industry 4.0 and digital projects is not so much to identify potential areas for innovation, as the potential for products and services is almost inexhaustible. The difficulty lies much more in actually establishing the solutions in an industrial environment. However, this only happens if there is a clear added value for industrial users.” (Participant E)

These companies had excellent economic structures and a high knowledge of the market and competition. However, they often needed more than one technological building blocks to create digital innovations independently. Therefore, they needed the capacity to apply the technological knowledge they had acquired in the projects.

In contrast, it became clear that the companies in the area of digital transition, in the vast majority of cases, had solid technical capacities. Because they work with very new

technologies, they must have high technological skills. Otherwise, they would not come into contact with these new emerging solutions. However, technological know-how built the centrepiece of these firms, which led to them showing weaknesses in other entrepreneurial competencies. For this reason, the technological knowledge they received was of less importance to them. However, they mainly needed capacities to link the received economic knowledge with their technologically driven ideas.

“In poland, blockchain is not yet very widespread, so we need support to make it more popular locally. However, if the support is only focused on how to introduce tech products into very developed nodes, this will only help us to a very limited extent.” (Participant R)

However, due to their less developed entrepreneurial structures, this posed a very high challenge for the companies.

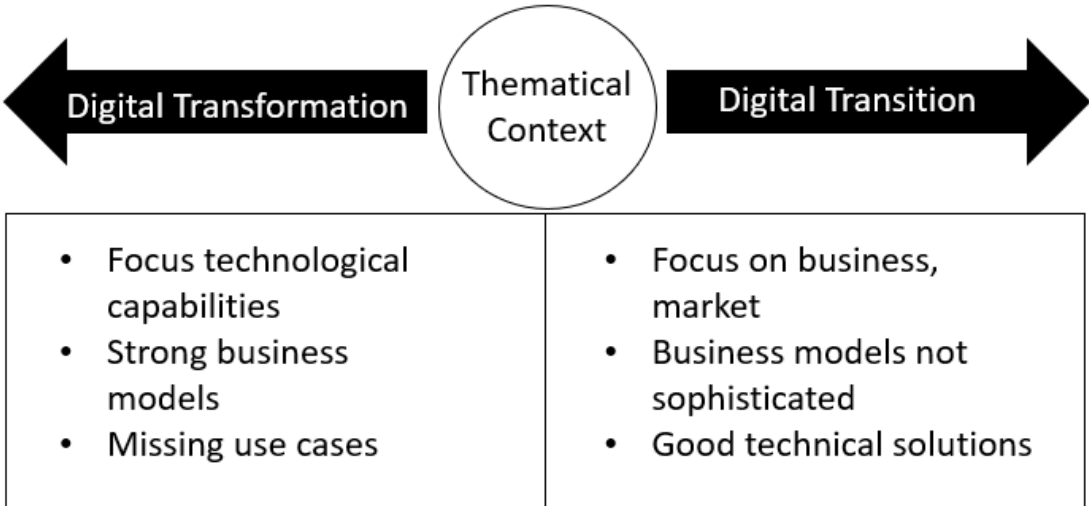


Figure 35: Influence Thematical Context Transformation

6.5 Exploitation

The exploitation component refers to an organisation's capacity to adapt, extend or refine its existing capabilities or develop new capabilities based on the implementation of the absorbed external knowledge (Zahra & George, 2002).

Concerning the analysed cases, the component exploitation largely determines the actual success of the project. Only if the project partners have sufficient capacities to use the knowledge and resources obtained in the project in a meaningful, targeted way could they add sustainable added value for them.

In general, concerning exploitation, the project success officially recorded within the framework of the projects should be distinct from the factors presented here. It has been shown that these partly only exist on paper to fulfil the funding body's requirements. However, the organisations could not develop any real long-term added value for themselves. Depending on the partner, the technical exchange varied in intensity but was not surprising due to the project experience. Especially in the methodological area, there was an apparent gain for the companies. In general, new projects have already been initiated through the project results of the Cases. Everyone was responsible for the extent to which they used the project results and thus really benefitted in the long term.

Consequently, the first barrier regarding exploitation was creating long-term benefits for the respective organisation. When discussing the benefits of projects in general, a clear distinction must be made between the financial and the technical benefits. The ultimate benefit of a funded project was not only to initiate developments. The support and the resources provided enabled the companies to work through a planned project roadmap much more quickly. An acceleration effect gave companies a significant competitive advantage, especially in fast-

moving topics such as blockchain, where the speed of development plays a significant role. The long-term benefit for a company is, therefore, not only the creation of new capabilities but also to offer of the environment to apply the existing ones and thus improve them. It was often enough to generate an awareness to continue using the existing capacities in the desired area but to use and prioritise them differently.

In addition to generating benefits, evaluating them was a significant challenge for the companies. Only if the success achieved was also measured or registered could the actual benefits be analysed and the successes assessed. However, evaluating the success of innovation projects is difficult, if possible, to measure in the long term using rather abstract indicators. Therefore, there was often a large discrepancy between theoretical and practical added value. At this point, many things were blown up that had little impact. The great advantage of funded innovation projects that specifically target the development of new products is that at the end of the project, the companies gain a direct competitive advantage through the exclusive use of the products and technologies developed in combination with all partners. Especially for marketing, this approach was fundamental and led to every company's primary goal: economic success. The discrepancy between companies' and universities' assessment of the project success can be attributed to a tremendous difference in the primary objectives. The more own financial resources are used in the project, the higher the expectation of the usable project result. Universities and research institutions are 100 per cent eligible for funding in ZIM networks and projects.

In contrast, companies have to finance a varying project share, depending on their size and type. This financial contribution automatically increases the pressure and expectations. Especially inexperienced companies involved in a collaboration project for the first time often tend to be dissatisfied with the project results and their own project benefits due to expectations

raised too high in advance. In addition, they have the economic pressure to make financial capital from the project through their contribution, which is different from other institutions. They can produce several publications about the project, publish the project results in events, and thus have already achieved their fundamental objective.

Furthermore, the universities themselves benefited from the fact that scientific staff could be financed through the project, which led to developing other know-how. This know-how, in combination with the developments and practical influences of the companies, was then used in teaching and helped to train the employees of tomorrow in the best possible way. With such projects, the research could be financed to this extent.

One of the biggest challenges of the projects and the third barrier was creating a real impact. This impact could range from economic benefits for the companies, the development of innovative approaches and products, the strengthening of the ecosystem, the further development of the intermediaries or the know-how formation in the research institutions. To create this impact, however, not only did the project have to be well organised, but the involved organisations also had to profit in such a way that they could and, in future can, create real added value for the ecosystem.

Absorptive Barrier	Illustrative Quotations	Cases Findings Occurred
<p>Long-term Benefits</p>	<p><i>“Besides the obvious financial support, the greatest incentive in the projects is to establish long term with research institutions, especially as an SME, which would otherwise be very difficult. Through our project, we gained access to their know-how and established strong relations, for these, intermediary played a decisive role.” (Participant A)</i></p> <p><i>“Especially with regard to the final benefit of the projects, the</i></p>	<p>A, C, E</p>

	<p><i>framework conditions play a very important role. What is generally seen as very critical here are the time horizons. A lot of time passes, usually up to a year, until a submitted project is finally ready to start and the actual work can begin. This is too long, especially for digital topics that are changing rapidly. Especially the time factor and the bureaucratic issues still have potential for improvement.” (Participant M)</i></p> <p><i>“If they see an EU project only as a cash cow for their own organisation, it is difficult to create a common added value. That's why experience is so important when you bring people into a consortium.” (Participant X)</i></p>	
Success Evaluation	<p><i>“It may also be that another way emerges that is somehow better, but in the end, everything you learn from or in such a project is actually to be interpreted as a success.” (Participant D)</i></p> <p><i>“For us it was more about refining our existing capabilities than growing new capabilities, we have been able to now better use our capabilities. But we have not necessarily developed new capabilities.” (Participant S)</i></p>	A, D
Impact Creation	<p><i>“Project funding is nice, but we really have to achieve added value. As a company, especially a small one, it's no use if you've invested three years of work and hardly get anything out of it.” (Participant H)</i></p> <p><i>“Impact is what we always try to achieve, you can get millions of euros. And if you do not distribute it well, if you do not manage it well and if all those goals were not set appropriately, then you will waste all the money”. (Participant V)</i></p>	D, E

Table 16: Absorptive Barriers Exploitation

Especially in the projects with indirect client involvement, this problem was very present. The project consortia consisting of intermediaries passed on the project progress to the project executing agency independently and were therefore very concerned about achieving the specified goals. Because the knowledge passed on was rather abstract, it is also much more difficult in these projects to measure the project's success based on concrete results. Instead, various project indicators were used and defined at the beginning of the project. One of the main problems, however, was that either the intermediaries themselves had to define the project's success, as explained above, or they had to rely heavily on the abilities of the participating companies to assess the added value. This evaluation, however, requires the necessary capacities for such an evaluation of success, which were often unavailable, especially with inexperienced partners. It became apparent that the feedback the companies gave back to the intermediaries did not necessarily correspond to their actual assessment. In addition, the projects with the indirect intermediation had the task of generating the highest possible impact for the target region and its ecosystems from the outset. However, it was challenging for all participants to determine this.

The projects with a direct client involvement had different requirements. Because concrete developments were carried out in these projects, the direct outcome could be better measured, and the companies had less difficulty determining to what extent they benefited from the project.

“From a technological point of view, new insights have certainly emerged for our company. In detail, this concerns the data security of large real-time processing streams. Although a possible scenario could be developed within the framework of the project, this differs significantly from the original approach, as this would be very difficult to implement from a technical point of view.” (Participant B)

It has been shown that the project's contacts and network have greatly improved, which can be described as a clear added value. The companies involved in the project had much more difficulty deriving long-term added value from the projects. Since the project support ended after a particular time, some participants had problems using the results of the projects beyond this time frame and mastering the last step towards an economically successful innovation.

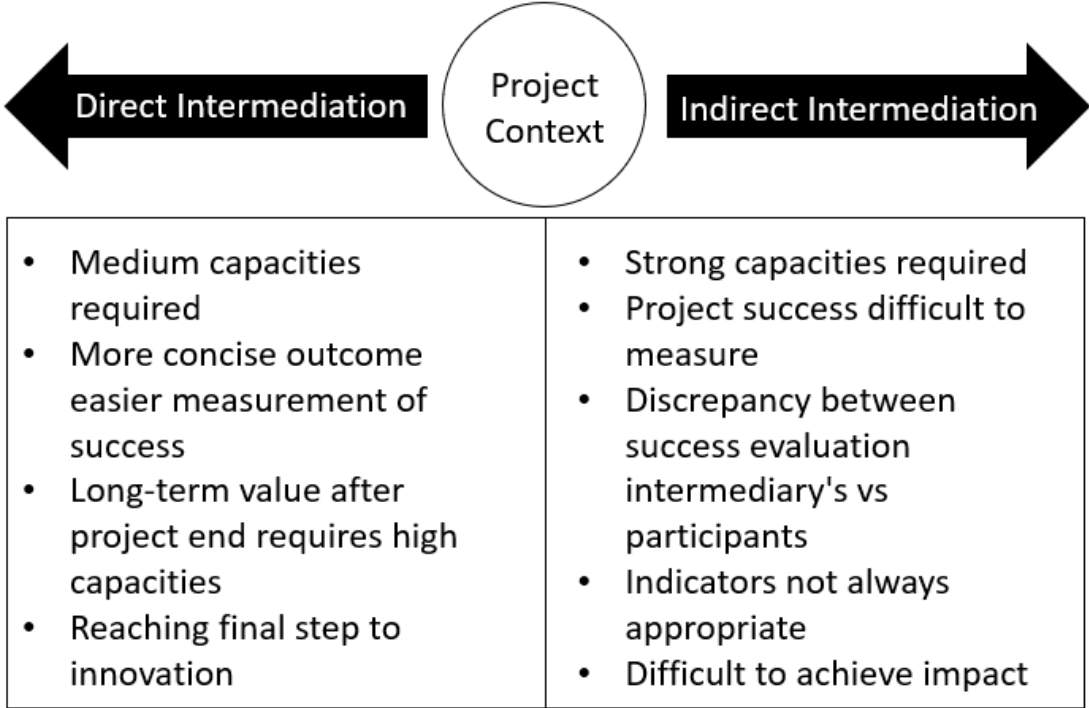


Figure 36: Influence Project Context Exploitation

In the context of the exploitation, a clear difference between the companies that were active in digital transformation and those active in digital transition also became apparent. On the one hand, companies in the first category were significantly better at it and consequently more satisfied when they could achieve small added values for their company from the project but needed help dealing with failed ideas. The companies in the second category focused much more on generating immense added value for their company. They placed less emphasis

on minor improvements, leading to some of them giving away potential or classifying the projects only as successes or failures. As a result, they had a more pronounced culture of failure, absorbed them much better and often tried to draw added value from them in new projects.

“So that we simply develop a culture. Developing a culture of being deficient, of course, developing an admission that not everything always has to be 100 per cent perfect, but that we also have to allow many attempts and that we then actually get a funding landscape that strengthens this productively.” (Participant N)

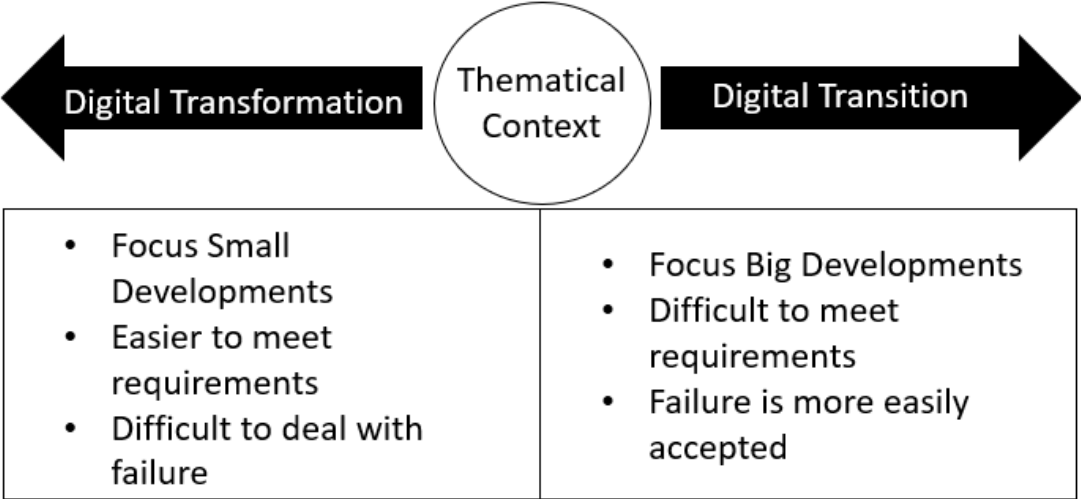


Figure 37: Influence Thematical Context Exploitation

In general, the exploitation of knowledge has shown a discrepancy between the added value achieved and one's assessment of it. Regardless of projects and the thematic areas, almost all participants needed help recognising to what extent and at which point they had concretely benefited. However, the high willingness of most companies to participate in collaborative projects again showed that they considered them a success that went beyond pure financial merit.

6.6 Summary

Two main findings became apparent through the comparative analysis of the five cases presented above. First, it was possible to outline the specific absorptive barriers for each component of the absorptive capacity framework. Second, it demonstrated the influence of the thematic and project context on these barriers and the absorptive capacities of the project partners. The analysis process identified absorptive barriers for each component of the absorptive capacity framework, which the project partners must overcome.

Despite a specific scattering in detail, it was possible to highlight the most critical absorptive capacity barriers in the context of funded projects. To overcome these, organisations need the appropriate absorptive capacities. The following table shows the emerging absorptive capacity barriers that became visible during the analysis.

AC Component	Absorptive Barrier
Recognition	Missing Awareness Lack of Interest Funding Identification Onboarding Partners
Acquisition	Idea Presentation and Processing Balanced Project Consortium Different Interest & Perspectives Excessive Demands & Promises
Assimilation	Lack / Non-functioning Communication Uncommon Denominator Different Geographic/Cultural Backgrounds Incorrect self-assessment
Transformation	Transfer Scientific & Practical Expertise Common Synergy Base Adaption of Theoretical Knowledge Practical Implementation
Exploitation	Long-term Benefit & Impact Creation Success Evaluation Strong Self-focus

Table 17: Absorptive Barriers Funded Collaboration Projects

Through the analysis, it became visible that the thematic and the project context impacted the absorptive barriers and the clients' existing absorptive capacities. It became clear that the companies had differently developed absorptive capacities depending on their thematic classification, which followed a clear pattern. Although digital projects generally have specific characteristics in rapidly changing subject areas, a complex combination of hardware and software, and many possible uses and interfaces, clear differences between digital transformation and digital transition became apparent.

Precisely because the field of the digital transition is even more volatile, the companies generally have a stronger focus on external knowledge. Consequently, they have significantly higher capacities on average than the companies that are active in digital transformation, especially in the areas of recognition and acquisition. Because it is challenging for the companies and start-ups involved in the project to achieve sustainable market success with solutions in digital transition, they have a significantly higher awareness that they depend on external resources and knowledge. In general, the project partners from the field of digital transition had different strengths and goals than comparable partners from the digital transformation category. While the former was mainly interested in knowledge about economic and market areas, the latter were mainly looking for technical support. This difference makes the two areas significantly different. Due to the broadness of the digitalisation field, the schemes' goals, characteristics, and partners differ significantly.

Figure 38 provides an overview of the differences in digital transformation vs digital transition that emerged during the analysis.

← Thematic Context Digital Transformation vs Digital Transition →

Recognition	<ul style="list-style-type: none"> • Weaker Capacities • Lower Demand & Need • Doubts about Use 	<ul style="list-style-type: none"> • Strong Capacities • High Demand & Need • High Awareness of Use
Acquisition	<ul style="list-style-type: none"> • Weaker Capacities • Slower Changes – less changeability • Strong sense of reality 	<ul style="list-style-type: none"> • Stronger Capacities • High volatility – more changeability • Less sense of reality
Assimilation	<ul style="list-style-type: none"> • Strong Ability self-assessment • Difficulties absorbing abstract knowledge 	<ul style="list-style-type: none"> • Weaker Abilities self-assessment • Open and eager to understand new knowledge
Transformation	<ul style="list-style-type: none"> • Focus Technological Capabilities • Developed Business Models • Missing Use Cases 	<ul style="list-style-type: none"> • Focus Business Capabilities • Less developed Business Models • High Technical Level
Exploitation	<ul style="list-style-type: none"> • Focus Small Developments • Lower Expectations • Difficulties dealing with failure 	<ul style="list-style-type: none"> • Focus Big Developments • Difficulties fulfil Expectations • Culture of Failure

Figure 38: Overview Influence Thematic Context Absorptive Barriers

Further, it became apparent that the project context significantly influenced the absorptive barriers. The projects' structures directly determined the requirements for the absorptive capacities of the project partners. In indirect intermediation projects, the requirements for recognition and acquisition are significantly lower for the clients of the intermediaries participating in the project. These are deliberately kept low by the project consortia consisting of intermediaries, but this also leads to the fact that the intermediaries predefine the content of the projects, which guides to a more theoretical approach that is less practicable under certain circumstances. This abstraction leads to the companies needing even higher capacities to assimilate and transform the received knowledge, especially in the exploitation area. The evaluation of exploitation challenged the involved organisations due to the companies need for concrete project outcomes.

In contrast, direct intermediation projects require a high capacity for recognition and acquisition from the project partners. As the clients, in this case, were part of the project consortia,

they needed strong capacities to meet the high requirements for project funding. In the assimilation area, the requirements were also high in communication with the other project partners but differed from the indirect projects due to the much higher practical relevance. In the area of transformation and exploitation, direct intermediation projects require individual capacities. However, due to a clear project result, the further exploitation of the knowledge gained was more evident than in the other category.

The following figure illustrates the main findings regarding the influence of the project context.

Project Context Direct vs Indirect Intermediation		
Recognition	<ul style="list-style-type: none"> • High Capacities Required • Shared Risks & Responsibilities • Project Experience decisive • Funding Selection including Clients 	<ul style="list-style-type: none"> • Lower Capacities Required • Low Risk for Clients • Project Experience less important • Funding Chosen by Intermediaries
Acquisition	<ul style="list-style-type: none"> • High Capacities Required • Each partner involved application • High Risk of Failure • High Resource Input 	<ul style="list-style-type: none"> • Lower Capacities Required • Funding Access generated by Intermediaries • Low/No Risk for Clients • Low entry Barriers
Assimilation	<ul style="list-style-type: none"> • High Capacities Required • Focus on Communication • Practical Knowledge Easier to Understand 	<ul style="list-style-type: none"> • High Capacities Required • Abstract Knowledge requires higher Capacities • Communication Strategy already Developed
Transformation	<ul style="list-style-type: none"> • High Capacities Required • Focus Transfer Received Knowledge • Focus practice oriented Knowledge • Research to Business 	<ul style="list-style-type: none"> • High Capacities Required • Focus Transfer Own Capabilities • Focus Abstract Knowledge into Practice • Abstract Knowledge difficult to transfer
Exploitation	<ul style="list-style-type: none"> • Medium Capacities Required • Clearer Outcome easier to measure Success • Sustainable Benefits require high capacities • Last step from invention to innovation difficult 	<ul style="list-style-type: none"> • High Capacities Required • Difficult to Measure Success/Outcome • Client evaluation vs intermediaries evaluation • Indicators not always Appropriate • Difficult to achieve impact

Figure 39: Overview Influence Project Context Absorptive Barriers

This overview clearly shows that both factors have a significant influence in the area of absorptive barriers and have a significant influence on the challenges. Further, the outline of the absorptive capacity barriers built the foundation for the following subchapter of the findings, analysing the intermediary interactions that enabled their clients to overcome the outlined barriers.

7. Findings Intermediary Interactions

Chapter 7 outlines findings regarding the second research question. It aims to understand how intermediaries help their clients overcome the outlined absorptive barriers, even if they do not have the necessary absorptive capacities. Depending on the type of client, they have more or less developed absorptive capacities that intermediaries must compensate for. Concrete interactions of the intermediaries are presented for each component of the absorptive capacity to answer this question in a targeted manner. The findings regarding the concrete intermediary interactions are divided into the five components of the absorptive capacity framework. Based on the framework as underlying guide for the data analyse, the interactions are linked to the respective barriers of each component.

Consistent with the outlined findings in Chapter 6, Chapter 7 first presents the specific interactions for each component of Absorptive Capacity before presenting the influence of the thematic and project-specific context.

7.1 Intermediary Interactions Recognition

Especially in the first component of absorptive capacity, the recognition category, intermediaries played a significant supporting role in providing companies with awareness of new projects and the associated external knowledge

As already mentioned in the context of absorptive barriers in the recognition field, four different barriers have emerged that need to be overcome by the organisations. The existing capacity in the area of recognition varied widely. Therefore, creating awareness was one of the main action points and one of the most vital points in which intermediaries were active. With their

expertise in the field, the intermediaries played a major role in helping the companies assess and recognise the opportunities.

Direct, personal contact and experience gained through previous cooperation, or the network played a significant role here. It was generally a matter of the intermediaries building up a comparable basis of trust with the companies involved to be able to compensate for their lack of assessment.

To helping companies to assess the opportunities and value of funded projects, they provided their clients with opportunities, information, and best practices examples. Thus, by creating the needed awareness they lay the foundation for joint projects, the analysed cases.

It became clear that the intermediaries required an excellent assessment of the experience of potential participants and a good understanding of the specifics of the sector or community.

Since the intermediaries themselves depended on the projects' resources, they were always looking for suitable projects for themselves and their companies. External players also had an influence, as in Case C, a project initiated by the city where the intermediaries were located and thus attracted the attention of the various partners involved.

However, the intermediaries could only convince some potential companies to participate. Especially in the case of small companies with weak capacities and tight resources that needed, the intermediaries were particularly challenged and had to offer close support. The following table shows the four most essential barriers for companies in the field of recognition and through which interactions the intermediaries were able to overcome them.

Absorptive Barriers	Intermediary Interactions	Illustrative Quotations	Cases Findings Occurred
Missing Awareness	Advertisement, Proactive Recruitment	<p><i>“Due to the spatial proximity and contact, one is right in the middle and has the opportunity to participate in their actions.” (Participant H)</i></p> <p><i>“It was a local contact of our branch manager at the time with a colleague from intermedia and the conversation turned to a research collaboration and that’s how the initial contact came about.” (Participant C)</i></p> <p><i>“I was with an employee of the intermediary, who was still directly responsible for project acquisition at the time. He was with us. We knew each other beforehand and he was there, and then we started to develop the first project ideas in 2012, and that’s when I joined the network for the first time.” (Participant G)</i></p> <p><i>“Of course, the promotion of the project also plays an important role. If the actual project is promoted too little or incorrectly, it only addresses a few companies, or the project may be overlooked by the actually interesting start-ups. It is therefore important to consider where the consortium wants to position the project and how they can best reach the community.” (Participant T)</i></p>	A, B, D
Suitable Funding Opportunities	Funding, Scouting and Advice	<p><i>“In the run-up to the project, it is important for the intermediary to explain to the companies what they can actually expect in the project, so that it is clear to them, even without project experience, to what extent potential participation in the project makes sense.” (Participant B)</i></p> <p><i>“You need to find the way to integrate some blockchain components, and that depends on having the right funding and the time to integrate and test this.” (Participant S)</i></p> <p><i>“The companies almost always fail because they cannot find the right federations, even though there are so many of them.” (Participant L)</i></p> <p><i>“It is essential to find suitable project opportunities that also fit the companies and thus fulfil the basic requirements for a successful project in the first place.” (Participant X)</i></p>	A, B, C, D, E
Lack of Interest in Collaboration	Trust Building	<p><i>“Sometimes we really have to persuade companies to participate in projects. Too often there are reservations about funded projects.” (Participant M)</i></p>	B

Onboarding Potential Part- ners	Partner, Sector & Community as- sessment	<p>„The biggest difficulties are actually always finding partners, finding suitable partners who a) fit thematically, who b) also want to have something to do with funding.“ (Participant K)</p> <p>“On the one hand, you have to get together and find partners. There the intermediary helps enormously.” (Participant B)</p> <p>“You need a certain amount of experience in the field to be able to recognise which partners fit together, what a sensible consortium is and how you could build one.” (Participant Z)</p>	B,C,E
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Table 18: Intermediary Interactions Recognition

The big challenge was to get inhomogeneous groups within the projects on board first and to arouse their interest to enable further steps in the cooperation. By acting proactively, the intermediaries involved companies that did not have a collaborative project on their agenda or only vaguely.

“I think it was ultimately through personal contact. Someone from the intermediary wrote to me and asked me if I was interested, and that's how we got in touch.” (Participant A)

This proactive approach was particularly critical in the cases with direct intermediation, where the other partner organisations were directly integrated into the project consortium and thus had to bear their risks and responsibilities. Since the companies in the cases with indirect intermediation were recruited for activities of the existing project, the focus was clearly different here, because the intermediaries already clearly influenced the project awareness of the companies through the design of the project.

Depending on the type of project and consequently the targeted participants, it differed on the one hand how much support the intermediaries had to provide already in recognition of

the added value of a collaborative project and, on the other hand, which channels were proper to advertise project opportunities.

For example, in indirect intermediation Case D, it was essential to generate the broadest possible reach for the project through communication channels such as social media to attract the most suitable companies. The clients were usually closely networked and well-informed about possible project opportunities. Intermediaries did not require to point out opportunities as they had to advertise the concrete added value of planned projects to draw the attention of the most suitable companies to the project.

In the case of direct intermediation, it was vital to advise SMEs and inexperienced participants to create a balanced project consortium and provide a clear idea of the added value and the substantial risks that can arise for them in the project. Moreover, the recognition component extended to the participating companies and was essential for the intermediaries in launching the cases.

In particular, suitable funding opportunities for the companies had to be identified, which depended heavily on the consortium and the final project idea. In contrast, in projects where the actual consortia consisted only of intermediaries, C, D and E, they had to determine which areas made sense to apply for federal funding.

“In such a case, the work starts long before the actual companies and other partners come into the project, you need an idea, a funding framework and the right partners.”

(Participant V)

Figure 40 illustrates the highlighted differences in intermediary interactions in direct and indirect intermediation projects.

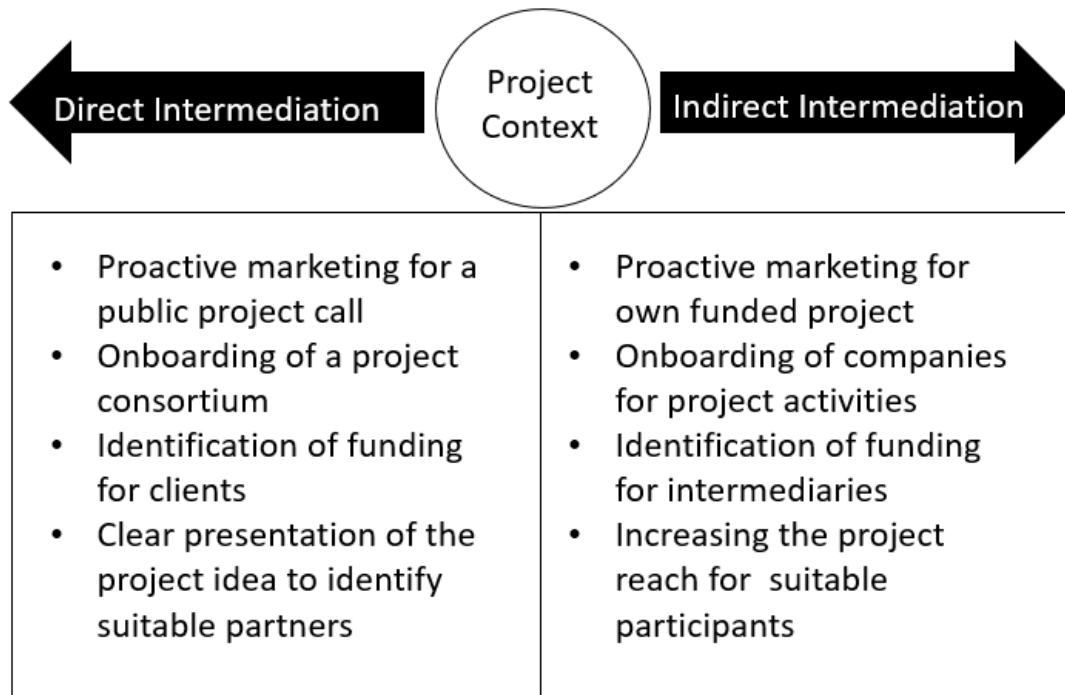


Figure 40: Influence Project Context Recognition Interactions

In contrast to the differences presented based on the Context project, which the intermediaries undertook to overcome the absorptive barriers in recognition, no apparent differences could be identified in the area of the Thematic Context. The intermediary activities in the cases examined did not differ clearly and comprehensibly in the projects in digital transition from those in digital transformation since the intermediaries pursued the same approaches in each of these components, regardless of the thematic content.

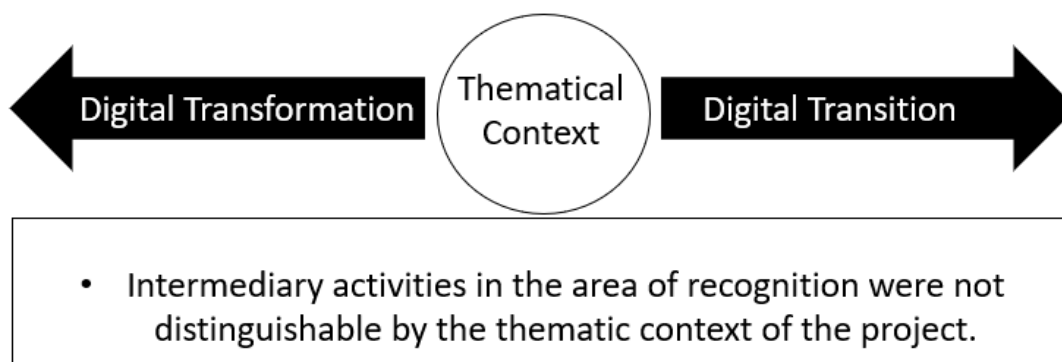


Figure 41: Influence Thematic Context Recognition Interactions

7.2 Intermediary Interactions Acquisition

The main task in the acquisition phase was to prepare a suitable project outline that would enable the acquisition of external knowledge and project funds and thus form the basic framework of the projects. Table 19 outlines the four most significant barriers for companies in the acquisition field, and through which interactions the intermediaries helped to overcome them.

It became evident that access to projects and the knowledge sources they contain was one of the main tasks of the intermediaries involved. To make this possible, the intermediaries were mainly involved in coordinating the project partners. They had to guarantee the preparation of a promising proposal as a project manager. To work out the individual categories of an application as well as possible, the intermediary called the individual partners for several meetings in which the individual categories and sections were gone through and discussed.

In this role, the most significant difficulty in the intermediaries' application phase was clearly highlighting and describing the potential innovation in the project proposal. Therefore, it was comprehensible to an outsider, in this case, the proposal reviewer, what the actual benefits of the project are and what risks it contains. These risks were often not entirely clear at the beginning and needed clearance. The basic structure of the applications was given, but the difficulty lay in fulfil the requirements in written form. The wishes and ideas of the funding body played a crucial role here. Formulating and translating scientific and technical ideas into texts suitable for application is very important and an important task that the intermediaries had to perform.

The task of the intermediary as network management institution or network coordinator was to lead the project consortium to create the best possible project proposal. The funding

agency then assessed this, and the funding agency specified some criteria and conditions to be followed in the subsequent detailed project application. Due to the different experiences in the field, the estimated effort required was very different.

The second significant difficulty affected all cases equally and related to the fine line between an innovative proposal and avoiding empty promises or exaggerations concerning the intended project. In practice, these promises cannot be fulfilled and implemented, which would lead to a large discrepancy between the project proposal and the actual project. This discrepancy in knowledge acquisition becomes one of the biggest obstacles to innovation in the further course of the project. It became clear that the intermediaries had to ensure that all partners gave realistic input in this phase and felt the set deadlines and requirements. Some partners noted that a stricter approach by the intermediaries at this stage would be helpful for the project's good.

Absorptive Barriers	Intermediary Interactions	Illustrative Quotations	Cases Findings Occurred
Idea Presenting and Processing	Conceptualisation and Developing of Ideas to Fundable Proposals	<p><i>"It is my job to lead the consortium to submit a successful project proposal. Of course, this includes holding regular project meetings and then making sure that a good application comes out of it." (Participant E)</i></p> <p><i>"When submitting an application, the ratio of resources made possible by the project and the required effort is always the decisive factor. Only when this is right does a call become interesting." (L)</i></p> <p><i>"First, the new calls for proposals are always analysed, and if one is of the opinion, as in Case C, that this should be pushed forward, one must normally first look for potential partners, which was, however, obsolete in this case. Since the partners were quickly identified, an exchange took place very quickly in this case. It was decided on which topics to work on together, how to coordinate them</i></p>	A, B, C, D

		<p>and what the corresponding modalities were." (Participant M)</p> <p>In practice, I would say we supplied raw data and content. But the formal part was done by the intermediary." (Participant G)</p>	
Balanced Consortium	Consortium Matching, Network Coordinator, Consortium Lead	<p>"Since the intermediary is very familiar with the requirements for such a network, the first task was to put together a consortium that best met the requirements. It is crucial to bring together companies, especially SMEs, universities and research institutions, and to prepare a project proposal." (Participant J)</p> <p>"The role of the intermediary was very important, especially at the beginning of the project when the application was submitted. On the one hand, suitable partners have to be found together, and this task is fulfilled by the intermediary." (Participant G)</p> <p>"The application falls to a so-called lead partner. This partner is responsible for putting together a suitable consortium and must take the lead in submitting a suitable funding application together with the partners." (Participant S)</p> <p>"The procedure for forming consortia in this type of project is usually very dependent on previous experience. Usually, new projects are formed from consortia of successfully completed similar projects." (Participant T)</p> <p>"The basic process of applying for a European funded project stands and falls with the right project consortium. This usually consists of partners who know each other from previous collaborations, as is the case in Case E. If you are not the lead partner, you will be asked if you would like to participate in a project, compare the objectives with your own plans and decide whether or not to participate." (Participant Y)</p> <p>"First, the new calls for proposals are always analysed, and if one is of the opinion, as in Case C, that this should be pushed forward, one must normally first look for potential partners, which was, however, obsolete in this case. Since the partners were quickly identified, an exchange took place very quickly in this case. It was decided on which topics to work on together, how to coordinate them and what the corresponding modalities were." (Participant M)</p>	B, C, D, E
Different Interests and Perspectives	Independent Mediating	<p>"After a first exchange, all partners sat down together and thought about what they could actually do within the framework of the call. The application phase is quite special, as all partners act as a consortium, but each one writes and submits its own application. In</p>	A, C

		<p><i>general, an exchange was then started on what should actually be in the application and what each partner wants to do concretely. Each participant then has a specific work package that is different from the others because it fits in best with their own activities and is compatible with the common activities.” (Participant P)</i></p> <p><i>“Of course, each partner wants to push through his or her own idea. We have to remain independent and push for the best solution. It is important that each partner gets a chance. Sometimes, however, it just doesn't fit. Then we have to send a stop signal.” (Participant E)</i></p>	
Excessive Demands and Promises	Project Management	<p><i>“Typically, at the beginning firms that come to us want to buy a 3d printer, or something that is industry 4.0 related, something you can read in the news. And we always explain them that it's not about the technology, but the application and they start to understand that how holistic they should approach instead of a pure technical approach.” (Participant X)</i></p> <p><i>„It is always a balancing act between an attractive programme and ideas and at the same time realistic announcements. We also have to steer the companies a little.” (Participant J)</i></p>	B, E

Table 19: Intermediary Interactions Acquisition

The challenges that had to be overcome in acquisition through the intermediaries' interactions differed significantly. In direct intermediation projects, clients were supported in submitting a successful project entry. Especially in Cases A and B, where the companies were actively involved in the project applications, the intermediaries had a particular focus on their activities in acquisition.

Thereby, the intermediaries had a crucial role. They coordinated and organised this application phase and offered great support, especially with formal criteria, through their expertise in the field. This close support significantly increased the chances of receiving funding. Therefore, the minimal contribution the companies had to make consisted of the application's content, capacity planning and technical direction. However, the intermediaries partially took the

formal effort away from them. These turned out to be a very unpleasant duty. Most clients have stated that the intermediary's takeover is essential for them.

"I would like to see the intermediary take a closer look at these formal criteria right from the start and say: You as company X have to make sure that the following criteria are fulfilled." (Participant B)

Depending on the type of project, the probability of success differs significantly. While in the ZIM projects, the probability of success is relatively high, in an Interreg project like Case D and E, it is common to be rejected. Case D, for example, was submitted three times and improved until the European Commission accepted it. The go-cluster project Case C had the lowest barriers, as the companies must fulfil the formal criteria, which makes a successful evaluation very likely.

In contrast to Cases A and B, where the actual application phase started with the intermediary trying to help the companies access external knowledge and resources about the project, Case C, D and E had an upstream process. Before the companies were even involved in the project, the intermediaries had to submit a successful project application to the relevant funding authority. Only when this was successfully approved was it possible to involve the companies. The main tasks of this application were located at the so-called lead partner. This partner was responsible for putting together a suitable consortium and had to take the lead in submitting a suitable funding application together with the partners. The application phase in Case C had a particular feature, as although the partners formed a consortium, each had to submit a separate application.

The acquisition phase in Case E was limited to the actual project promotion of the intermediaries, as the companies themselves did not have to apply directly for the project. The

companies supported in the project were mainly reached through events organised in the framework of the project.

Two main difficulties emerged, which the intermediaries helped to overcome. First, the intermediaries, and in the case of Case D and E, more specifically the lead partners, had to elaborate a proposal that equally represented all partners' interests in a balanced way. In addition, the intermediaries were responsible for forming a balanced project consortium in this phase, as this was a decisive criterion for the successful implementation of a federation project.

This task also represented the particular position of the intermediaries as independent supporters, which aims at a successful innovative project for all partners and does not focus specifically on one part of them. Figure 42 outlines the differences regarding the intermediary interaction in acquisition.

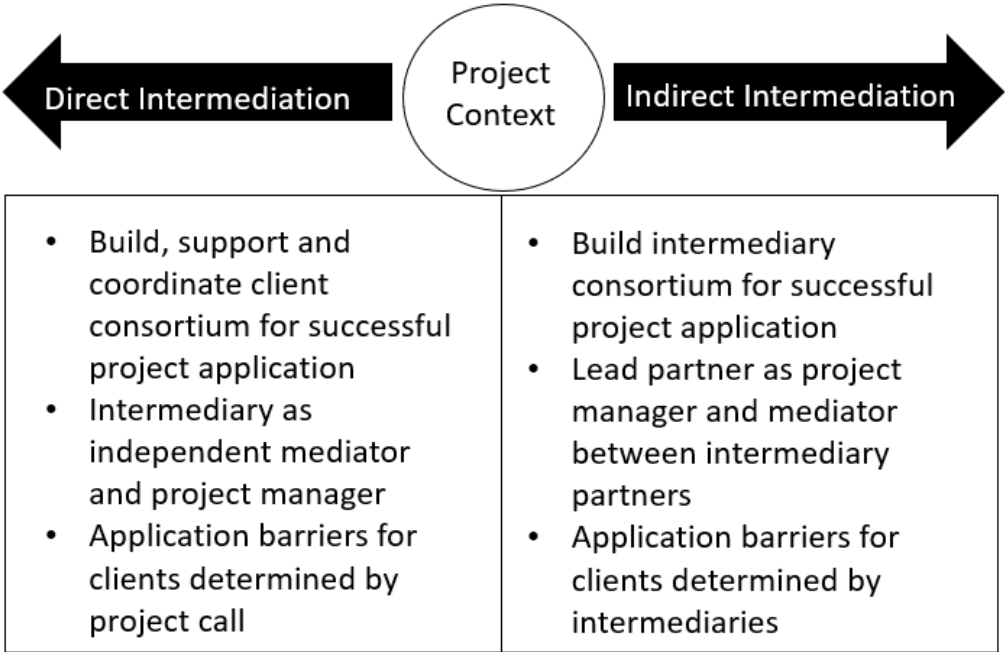


Figure 42: Influence Project Context Acquisition Interactions

In line with the findings in recognition, no significant differences were identified in the intermediary interactions between the projects assigned to digital transition and those assigned to digital transformation.

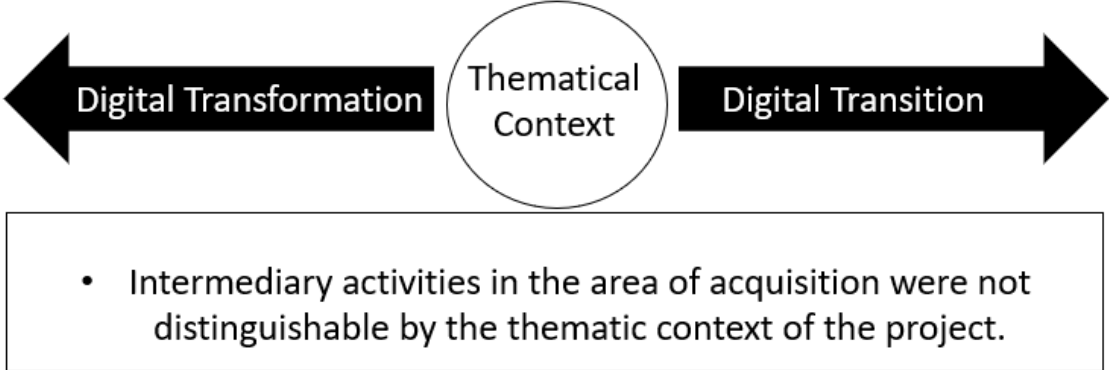


Figure 43: Influence Thematic Context Acquisition Interactions

7.3 Intermediary Interactions Assimilation

The actual knowledge exchange started when the project or project proposal was approved. From this point on, it was essential that the organisations understood each other and that an active knowledge flow started. In the assimilation phase, the intermediaries had to mediate and took advantage from their neutral, independent role in the project. They acted as a neutral sparring partner to create a shared understanding of the emerging problems and each partner's role.

During the projects, several different factors emerged that the intermediaries could influence to improve the assimilation of the individual partners and thus generate a good level of understanding that was essential for the success of the project and the role of the individual partners.

The factor that was by far the most highlighted and invariably mentioned by all participants was communication. The communication barriers between these two groups needed to be solved by intermediaries so that all parties could understand each other and speak a common language. Therefore, one task of the intermediaries was to create a link between the actors of all partners to create a shared understanding. Reference was necessary because rules and guidelines were predefined, even if this hindered progress. The handling of data was an example of this.

Further the intermediaries introduced tools to further promote and coordinate the exchange between the project partners. However, only when the partners became aware of the added value of these tools and their exact usage did the whole process of introducing them added value. This value was a critical point for a common understanding. The creation of trust through the intermediaries was crucial to enable an even knowledge assimilation.

The early discovery phase in the projects played an essential role in the subsequent cooperation, as it crystallised the competencies of the individual partners and thus laid the foundation for good communication, even without the coordinator, to organise their meetings and to exchange and discuss results. Especially in times of COVID-19, this was more difficult because personal exchanges were only possible digitally, and there were no opportunities to visit the production facilities and laboratories of the respective partner to get a better overview of how things work.

Absorptive Barriers	Intermediary Interactions	Illustrative Quotations	Cases Findings Occurred
Lack of / Non-functioning Communication	Communication Leader, Tool Provision	<p><i>“Already during the preparation of a proposal, we introduce tools as coordinators, such as a collaborative cloud where each partner can upload documents and work on them simultaneously.” (Participant J)</i></p> <p><i>“As the project coordinator I set the pace of communication through. Project meetings were initiated to promote the exchange between the individual partners and to create an atmosphere of trust for further cooperation.” (Participant E)</i></p> <p><i>“At the beginning, it must always be ensured that the exchange is possible and gets rolling. This requires functioning channels between the partners, and we often get the ball rolling here.” (Participant X)</i></p>	A, B, E
Uncommon Denominator	Partner Integration, Set Direction	<p><i>“As a coordinator, it is an important challenge to get the individual partners, who have very different backgrounds, be it science or industry, on a common denominator, a common understanding of the problem. Experience shows that the partners from science come up with innovative solutions, which are then combined in the projects with the practice-oriented approaches of the industry partners. For this, however, a common basis must be created so that the companies also understand the benefits of the new approaches for their company, in order to find a practical area of application.” (Participant E)</i></p> <p><i>“The intermediary also has the task of successfully integrating more passive members. If, for example, certain partners have not yet reached the desired consensus during the events, the intermediary organises bilateral discussions afterwards, in order to eliminate misunderstandings and create a common understanding.” (Participant J)</i></p> <p><i>“Especially, in the area of digital technologies, companies have a completely different basic understanding. An example is the development in the early 2000s, where companies didn't really know how to use ICT properly and invested without really getting value back, because the offer didn't fit the nature of the customers. And now it is about avoiding exactly this mistake and preventing companies from investing out of the motivation to become more digital in things that are actually not integrated in their value stream but offer little added value as standalone solutions.” (Participant X)</i></p>	A, B, E

Different Geographical & Cultural Backgrounds	Connecting Actors	<p><i>“We work with companies all over Europe, so differences inevitably come to light. There are simply differences between countries and regions. We therefore try to link the actors despite these differences. This is when the most promising collaborations emerge.” (Participant A2)</i></p> <p><i>“It is important to link different countries and regions. Especially in digital technologies, eastern countries are very advanced but there are no sales markets. As intermediaries, we actively bring them together.” (Participant V)</i></p>	D, E
Incorrect self-Assessment	Strengths Weaknesses Evaluation	<p><i>“Everyone contributes their thematic strengths. In this process, it is also quite often the case that some problems arise that were not yet clear to some of the partners, as they are based on misjudgements. For example, legal matters. A partner who already has a lot of experience in this area brings this in and identifies the problems, which often leads to the other partners only understanding in which directions further work needs to be done or where problems are still hidden. This applies especially to practical issues that do not receive as much attention in a more theoretical proposal.” (Participant H)</i></p> <p><i>“In order to be able to offer the companies real added value, it is first necessary to find out exactly in which area they or an entire ecosystem needs support, what they themselves mostly do not know. In doing so, it must be determined which processes are currently being initiated, which problems exist, how these can be represented by indicators and how they can be monitored. In addition, a future scenario must be developed to determine in which direction, or towards which goal the work should be done. This was the more theoretical part in Case E to create an understanding and to understand the perspective of the companies.” (Participant Y)</i></p>	B, E

Table 20: Intermediary Interactions Assimilation

As project coordinators and consortiums, the intermediaries directly influenced how the project is communicated and set the pace of communication through the project manager.

“A particularly common phenomenon can be seen at the beginning and course of during the projects. The individual partners often communicate far too little. As a project

manager, it is therefore important to prevent this and to establish functioning communication right from the start.” (Participant J)

The intermediaries initiated project meetings to promote the exchange between the individual partners. Open, cordial cooperation promoted a common understanding of the project and considerably reduced communication problems. It has turned out that there was a general trend that universities and research institutions were more accessible communication partners than companies. This openness was because companies pursued their own goals more strongly, which had to be addressed by the project coordinator in case of doubt to strengthen collaboration. Every partner needed to know specifically what they were working on and for what goals. Introducing communication tools such as cloud solutions helped simplify this process.

Furthermore, matchmaking between the involved organisations was a strong ability of the intermediaries to merge the different backgrounds and characteristics of the organisations involved. This linkage involved bringing together suitable higher education institutions with companies. The intermediary had to coordinate that the competencies of the individual partners, which were very different, fit together. After a project consortium had come together and the first application phase was completed, there was a more concrete exchange in which everyone contributed their thematic strengths.

“Every participant is an expert in a certain field, but also has weaknesses. Of course, you only want to contribute your expertise if you get something in return.” (Participant A)

In this phase, the intermediaries were particularly needed as mediators and organisers who kept a neutral overview of the project. It was essential to involve all partners in the best

possible way and distribute the tasks appropriately and reasonably to facilitate the best possible matchmaking that leads to successful developments. This led the companies to deal with things they had neglected before, which later had great value for them.

The intermediaries also had the task of successfully integrating more passive members. If, for example, certain partners have yet to reach the desired consensus during the events, the intermediary organises bilateral discussions afterwards to eliminate misunderstandings and create a shared understanding. From the firm's perspective, a central contact person was always a great advantage, especially if he or she had the best knowledge of any funding issues or the best contacts to funding bodies. This contact helped enormously to answer questions and to steer the project in the desired direction. In Case D, several changes in the project management could have been communicated more effectively, which was very cumbersome for the participating companies, as there were uncertainties about the actual contact points. This issue was exacerbated by long response times, which resulted in a relatively slow exchange of information in certain phases of the project, as there needed to be an assigned person for communication. This absent person was made even more difficult by Covid 19, as there were no project events in person, and the entire exchange took place online.

Concluding, to enable the assimilation of different knowledge by the partners, the main task of the intermediary in this phase was to start and organise the knowledge flow in the projects. This basis created a shared vision and a basis of trust that made it possible to find a common project language. This common ground was essential so that the partners with different backgrounds could understand the external knowledge brought to them.

As with the two previous components, there were differences in how the intermediaries interacted in the direct and indirect intermediation projects. While the task of communication

leadership was clearly assigned to the intermediaries in both projects, the focus in the direct projects was on matching partners to concrete problems within the consortium. In contrast, the indirect projects focused on an essential matching of the participating clients to enable later cooperation. In general, the intermediaries in the direct projects were a neutral part of the consortium, focusing on the success of each partner. In contrast, the intermediaries pursued the actual project agenda as project managers in the indirect projects. The focus of knowledge transfer in the direct projects was clearly on enabling direct client-to-client interaction. In contrast, in indirect projects, the flow of knowledge from the intermediaries to the clients and vice versa was enabled.

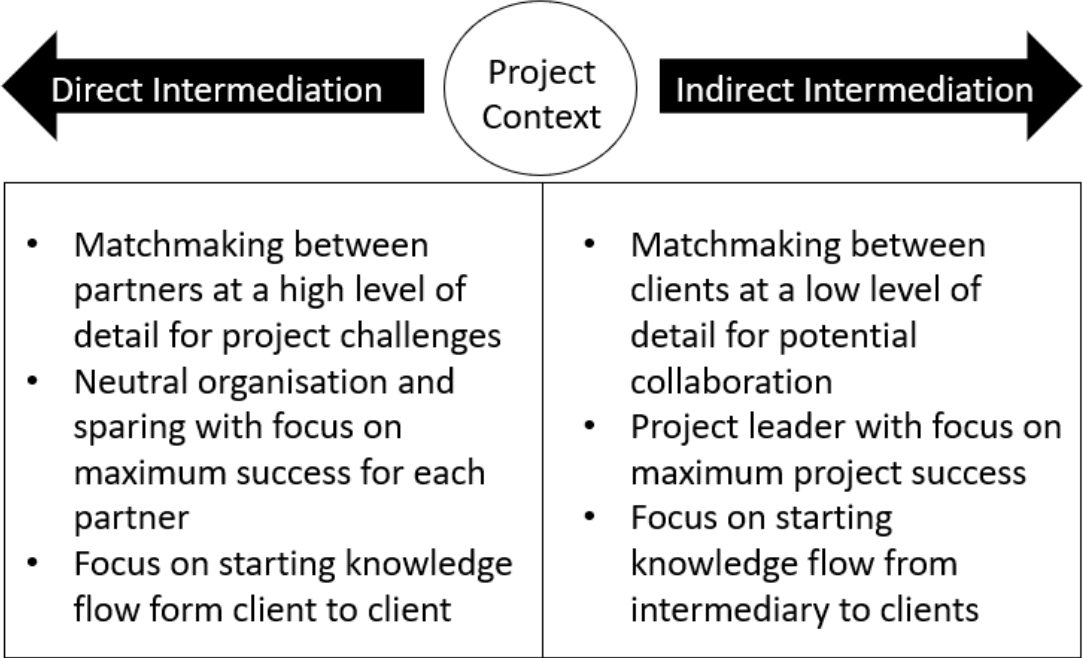


Figure 44: Influence Project Context Assimilation Interactions

In line with the previous two categories' findings, in the third component of the potential absorptive capacity, assimilation, no clear pattern could be identified after the intermediary interactions were dependent on the thematic orientation of the projects.

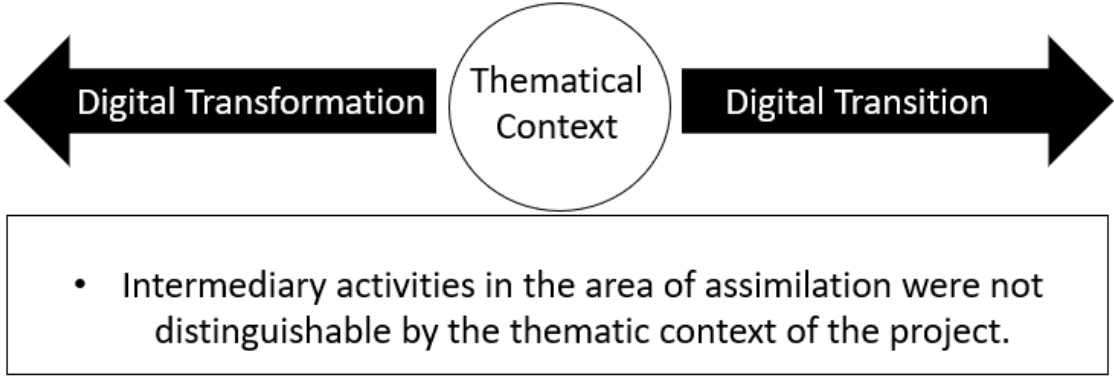


Figure 45: Influence Thematic Context Assimilation Interactions

7.4 Intermediary Interactions Transformation

After the flow of knowledge between the parties was started with the help of the intermediaries within the framework of the assimilation process, it was particularly important to focus and accelerate this flow in the area of transformation.

Based on the different backgrounds of the participants, the ideas on how to proceed with information and knowledge gained from events and projects were very different.

The main task of intermediaries in terms of successful knowledge transfer started with the composition of the consortium. From the companies' point of view, the selection and connection of the right partners were among the most critical services and activities the intermediary

performed. If this task is fulfilled well, the likelihood of generating added value for everyone in the project, which also leads to applied demonstration projects, is highly increased.

Only then the successful implementation of ideas was enabled in the best possible way. Thereby the different perspectives and readiness levels had to be reconciled, and it had to be determined at which point which partner was mainly challenged. Developing an idea into a prototype was crucial here and was only realisable with a joint project, especially for the smaller partners. It was crucial to get the proper support at the right time. In general, knowledge transfer was the focus of all collaborative cases.

There was an overall agreement that the intermediary had a central role in bridging the project participants for further cooperation, thus enabling knowledge transformation. Although the companies were working on solutions, almost all participants expected collaboration led by the intermediary to accelerate the exchange and practical implementation of any ideas significantly.

Absorptive Barriers	Intermediary Interactions	Illustrative Quotations	Cases Findings Occurred
Transfer Scientific & Practical Expertise	Knowledge Transfer Promotion, Exchange Stimulus,	<p><i>“The actual transfer of technology forms the core of the project in technical terms. Only through a successful transfer of the expertise that each partner brings to the table is it possible to develop a technology or a tangible product. The crucial point here is that the idea usually comes from a partner who has little specific experience. By organising specific workshops, the intermediary tries to promote an active exchange between the partners.” (Participant J)</i></p> <p><i>“One of the key tasks in projects is not only to provide companies with resources but also with active know-how. In Case D, a decisive starting point was to enable the transfer of knowledge through personal 1-to-1 contact. For this reason, from the second phase onwards, each team was assigned a so-called business</i></p>	B, C, D

		<p>mentor, who has expertise in different fields, be it technical or economic.” (Participant U)</p> <p>“There is often a large discrepancy between tech people and business-oriented project participants. This is also strongly reinforced by local differences. The consortium must therefore take into account the differences between the start-ups' environments so that a proper exchange can take place.” (Participant R)</p>	
<p>Adaption of Theoretical Knowledge</p>	<p>Exchange Stimulus, Tighten and Balance consortium</p>	<p>“Of course, the transfer from universities is also very important in sensor technology and artificial intelligence. That's why our organisation has university partners from all over Bavaria. The number of university partners is growing steadily. The exchange between them and the companies is then actively initiated by the intermediary. This is done through exchange formats and direct contact mediation. Some companies become members precisely because of this opportunity, to get connected to the scientific landscape in the field of sensor technology in Bavaria, to have a good start and are then also pleased about recommendations from the network management in the sense of “We have topic XY and Z in mind here.” (Participant M)</p> <p>“Of course, it is not possible to simply copy and paste good ideas and processes, but the individual intermediaries can also benefit a lot from each other through a project. In the long term, of course, this benefits the company and the ecosystem. In Case E, the approach was to pick out parts of the analyses from the beginning and to work on them with the partners and implement solutions themselves.” (Participant Y)</p> <p>“In areas like agrifood, the gap between theoretical scientific knowledge and practice is currently still huge. Many companies in this area are not even aware that there is the possibility of exchanging information with universities and that there are contact points for solving specific problems. However, there are also many companies from the same area that make great use of this offer and have already had very good experiences with collaborations with universities or research centres. This has led to good relationships that in turn facilitate the transfer of knowledge and access to new projects. But in general, this transfer still functions far too unbalanced.” (Participant A2)</p>	<p>C, D, E</p>

Practical Implementation	Support Idea Development	<p><i>“After each project participant has received an overview of the technological context, the partners must be coordinated in such a way that they each contribute a part of the project goal. In doing so, the different perspectives and readiness levels have to be reconciled with each other and it has to be determined at which point which partner is mainly challenged. The process of developing an idea into a prototype is crucial and cannot be realised without a joint project, especially for the smaller partners. It is crucial to get the right support at the right time.”</i> (Participant F)</p> <p><i>“The way in which the consortium brings solutions closer to the companies is extremely important, especially for topics related to digitalisation. Companies often have concrete questions about problems and hope that these can be solved through our offer within the framework of the project. This starts with the definition and interpretation of digitalisation, through the use of data to service models. Most of the time, the process of finding a solution is multi-step, starting with a discussion and presentation, followed by training to help the companies develop the necessary know-how to achieve success with the existing possibilities.”</i> (Participant Z)</p>	B, E
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Table 21: Intermediary Interactions Transformation

As outlined, in the area of transformation, one of the main difficulties was to enable the transfer from research to the involved firms. The intermediary’s task was facilitating this transfer through a balanced project consortium. It was crucial to support the companies in pursuing the direct approaches and not discard good ideas too quickly, which is a common problem if there is no coordinator who also actively motivates the partners to continue working on the ideas and keep to the timeline.

“The participants from research always have a lot of ideas, but these first have to be implemented in practice.” (Participant M)

“Unfortunately, companies are often very reluctant when it comes to new ideas, especially in the digital field, although there is still so much unused potential here.” (Participant K)

However, the focus between direct intermediation Cases A & B differed from that of the other three projects.

In the first two projects, the intermediary was no longer as involved in this phase, but active knowledge transfer was stimulated through workshops. The intermediary took an administrative role and tried to continue motivating the companies. This phase was very dependent on the phases described above, as the project consortium and the actual project focus had a decisive influence on the actual transfer.

In general, it was found that the intermediary acts as a mediator in transforming knowledge and trying to break down the barriers between individual companies. Be it through contact brokering or through concrete exchange formats. The approach to achieving this was very different, with Case D having a unique approach - from the second phase onwards, each team was assigned a so-called business mentor who had expertise in different areas, be it technical or economic.

“One of the key tasks in projects is not only to provide companies with resources but also with active know-how.” Participant U

The mentors were a significant benefit of the project for the involved firms, as they helped them to apply for information and support directly to them. In addition to mentoring, the project has generally helped to expand the network with suitable partners through events and workshops. This combination of offers, such as events, mentoring, and time to work on the project, has enabled the firms to use as much support as possible and integrate it into their

processes. Especially in the European projects, regional differences had to be considered here, as this had a major impact on the perspective and level of knowledge of the respective organisations. This problem was solved with a matchmaking process, in which two or three regions got together and tried to benefit from each other through mutual exchange and pilot projects. In this way, the invested companies and the intermediaries could benefit from each other. Especially by providing funds for pilot projects beyond the purely strategic approaches, the companies could apply the theoretical know-how. While there is not much money for implementation in such projects, a start of cooperation is possible, which was the point at which the intermediaries became involved to enable later cooperation without funding. Figure 46 outlines the different interaction regarding the direct and indirect intermediation projects.

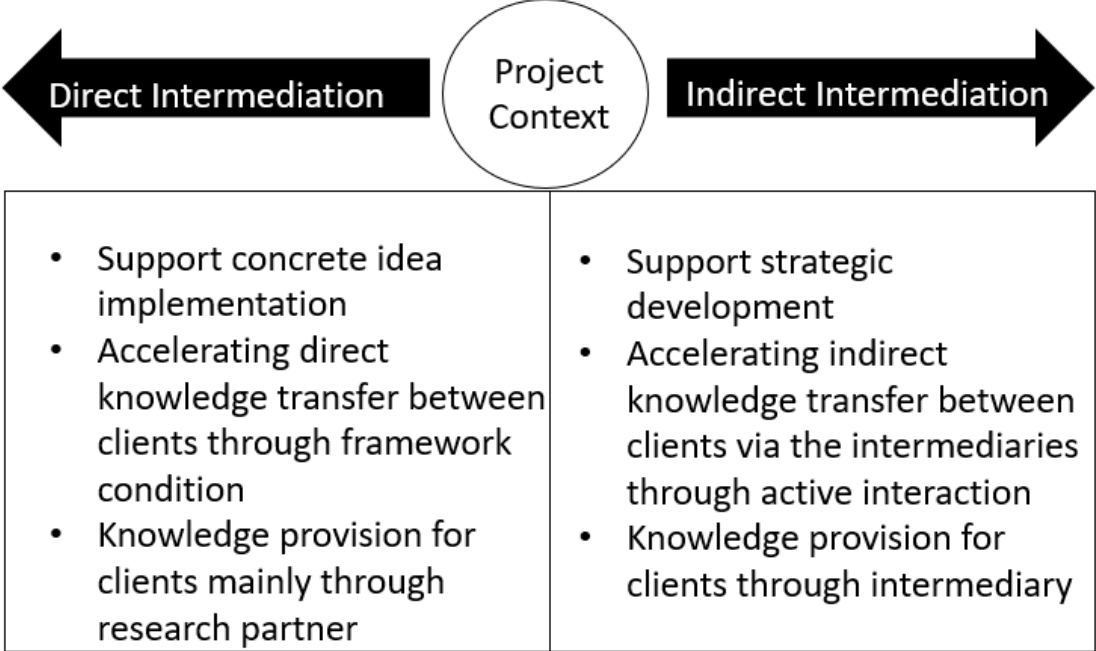


Figure 46: Influence Project Context Transformation Interactions

One difficulty that arose in all cases and made it challenging to promote knowledge transfer, especially in the technical field, was the low level of technical understanding among some of the facilitators involved. Therefore, the use of the technical tools could have been higher because no contact person could adapt them to the needs of the companies and because the topic of blockchain is developing so quickly, the solutions were no longer up to date as quickly.

Especially with more structural business support, this support needed to be offered to the companies in such a way that it was also tailored to the individual actors and that they could use it. If the consortium focuses too much on top-down solutions, it could quickly become one-sided, and they offer no longer fits the actual companies or the region.

In the transformation component, direct differences in the intermediary interactions were identified depending on the thematic context of the projects. In order to increase the flow of knowledge to the clients, an attempt was made to take into account the technological background of the projects in particular. Interestingly, in digital transformation, the intermediaries tried to bring applied knowledge closer to the clients and focus on applying theoretical knowledge. Due to the technologies novelty in the digital transition area, the focus here was much more on communicating technical knowledge and explaining technical and economic risks. While the intermediaries in the area of transformation tried to point out opportunities and best practice examples, the focus in the area of transition was more on the economic efficiency and risks of the technologies.

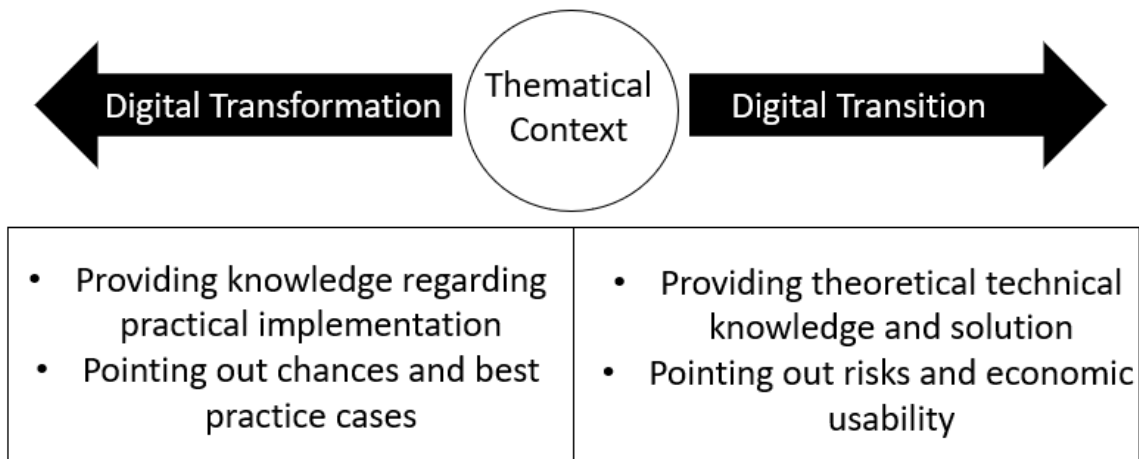


Figure 47: Influence Thematical Context Transformation Interactions

7.5 Intermediary Interactions Exploitation

In the exploitation component, it was critical to support the clients to benefit from the projects. The role of the intermediaries was more expansive than the project period, as the clients needed help beyond this period to benefit from the obtained resources and knowledge.

The focus in the exploitation phase was on value creation. In part, the intermediaries in the project framework could be called value creation intermediaries, as the question in the project when preparing a project proposal was mainly- what is the value for the companies, the region and how is this reflected financially.

“We are part of the economic development and I see myself as such. We have to do something positive for the economy and at the end of the day, we need the framework conditions for this, but we also need to justify this trust.” (Participant P)

If this was clear, the donors usually understood the sense of the project immediately, and there was a good chance of success. In principle, it demonstrates how the approach could

generate value from new technologies or services for specific organisations and regions. The environment had to be in place so the project could be realistically implemented, and the partners had to fulfil the basic requirements. In addition, strong support is needed from the political and scientific communities.

In this context, the intermediary intervened in two ways to increase satisfaction with the project results and their use. On the one hand, they offered assistance in the initial phase of the project, especially to inexperienced project partners, to set realistic goals and prevent exaggerated expectations with an open approach. On the other hand, they were mainly in demand when the project's defined goals were not fully achieved. New approaches had to be brought to light that was not planned in this way but may represent a better solution and trigger a learning process in the organisations. However, it turned out that the companies had different expectations of the intermediary and that fulfilling these expectations significantly impacted the subjective assessment of successful exploitation.

The individual partners always had different opinions, particularly regarding the goal or the potential outcome of the project. To benefit from other external sources, it was essential to integrate and accept a kind of failure culture. This culture must be a matter of course, especially when submitting applications after the rejection is before the next application. Small and medium-sized enterprises are unaware of this because they are rarely touched by it.

Realistically, it was only possible for some participating companies to become successful because of the project. However, they were favoured by the project, and the intermediaries had to see how they could benefit most in the long term from this funding at the stage they are.

Absorptive Barriers	Intermediary Interactions	Illustrative Quotations	Cases Findings Occurred
Long-term Benefit	Support Beyond Project, Building on Project Opportunities	<p><i>"Realistically, it is not possible that every participating company will eventually become successful because of a project. However, they are favoured by the project and the intermediaries have to see how they can benefit most in the long term from this funding at the stage they are at. That's why it's no use just handing out money, especially in topics like blockchain; the technical and economic support that is given is also crucial for the long-term added value of the project." (Participant T)</i></p> <p><i>"It becomes problematic after the projects have been completed. Then it's a matter of marketing the solutions. Unfortunately, this is often the sticking point. We then try to support the companies in our network, but the resources for this are spent by us because the funding is over." (Participant J)</i></p>	B, D
Success Evaluation	Assistance Using results, Expectation Setting	<p><i>"What is important in order to really benefit from other external sources is to integrate and also accept a kind of fail culture. This must be a matter of course, especially when submitting applications. After the rejection is before the next application. Small and medium-sized enterprises are not aware of this because they are touched by it far too seldom." (Participant N)</i></p> <p><i>„At the end of the project I sit down with the companies, and we discuss how we can best use the result. This can be a sale or a follow-up project. Sometimes, unfortunately, the expectations were too high, and the companies are dissatisfied. I always try to help them assess their achievements realistically." (Participant E)</i></p>	A, C
Impact Creation	Combination of Interactions	<p><i>"Our main challenge we're dealing right now within the consortium is how to utilize our assets to create the best possible impact, particularly for the European economy at the end of the day." (Participant T)</i></p> <p><i>"The project benefits are also about improving the structures of companies, whether technically or economically, in such a way that they are not only beneficial for the product dealt with in the project, but also help the company in its further development." (Participant W)</i></p>	D, E

Table 22: Intermediary Interactions Exploitation

Due to their lack of experience, the companies needed support in dealing with alternative results and their utilisation. In this case, the intermediary had to provide the expertise to actively support companies exploiting the results, including in public relations. For the participating companies to make optimal use of the knowledge they have gained, the intermediary had to pay special attention to ensuring that less experienced partners benefit mutually from activities that do not correspond to the classic project goals.

“Especially unsecure, mostly unexperienced clients need to be helped to use their results, just because a project did not generate billions of euros in innovation does not mean that no added value was generated.” (Participant W)

The intermediary supported the companies in marketing the successes and implementing alternative approaches so that the project could be considered a success. One problem in creating good results was often that the partners had very different levels of knowledge and were committed to different degrees.

The lack or reduction of intensive support makes it much more difficult, especially for small companies, to participate successfully in projects, as it is precisely this support that makes the difference to other projects. Of course, the costs for the intermediaries must be covered.

A direct benefit from which some of the partners profited directly was follow-up networks and projects. In cases A & B, a network ends, and a new one is developed based on it and thematically adapted. Experiences, processes and developments from the first network can be used directly and adapted thematically.

“Particularly in the context of ZIM networks, it is a cycle: new ideas emerge within the framework of projects, which can be implemented for a new network, partly with the

same partners, partly with new partners. In this way, the topics also continue to develop.” (Participant J)

In Strategic Case like C, D & E, the most significant problems were traditionally after the projects. When the project ended, the question arose whether the offer was used enough or only the money was taken. Above all, the donor wanted to see results beyond the project. Otherwise, it made no sense for the European Commission to invest so much money in these projects. This sustainable use took much work to measure for the intermediaries. One has to rely on experiences during the project. Most of the time, contact with the companies after a project is also complicated, which makes a long-term evaluation almost impossible.

To fulfil this task as well as possible, each intermediary had its processes applied in projects. These processes concerned things like project management, the selection of companies, the type of business support or communication, and the precise formulation of expectations for the project for itself and the companies. These processes are further developed from project to project but are used to a greater or lesser extent each time. However, they had to be adapted to the individual project requirements since a sustainable added value is lost at the end of the project through pure copying. Each project has its characteristics; only if these are understood and used can it achieve tangible results beyond theoretical results.

From the view of intermediaries, the plan over the actual project period, a roadmap with goals, is significant for the actual exploitation of projects. If an intermediary only jumps from one project to the next, it is difficult to build things up and generate accurate results.

“Unfortunately, not all results are comparable. You can sell a little as a lot, but you don't create value for your ecosystem. Only if you think in the long term and really make a difference can you survive as a support organisation in the long term.” (Participant X)

Diversifying the economic profile was crucial, as well as creating sustainable infrastructural measures from which the next project could benefit. Tangible things such as machines, technical equipment and laboratories also played a significant role. These assets immediately increased the chances of being accepted in the next project. Of course, every project evaluation started from scratch, but things like equipment and experience did play a role. The problem with the strategic projects was the need for more focus on countable results. Some KPIs need to be met, but there needs to be more focus on outcomes. The strategies and networking with the other intermediaries were a result, but there were no tangible results for the actual target people, the companies, and the economic ecosystem.

Due to this strong influence of the type of project, there were significant differences in the interactions that the intermediaries carried out to help their clients in the field of exploitation. Figure 48 outlines these differences in exploitation between direct and indirect projects.

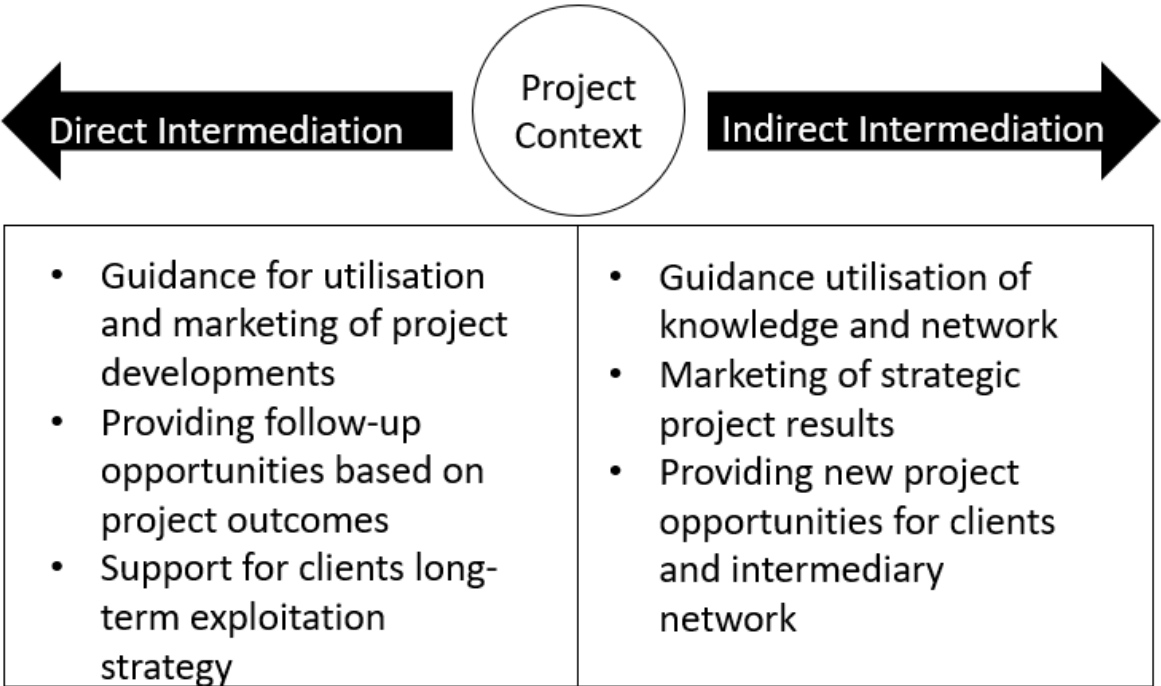


Figure 48: Influence Project Context Exploitation Interactions

In the area of exploitation, apparent differences could also be identified based on the thematic focus of the projects. While the intermediaries in the digital transformation projects were keen to provide substantial assistance in implementing project results in practice, be they developments, concrete knowledge or network possibilities, the focus in digital transition was much more on long-term exploitability. Although the goals of the intermediaries in both cases were long-term added value for their clients, it was clear that in the area of digital transition, the approach was less about finding a solution to a specific problem and more about the further development of companies in this emerging area. Especially in these emerging topics like blockchain, the technical and economic support given was focused on the long-term added value of the project and guidance regarding a sustainable exploitation of the gained results. In contrast, the intermediaries in the digital transition projects tried to provide concrete value for the clients to use for specific problem settings. Figure 49 illustrate these differences regarding the thematic context.

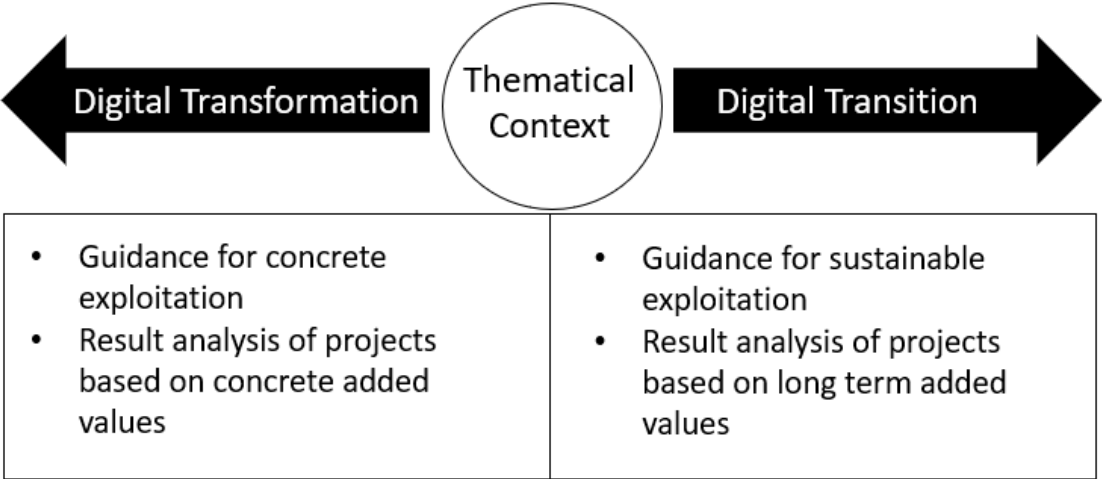


Figure 49: Influence Thematic Context Exploitation Interactions

7.6 Summary

Through the thematic analysis of the five cases presented above, it became clear how intermediaries supported companies to benefit from external knowledge in the context of funded open innovation projects. Absorptive capacity and the components included had emerged as a crucial dimension in which intermediaries act. Contrary to the original organisational view that organisations must have enough absorptive capacity to benefit from external knowledge, it became clear from the different projects that the intermediaries acted precisely in those areas where the individual partners, or even the project consortium, needed more capacity to carry out projects within the framework outlined above. Only through the targeted support of the intermediaries was it possible for the participants to realise the projects through the funding they received. Depending on the companies and the thematic issues, the support services focused on all components of absorptive capacity and compensated for missing interfirm capacities.

In order to get an overview of the respective intermediary interventions, Table 22 provides an overview of the most noteworthy interactions related to the respective AC component.

The table outlines the intermediaries' main activities to help their clients overcome the absorptive barriers of funded digitalisation projects. It was also possible to highlight the role of the intermediaries for each of the absorptive capacity components. In the recognition phase, the intermediaries' role was to initiate the projects proactively. With the help of the intermediaries, the projects could be launched, and the participating firms took the opportunity to start a funded project. Regarding the acquisition, the role of the intermediaries was to manage the project application to meet the requirements of the funding agency and thus obtain approval for the project and the funding it contains. In the area of assimilation, the

intermediaries were responsible for opening the exchange of knowledge between the project partners through their activities and facilitating this exchange through the creation of framework conditions. Building on this knowledge flow, the role of the intermediaries in transformation was mainly to accelerate this flow of knowledge and to make it happen in a targeted manner. Finally, the clients needed support from the intermediaries beyond the actual project time and the associated requirements to be able to exploit the results in the long term. The fulfilment of these roles was only possible based on the utterly independent position of the intermediary. Only in this way could the community's project goals be superimposed on all its other goals, and the intermediary could entirely focus on its role as a project developer and provide equal support to its clients.

Project Phase	Absorptive Barriers	Intermediary Interactions & Role
Recognition	Missing Awareness Lack of Interest Funding Identification Onboarding Partners	Trust building, Advertisement, Proactive Recruitment, Partner, Sector & Community Assessment, Benefit & Risk Assessment, Funding Scouting and Advice
Acquisition	Idea presentation and processing Balanced Project Consortium Different Interests and Perspectives Excessive Demands and Promises	Conceptualisation and Developing of Ideas to Fundable Proposals, Formal Support, Consortium Matching, Network Coordination, Consortium Lead, Project Management, Independent Mediation
Assimilation	Lack of / Non-functioning Communication Uncommon Denominator Different Geographical & Cultural Backgrounds Incorrect self-assessment	Communication Leader, Tool Provision Enable Partner Integration, Set Direction, Connecting Actors Strengths Weaknesses Evaluation
Transformation	Transfer scientific & practical expertise Adaption of theoretical knowledge Practical implementation	tighten and balance consortium, support idea management, knowledge transfer promotion, exchange stimulus,

Exploitation	<ul style="list-style-type: none"> Long term benefit Success evaluation Strong self-focus Impact creation 	<ul style="list-style-type: none"> Assistance using results, marketing, expectation setting, support beyond project, succession possibilities
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Table 23: Overview Intermediary Interactions

In the analysis of the intermediary interactions, it became clear that the project context strongly determined these. As in Chapter 6, the nature of the project also firmly determined how the interactions were implemented. The composition of the consortia, the involvement of the clients, and the absorptive barriers described above clearly differed between direct and indirect intermediation projects. Accordingly, the interactions differed from one another. The following figure illustrates the differences in interactions depending on the project context:

Project Context Direct vs Indirect Intermediation		
Recognition	<ul style="list-style-type: none"> Awareness building project calls Onboarding consortium of clients Funding identification for clients 	<ul style="list-style-type: none"> Awareness building own project Onboarding clients for project participation Funding identification for intermediaries
Acquisition	<ul style="list-style-type: none"> Leading consortium of clients Independent project mediating Support for formal barriers of project calls 	<ul style="list-style-type: none"> Building intermediary consortium Lead partner as mediator between intermediaries Formal barriers for clients set by intermediaries
Assimilation	<ul style="list-style-type: none"> Matchmaking between clients during project Focus on success for every partner Enabling knowledge flow from client to client 	<ul style="list-style-type: none"> Matchmaking between clients for cooperation Focus on maximum project success Enabling knowledge flow from intermediary to clients and vice versa
Transformation	<ul style="list-style-type: none"> Support idea implementation Accelerating direct knowledge transfer via clients Knowledge provision mainly through research partner 	<ul style="list-style-type: none"> Support strategic development Accelerating indirect knowledge transfer via intermediaries Knowledge provision mainly through intermediaries
Exploitation	<ul style="list-style-type: none"> Guidance utilisation and marketing project developments Providing result based follow-up activities Support for applied long term exploitation strategy 	<ul style="list-style-type: none"> Guidance utilisation of knowledge & network Marketing of strategic project results Follow-up opportunities for clients and intermediaries

Figure 50: Overview Influence Project Context Intermediary Interactions

Depending on the type of project and its structure, the intermediaries were particularly challenged and needed in different areas. It was precisely the intermediary's task to balance the partners' non-existing capacities in the best possible way. However, fulfilling this role was only

possible based on the independent position of the intermediary. Depending on the companies and the thematic issues, the support services focused on all components of absorptive capacity. They compensated for missing interfirm capacities as far as possible through external assistance.

In contrast, intermediary interactions could only be partially classified based on the thematic context and placed in the selected digital transition and digital transformation categories. A clear difference emerged in the three categories of potential absorptive capacity compared to realised absorptive capacity. While apparent differences were found for all five components in previous Chapter 6, the findings did not show any differences between the three categories of potential absorptive capacity. The thematic context did not determine the intermediary activities in these three components. Differences were found for the transformation and exploitation components, summarised in Figure 51.

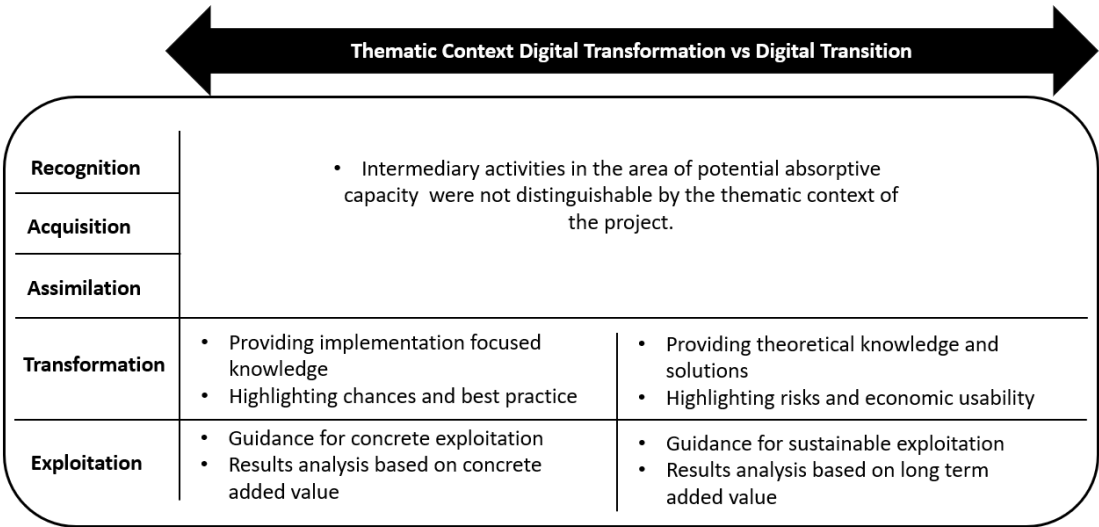


Figure 51: Overview Influence Thematic Context Intermediary Interactions

8. Findings Benefits Intermediaries

Chapter 8 outlines how intermediaries' profit from collaboration with their clients. To investigate to what extent the intermediaries themselves benefited from the projects carried out, this part of the findings section outlines the essential profit fields of the intermediaries.

This chapter has a different structure than chapters 6 and 7. Although it is, to a certain extent, based on the absorptive capacity framework, it only applies to the exploitation component from the point of view of the intermediaries.

This orientation is because of the framework's strong orientation towards the client's perspective, and the cases analysed are also geared toward supporting the clients. For this reason, it is hardly expedient to relate all five components to the benefits of the intermediaries either linearly or sufficiently with the available data. In contrast, to maintain the methodology's comparative character and highlight significant findings regarding the influencing factors, it highlights the influence of the thematic and project context on the benefits.

The benefits of the intermediaries in the context of the 5 cases studied can build two basic categories. On the one hand, they benefit financially from the resources associated with the projects. On the other hand, there are several non-financial factors from which the intermediaries benefited within the project's framework. By analysing the data regarding benefits for the intermediaries, the different characteristics of the analysed projects and the thematic context had an evident influence. Although there were benefits that occurred equally across all cases, a closer look revealed apparent differences. For this reason, in the points on financial and non-financial benefits, the primary benefits that generally emerged across all projects are presented first, followed by a more precise differentiation based on the known axes of the thematic orientation and project context.

8.1 Financial Benefits

The analysis of the finance-related factors showed that intermediaries mainly benefited from projects in three ways. All thirteen intermediaries interviewed during the study stated that funded projects as their primary source of income. Although the business models of the involved innovation intermediaries are diversified, funded projects form the financial backbone of the organisations. Thus, they are essential to maintaining their service portfolio for the companies.

Although in several cases, the intermediaries have received start-up funding in the form of funding programmes aimed directly at intermediaries, this funding has either only been made available for a limited period or only covers a small part of the organisations' actual expenditure. For long-term survival, funded projects emerged as a reliable, predictable source of income. Consequently, the intermediaries were under pressure to acquire a certain number of projects to be able to cover their funds and generate a long-term financial return. Since the projects usually run for up to four years, this results in a reasonably stable planning window.

The resource mobilising factor of funded projects has a second advantage for the intermediaries in addition to their financial security, from which they benefit greatly. The project-related income enables them to develop their organisations both organisationally and thematically. The resources that the intermediaries receive within the framework of the projects enabled them to expand their organisational structures. This expansion can take many forms, such as hiring additional staff, purchasing equipment, or improving the infrastructure of buildings.

“Due to the financial support of the project, the importance for us intermediary was very high from the beginning, as the financial resource made it possible to further advance our business and increase the number of employees.” (Participant E)

Although these resources are tied to the specific project duration, they last beyond the project period. In this way, intermediaries can gradually improve their framework conditions from project to project and consequently improve their portfolio of support services.

In addition, there is a third significant benefit for the intermediaries. It is possible to generate synergy potentials with the project resources and thus cross-subsidise other projects. Especially when projects are relatively generous regarding the available resources to the intermediaries, other less well-funded projects can be supported with available resources. The same applies to hired personnel, who are deployed on a project basis but are also involved in other activities, further promoting the intermediary's development. Also, on the thematic side, the projects offer a resource framework that enables the intermediaries to advance other complementary activities in addition to the actual core activities of the projects. In this way, a project enables the intermediary to position itself in a specific thematic area and thus lays the foundation for further activities and support services. Sometimes, projects include funding that has been approved for the project duration but can be used as relatively free funds for the further development of the organisations. The share and the amount of these funds vary greatly depending on the project context.

The table 23 provides an overview of the three tangible benefits that emerged during the analysis. For a better understanding, meaningful quotations underlining the factors and the cases in which they explicitly appeared were also presented.

Benefit	Illustrative Quotations	Cases
Foundation of Business Model	<p><i>“As cooperation projects are the main area of income, our organisation has a great deal of expertise in the field of funded projects.” (Participant E)</i></p> <p><i>“Three quarters of our budget is generated by funding projects that focus on organisational and personnel development. Awareness in the field of AI is quite high and the topic is also very controversial. Our organisation was quick to notice that a lot of funding was being provided in the area of digitalisation and AI in particular, and thus positioned itself.” (Participant M)</i></p> <p><i>“Due to the ZIM background, it was interesting for us to open such a network from the beginning, as this creates a framework in which the projects of the companies as well as the intermediary, the operator of the network, can be supported. Without such a network, the creation of projects would also be possible, but the risk for the companies and especially the intermediary is significantly higher.” (Participant “Supported projects are an important part of the business model of our Organisation. For this purpose, the organisation has an extra team that takes care of convincing companies to participate in projects and the associated events and trainings, and also explains and discusses technical framework conditions right from the start in order to enable targeted support.” (Participant X)</i></p> <p><i>“Internationally funded projects are the main source of income for our organisation and are therefore an important part of its sustainable existence. In addition to the rather large international projects, we also run many smaller nationally and regionally funded projects that are mainly designed to support technology and knowledge transfer, especially between businesses and R&D. Although there was a grant from a national federal initiative at the beginning when the organisation was founded, this was only sufficient for the start-up and does not serve for further operations.” (Participant A2)</i></p> <p><i>“Due to the fact that the funding possibilities in Slovenia are rather limited for the kind of organisations like us, the income from the projects is very important to guarantee a sustainable operation.” (Participant Z)</i></p>	A, B, C, E
Business Development	<p><i>“From our point of view, however, the option and the offer of funded projects must always be pursued in order to keep this possibility open for further development and change of one's own organisation.” (Participant J)</i></p> <p><i>“Case C was initiated because the project fits perfectly thematically. It provides a suitable framework and resources for activities that we had planned anyway. In principle, artificial intelligence is also a thematic focus in other activities, but here the justification would be why working time is invested specifically in this topic without funding.” (Participant L)</i></p>	B, C, E

	<i>“With strategic funding as in Case E, it is also possible to develop the necessary structures for further interventions.” (Participant X)</i>	
Cross-subsidisation	<p><i>“We have projects where our support is very important, but the funds are actually not sufficient. Then it helps enormously if other projects do not have to be calculated so tightly.” (Participant J).</i></p> <p><i>“A good mix of projects is essential. There are projects that have super important goals but hardly any budget for us and, conversely, there are of course also projects that are done more for financial reasons than for other reasons. The goal here is always to have a balanced project portfolio that complements each other well.” (Participant T)</i></p> <p><i>“Of course, there are also projects that we could not actually do financially, but that we can make possible through the clever use of other resources from other projects.” (Participant L)</i></p>	B, C, D

Table 24: Financial Benefits Intermediaries

The factors presented differed depending on the case analysed. These differences could be attributed to a high degree to the respective projects. The type of projects had an essential difference in terms of financial benefits. Depending on the type of project, there different funding quotas and amounts for the intermediaries and the other project partners involved emerged. It became clear that for the intermediaries themselves, the financial incentive for projects in which the consortia consisted only of intermediaries was significantly higher than those in which the intermediaries formed a consortium with companies and other organisations as lead partners or project managers. As already explained, different organisations form the project consortium in projects with direct intermediation. Since the companies and research institutes are responsible for the thematic work in these projects, the intermediary is only active administratively. As a manager, the largest share of the funding goes to the other partners for their thematic work.

“At their first funding projects, they still took on a very large part in the project. So, for example, the project management, writing the sketches, writing the concept and so on, it was a large part of the project and that was brilliant for us. But in the course of the

three years of the project, the intermediary probably saw that they had overstretched themselves a bit, that the budget wasn't enough for what they offered. And in the next project, the project management practically concentrated on the essentials - organising a new deadline, following up, but the rest was more or less left to the companies themselves.” (Participant F)

The share of the intermediary is relatively tiny and barely covers the time spent by the intermediary. This low funding means that the intermediaries cannot solely focus on this type of project, as the financial resources provided are insufficient for the intermediaries to operate independently. In contrast, in projects with indirect intermediation, the funding amounts for the intermediaries were significantly more lucrative. Because the consortium consists entirely of intermediaries, the entire funding amount falls on the intermediaries. This higher funding gives them much more financial leeway, which they can use for various expenses. Depending on the type of project, this includes personnel costs, purchases or infrastructure such as the extension of buildings. Due to the rules of the European Union, it is also not allowed to pay more considerable sums of money directly to the companies within the framework of these projects, as this would otherwise violate the de minimis guidelines. In the cascade funding project Case D, the companies involved received sums of money in addition to the other services, but these were within limits.

Instead, it was the intermediaries' task to use the funds in such a way that they could create added value for their network that was made possible by the payments. Often, synergy effects could be created, and the relatively high level of funding of projects with an indirect client involvement could be used to co-implement or cross-subsidise other projects, tasks and goals. However, this was by no means incompatible with project objectives - on the contrary, it became clear that this kind of interweaving was already rooted in the project proposals. There

was a risk for the intermediaries spending too much funds generated on a specific project outside the actual project focus. In this case, the measures of the actual project suffer, which leads to a significant reduction of the generated impact. Figure 40 summarises these points, which can be assigned to direct or indirect intermediation projects.

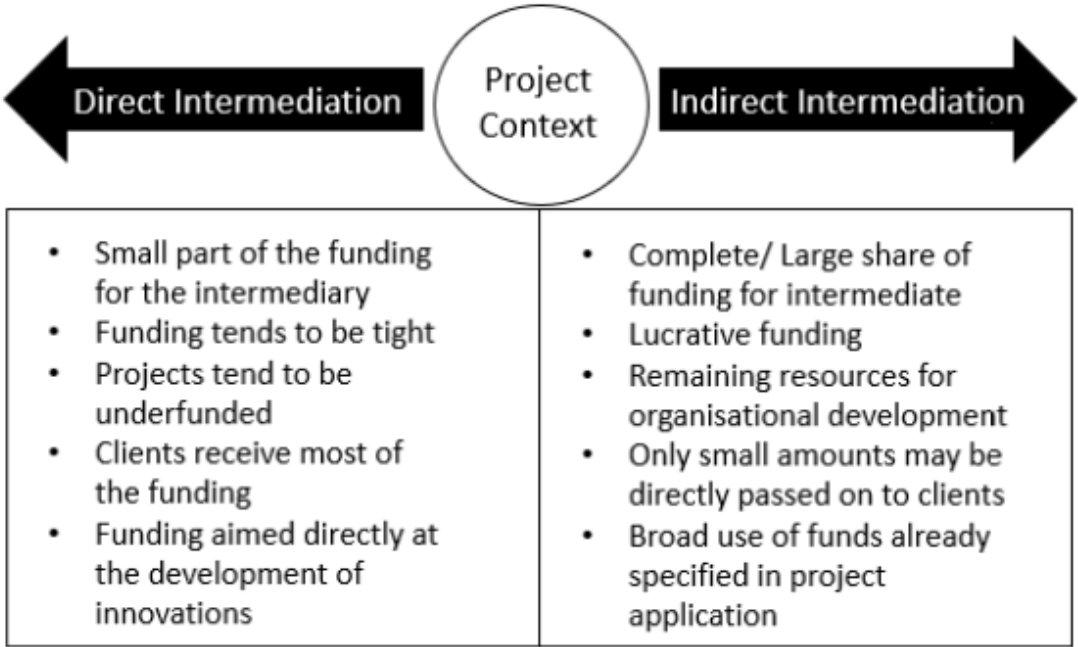


Figure 52: Influence Project Context Financial Benefits

The thematic context had a relatively small influence on financial benefits. This missing correlation is mainly because the projects’ financial background depended on the project characteristics rather than on their thematic orientation. In this sense, it also became apparent that the financial benefits for the intermediaries were not explicitly related to the thematic context. Despite great opportunities for funding within the framework of digital projects, there were various funding opportunities for both the thematic fields of digital transformation and digital transition. They include the entire spectrum of project factors and bring more significant or fewer financial benefits.

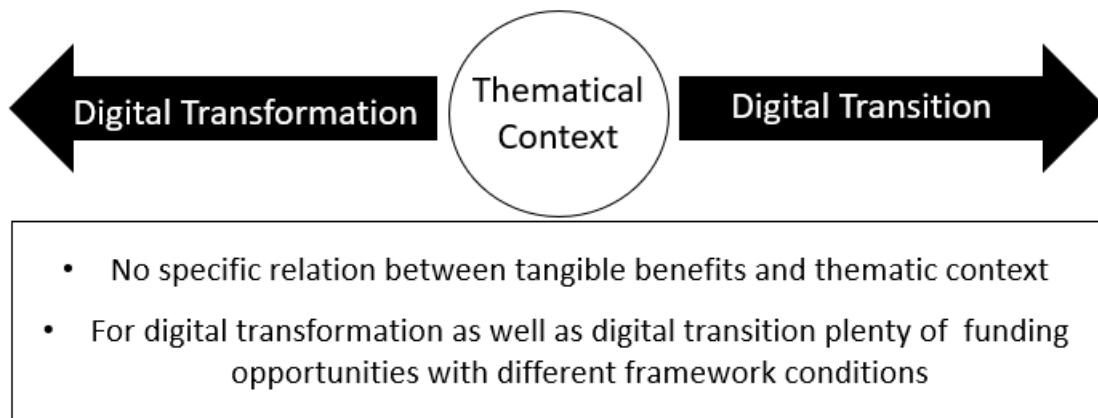


Figure 53: Influence Thematic Context Financial Benefits

8.2 Non-financial Benefits

The benefits to intermediaries went well beyond the materially supported ones. The findings suggest several other factors from which intermediaries benefited directly but had no direct material value and were, therefore, less noticeable.

An essential advantage of the projects was that they were closely linked to the core activities of the intermediaries and represent a cycle. The collaborative projects helped the intermediaries build up a network or further develop their own network. In the analysed projects, it was often the case that some of the project partners were already in contact before the actual project. However, through the projects, new contacts with partners were established, existing ones were significantly improved, and the exchange with other organisations was significantly increased.

In addition, previous projects increase the visibility of the intermediaries enormously. This increased visibility leads directly, in the medium and long term, to clear advantages for the

intermediaries, as it has been shown that their perception has increased significantly due to the projects.

Furthermore, the intermediaries involved benefited greatly from the projects in terms of their professional expertise. Considering the personnel structure of the intermediaries involved, it emerged that the employees are not technical experts but focus on technology management, project management or other economic areas. However, since they are not experts in the particular topics, they benefit significantly from the professional exchange within the framework of the project and thus gain a level of professional expertise that enables them to assess the problems, risks and opportunities of the topics addressed. The additional expertise gained through the projects provides the basis for further interactions that enable the intermediary to open up new fields, support companies successfully, and discover new problem areas and innovation potentials in which they can act in the future.

Table 15 gives an overview of these three factors with corresponding symbolic quotations.

Benefit	Illustrative Quotations	Cases
Network Development	<p><i>“Basically, the starting point for the project was that companies in the city of Regensburg approached the administration with the wish to better offer and structure the topic of AI at the location. Through this platform, cooperation has already been established, but rather loosely between the parties involved. It quickly became clear that our organisation will participate, especially since the call for proposals for go-clusters and the associated funds mean that network topics can be developed and a kind of test field for cross-cluster cooperation is created.” (Participant M)</i></p> <p><i>“The aim is to build up a complete value chain in the form of the Triple Helix with all partners, including research and administration, which is to be used to simply develop Regensburg into an artificial intelligence location, to make it known, to promote it in order to generate prosperity, but also more comfort for our citizens. In order to enable this synergies we need a project frame.” (Participant N)</i></p> <p><i>“We were invited to participate in the project through another partner. According to all participating clusters, this approach is very typical for European projects. Due to the fact that we have a strong</i></p>	A, B, E

	<p><i>project management, we are often invited to participate in projects. However, we are only active as a partner and not as a lead partner in the projects, as we do not have the necessary capacities to develop a project ourselves.” (Participant A2)</i></p> <p><i>“When you have the opportunity to participate in an international project like Interreg, you never really turn it down, because you depend on the resources and there are always great opportunities for making further contacts.” (Participant Z)</i></p> <p><i>“Usually, new projects are formed from consortia of successfully completed similar projects. Depending on how the cooperation has worked, a core of partners remains and tries to submit a new project successfully. Of course, some of the partners change or the lead partner changes, as this is by far the biggest task. It is common practice for a new lead partner to appoint known partners to his or her consortium who have themselves approached the lead.” (Participant T)</i></p>	
<p>Visibility</p>	<p><i>“An important function of the project is to explain and make visible our role in a project like the Regensburg Initiative for Artificial Intelligence.” (Participant N)</i></p> <p><i>“Of course, the promotion of the project also plays an important role. If the actual project is promoted too little or incorrectly, it only addresses a few companies, or the project may be overlooked by the actually interesting start-ups. Consequently, we as facilitators are overlooked as well without promoted successful projects.” (Participant T)</i></p> <p><i>“Our European Project form the basis for the international and European marketing of products that until now have only been sold on the national market. At the same time, it is also the marketing platform for us as an intermediary.” (Participant Z)</i></p>	<p>A, C, E</p>
<p>Thematical expertise</p>	<p><i>“Of course, we also benefit a little from each project. Especially the expertise in the area of project calls and the necessary contacts were built up piece by piece from project to project.” (Participant E)</i></p> <p><i>“As an intermediary, it is essential to understand the ecosystem, the companies, their level of knowledge and needs in order to find out what makes sense as an offer, how it makes sense and what the project partners can achieve, through our project, we were able to acquire this knowledge, which has helped us to make significant progress ourselves.” (Participant Z).</i></p> <p><i>“We are no experts in the technology field, but in term of the projects our expertise and consequently the expertise of our organisation significantly improves. This is based on the exchange with our partners, analysis, workshops and all other activities.” (Participant J)</i></p>	<p>C, D, E</p>

Table 25: Non-fincancial Benefits Intermediaries

Again, there was a clear difference between the projects with direct and those with indirect intermediation. In the R&D projects Case A & B, this mainly concerned the contact with the companies since the possibility of a ZIM network added new clients to the existing intermediary network. The intermediary significantly improved the contacts with the companies, which also explains why companies often participated again based on previous projects.

In the cascade funding project Case D, the call for proposals with direct funding opportunities even brought completely new companies into the European network. However, the contact was only sometimes sustainable. In the strategic projects Case C and E, the network between the intermediaries was essentially improved, which contains an excellent synergy potential for the following projects. Particularly in European projects, it became clear that the chances of receiving funding increase considerably if one has already been active in project consortia and has a good network of other intermediaries.

Especially in projects with indirect intermediation, the network of intermediaries was critical. Only some intermediary organisations have the capacity to act as a lead partner in a European project. Since the lead partner has significantly more responsibilities than the other project partners and a large part of the project conception and design of the project application falls back on it, it requires significantly more robust capabilities and resources than a regular project partner. In addition, the lead partner is responsible for creating the consortium, which is why a network is needed to identify suitable partners and integrate them into the consortium. Since the project's design, the lead partner's network, experience, and skills all play a role in the project evaluation. It is challenging to take on this function for the first time. The also indicated an informal mechanism whereby partners brought into a consortium by a lead partner contact this lead partner as soon as an exciting project opportunity arises.

Accordingly, a successful project leads to a significant increase in the chances of follow-up projects. This change is a clear added value for the intermediaries. Experienced participants significantly increased their chances of participating in projects due to this mechanism, which allows them to plan more confidently. In addition, links to funding bodies have been significantly improved for all types of projects, improving the chances of further successful projects.

Concerning thematic orientation, it became apparent that there were many similarities. However, it became clear that in the projects that were thematically assigned to technological transition, new networks tended to form in these emerging themes. In contrast, existing networks tended to strengthen in the areas of technological transformation. Here, partners were often involved who were already part of the network. However, the projects created a lot of added value for them, significantly strengthening their connection to the intermediary.

The projects also offered intermediaries increased visibility beyond their network. Furthermore, visibility was generated among the population, as the intermediaries are promoted through the projects in the context of events, online and social media and associated with concrete activities. In addition, new target markets could be opened up through international projects, and the intermediaries become better known beyond the regional area, which in turn helps acquire new opportunities.

Through participation in projects, the activities of the intermediaries, which are often difficult to highlight, became visible. In particular, projects with an indirect intermediation made it possible to increase the visibility of the intermediaries' activities not only among potential companies and other organisations but also among the scientific community and the administration, especially in the triple helix structure. Although the projects with direct

intermediation could increase the visibility of the intermediaries, the effect of indirect intermediation projects was more significant and less related to a specific regional stakeholder group.

This result was mainly because the intermediaries in these projects could already anchor more robust project marketing in the conception of the project applications. While the projects with direct intermediation focused on specific development processes, resources to increase the visibility of the projects formed a non-negligible part of the projects' indirect intermediation. This result was reflected in their communication and marketing strategies and in the inclusion of promotional events.

In contrast, the projects with a direct intermediation were able to increase the visibility of the organisations in a more targeted and limited way. Through the more tangible project results in concrete developments and innovation, the projects with a direct intermediation were also able to increase the visibility of the intermediaries, which related more to a specialist audience and interested companies. Through previous demonstrable successes, companies became aware of the intermediaries and proactively approached them to obtain more detailed information about their portfolios. This substantial lighthouse effect was achieved through concrete project developments, which were increasingly found in projects with a direct client involvement.

Concerning visibility, it has also been shown that the thematic context in which the respective projects are located makes a noticeable difference. Especially projects related to digital transformation are of interest to a limited group of active stakeholders in the same or similar thematic fields. They also become aware of successful projects and, thus, of the intermediaries' work. Projects that were active in the field of digital transition achieved a significantly higher

reach, as the emerging technologies they contained generated a great deal of interest, especially in digital technologies. Since these were pre-retirement technologies such as blockchain or AI, which are only used to a minimal extent in the business context, the results, and the associated visibility of the intermediary in this area were interesting for a more significant interest group. However, this was also less targeted, and the increased visibility gave the intermediary fewer known benefits compared to the transformation projects that actively attracted new stakeholders.

Furthermore, the intermediaries involved benefited greatly from the projects in terms of their professional expertise. Considering the personnel structure of the intermediaries involved, it emerged that the employees are not technical experts but focus on technology management, project management or other economic areas. However, since they are not experts in the particular topics, they benefit significantly from the professional exchange within the framework of the project and thus gain a level of professional expertise that enables them to assess the problems, risks and opportunities of the topics addressed.

In projects with direct intermediation, the intermediary profited significantly from the expertise of involved firms and scientific organisations. Especially the practical-oriented knowledge regarding issues in implementing theoretical solutions brought a valuable knowledge-driven perspective for the intermediaries. In contrast, the participants from the scientific community offered timely technical and research-related knowledge and access to research facilities to understand the actual state of research regarding digital topics.

Particularly in the indirect projects, the exchange with companies and universities also important, but rather the cooperation with other intermediaries. Intermediaries have different areas of expertise and overlaps, resulting in cross-thematic intersections and collaborations.

Thereby the intermediaries can benefit significantly from each other and thus network their clients from different areas as they develop an understanding of the technical and economic potentials of energy within the framework of the projects and promote them.

The best example is Case C, a project based on a cross-domain approach from the outset that aims to link different professional expertise. However, the intermediaries not only gain technical knowledge in the projects, but they also gain expertise in the ecosystem in which they operate and thus gain an understanding of where the system needs help in the first place.

Figure 42 summarises and highlights the influence of the project context on the intermediaries benefits.

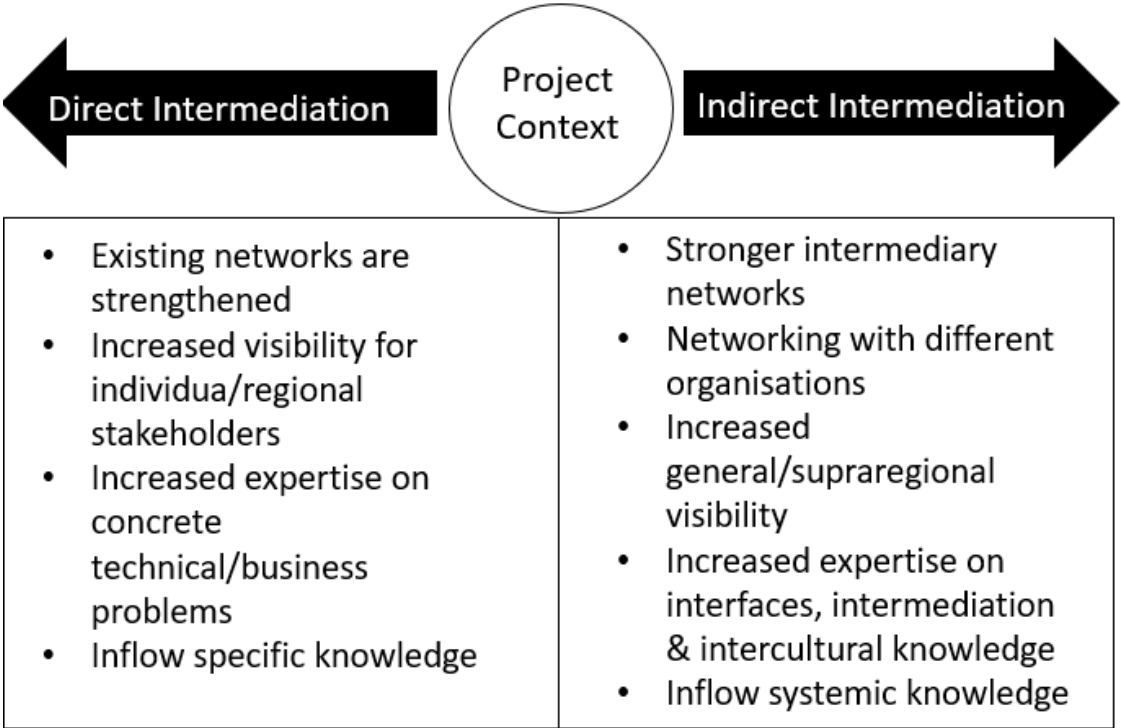


Figure 54: Influence Project Context Non-Financial Benefits

Especially when it came to how the intermediaries benefited from the projects in terms of their expertise, it became clear that the thematic context had a significant influence. Although

it became clear that both in the projects located in the field of digital transformation and the projects active in the field of digital transition, the intermediaries and the staff involved benefited considerably from the professional input of the participants, the type of knowledge obtained was quite different. Complementary to the type of knowledge transferred to the clients, the intermediaries received knowledge back.

In the field of digital transformation, the intermediary could benefit a lot from the more practical user-related knowledge of the companies. Because the companies and research institutions in these areas already have some experience in different fields, the intermediaries were able to benefit significantly from this experience and the associated knowledge. The knowledge about the challenges of the applications of digital technologies and the specific problems turned out to be valuable knowledge that the intermediaries could further develop and use in new projects.

However, this knowledge was much more technical in the digital transition area. Although the intermediaries needed some basic knowledge to create projects in areas such as blockchain or AI, this was significantly deepened by the input from research institutions and companies. Especially in the fields of the state of art, technical feasibility and implementability, the intermediaries benefited greatly from their clients' knowledge. Especially concerning emerging technologies, this knowledge was of great value to the intermediaries. To conclude the findings on the intermediaries' benefits, Figure 43 illustrates the thematic influence.

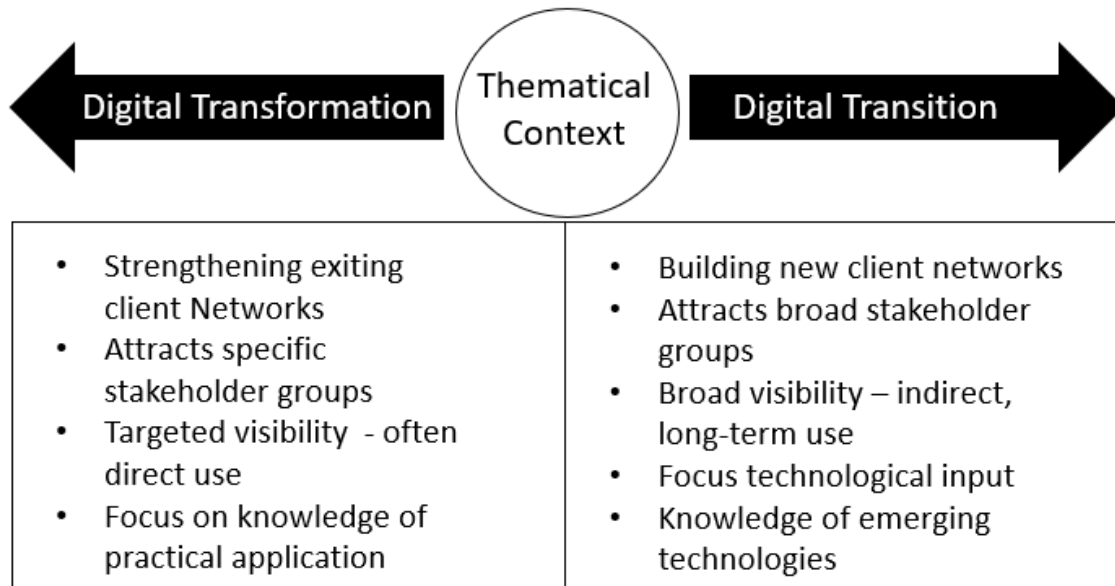


Figure 55: Influence Thematic Context Non-financial Benefits

8.3 Summary

The analysis of the cases revealed how intermediaries benefited financially and non-financially from the funded collaborative projects. Furthermore, it was possible to determine how and to what extent the two influencing factors, the thematic and the project context, affected the benefits of the intermediaries. For all intermediaries in the data sample, funded projects were the primary source of income. Within the framework of the projects, the intermediaries were able to mobilise the necessary resources for their substantial existence. It was demonstrated that the projects enable the intermediaries to develop their organisations and related infrastructure. In addition, the project resources received can support other projects, allowing the intermediaries to cross-subsidise complementary activities.

The intermediaries also benefited from the projects in non-financial terms. The projects enable them to expand and develop their networks, which are essential to their business model. In addition, they could significantly increase their visibility. Furthermore, they were able to

expand their expertise within the framework of the projects. Table 20 provides an overview of the six most important benefits the intermediaries received from the projects.

Benefits Intermediaries			
Financial	Foundation of business model	Business development	Cross-subsidisation
Non-financial	Thematical expertise	Visibility	Network development

Table 24: Overview Benefits Intermediaries

In the context of these benefits, it also became evident, that the thematic and project context factors played an important role. Particularly, the thematic context had an impact, primarily in non-financial benefits. The thematic orientation did not verifiably determine the financial benefits. However, this context considerably impacts the other benefits for the intermediaries. Projects in digital transformation tend to have a more targeted impact on network development and visibility but often result in direct benefits for the intermediaries.

In contrast, projects in digital transition tend to have a broader reach but are less focused, which leads to more long-term benefits. The expertise gained by the intermediaries also differs significantly. Figure 44 outlines and summarises these findings regarding the thematic context influence on the benefits of the involved intermediaries.

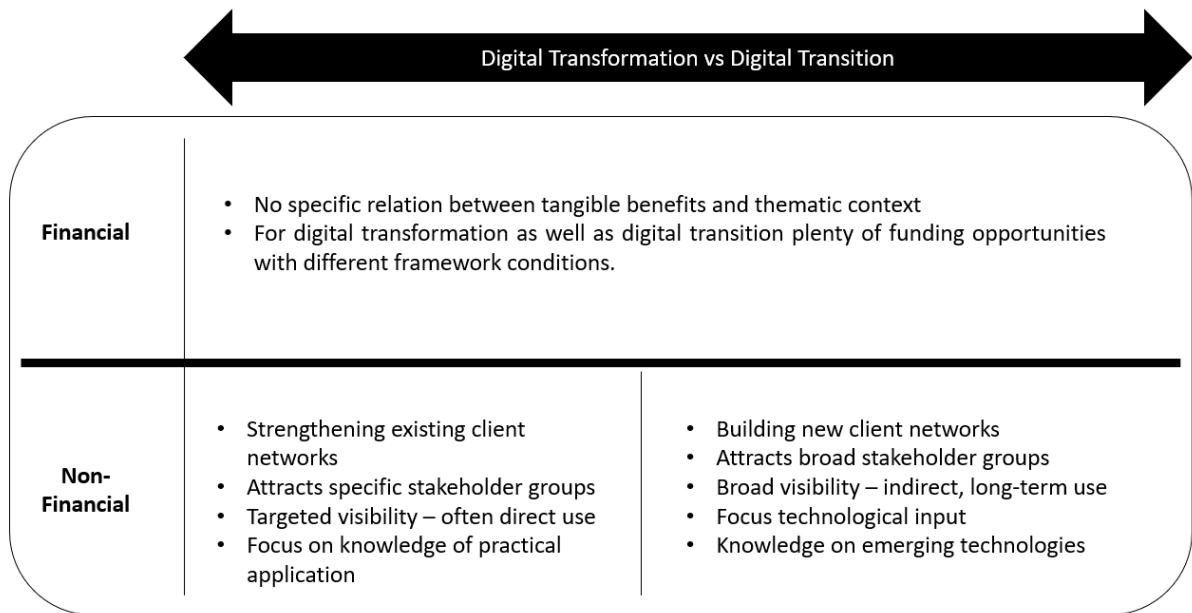


Figure 56: Benefits Intermediaries Influence Thematical Context

In addition, the influence of the project context on the benefits of the intermediaries was demonstrably significant in the financial and non-financial area. Regarding financial benefits, projects aimed at indirect intermediation are significantly more lucrative for the intermediaries, as most of the funding falls on them. In contrast, intermediaries receive only a tiny part of the funding in direct intermediation projects where their clients are part of the project consortium. This financial framework strongly impacts the three financial benefits of intermediaries mentioned above, as the financial scope differs significantly in both categories. In non-financial benefits, direct projects mainly increase local visibility and strengthen existing networks, while indirect projects mainly strengthen networks with other intermediaries and increase their supranational visibility. In addition, the knowledge obtained by the intermediaries in direct projects is much more specific and practically oriented than the more systemic but often interculturally valuable knowledge of indirect projects. Figure 45 highlights the influence of the project context on the benefits of the intermediaries.

← Direct Intermediation vs Indirect Intermediation →

Financial	<ul style="list-style-type: none"> • Small part of funding for Intermediary • Funding trends to be tight • Projects tend to be underfunded • Clients <u>recieve</u> most of the funding • Funding aimed directly at the development of innovations 	<ul style="list-style-type: none"> • Complete funding/Large share for intermediaries • Lucrative funding • Remaining resources for organisational development • Only small funding amounts directly for clients • Broad use of fund specified in project application
Non-Financial	<ul style="list-style-type: none"> • Existing networks are <u>strengthened</u> • Increased visibility for individual / regional stakeholders • Increased technical/practical expertise • Inflow specific knowledge 	<ul style="list-style-type: none"> • Strengthening intermediary networks • Networking with different organisations • Increased <u>general/supraregional</u> visibility • Increased expertise on interfaces, intermediation & intercultural knowledge • Inflow systemic knowledge

Figure 57: Benefits Intermediaries Influence Project Context

To conclude, these findings clearly demonstrated the diversity of the intermediaries' benefits and the strong influence of the thematic and, above all, the project context.

9. Discussion & Conclusion

Chapter 9 concludes this thesis and completes it with an overview of the results, their discussion and concluding remarks. First, it recapitulates the research gaps and aims. It presents and discusses the elaborated main findings of this research and their derived implications. An outlining of the research reflections and concluding remarks complete this thesis.

9.1 Research Gaps & Aim

Innovation intermediaries are an essential group of organisations that play a crucial role in various innovation processes (Howells, 2006; Dalziel, 2010). They are vital and strongly represented in thematic areas that are undergoing change, as the demand for support services is exceptionally high (Day & Schoemaker, 2000; Clarke & Ramirez, 2014; Parag & Janda, 2014, Gliedt, Hoicka & Jackson, 2018; Kivimaa et al., 2019).

Particularly in digitalisation, one of the tremendous technological changes of our time, knowledge about the actions of intermediaries is very limited (Rossi et al., 2021).

However, this knowledge is fundamental to understanding how companies can be better supported within the framework of the general innovation policies in the context of digitalisation. Intermediaries, as one of the central elements of this policy, must be understood both in their supporting function and as an independent organisation with its business model in order to be able to classify their actions better and improve the policy structure (Yang, Kim & yim, 2019; Rosca et al., 2022; Bäumle, Hirschmann & Feser, 2023). Since their role is always strongly dependent on the context, this role must be addressed in their consideration.

Specific insights into the actions of intermediaries in this field are necessary, as their role is strongly dependent on the context in which they interact and needs more awareness (Backhaus, 2010; Iturrioz, Aragón & Narvaiza, 2015).

The spectrum of digital change presented in chapter 2.2.4, ranging from digital transformation to digital transition, clearly highlights that clients of intermediaries in digitalisation are confronted with very different challenges.

While there is evidence that intermediaries play an essential role in transition and transformation, this evidence either relates to other thematic areas or relates only to certain types of intermediaries (Van Lente et al., 2003, Haas, Blohm & Leimeister, 2014; Hossain & Lassen, 2017; Kivimaa et al., 2019; Kanda et al., 2020; Crupi et al., 2020; Sovacool et al., 2020). Consequently, the outlines of specific influencing factors considered in this thesis are not fully addressed, leading to a lack of clear understanding of their influence and interrelationship.

To comprehend and understand the complex interactions of intermediaries holistically, a focus on the intermediary organisations is necessary, including the system in which they interact. However, in most cases, this is not sufficiently considered (Kanda et al., 2020).

Furthermore, the specific role of intermediaries varies based on the specific projects in which they interact. Dependent on the characteristic of the respective projects not only the level on which the intermediary interacts differ, the involvement of their clients and the focus and entailed challenges vary (Ansell & Gash, 2012; Calamel et al., 2012; Hartley, Sørensen & Torfing, 2013; Vom Brocke & Lippe, 2015; Polzin, Flotow & Klerkx, 2016; Kanda et al., 2020).

To fill the research gap in relation to the intermediation context and the associated characteristics, it is necessary to include both the thematic and the project context in the analysis.

Besides the external influence factors, the immediate collaboration process between intermediaries and their clients requires focus to understand how the clients can utilise and exploit intermediary services. Against initial persuasions, some findings indicate that intermediaries can compensate for the lack of absorptive capacities from their clients that are necessary for a collaborative innovation process (Spithoven, Clarysse & Knockaert, 2010; Katzy et al., 2013; Kokshagina, Masson & Bories, 2017). However, there needs to be a detailed understanding of how this happens (Spithoven, Clarysse & Knockaert, 2010; Alireza & Utz, 2020).

In addition, there needs to be more research on how intermediaries benefit from working with their clients. This benefit concerns financial benefits, which relate to the mobilisation of resources, and non-financial benefits (Lopez & Vanhaverbeke, 2009, Polzin, Flotow & Klerkx, 2016, De Silva, Howells & Meyer, 2018). This perspective is rarely considered in research on intermediaries, but it is crucial to understand how intermediaries can evolve and persist (Knockaert & Spithoven, 2014; De Silva et al., 2022). Especially the aspect of how intermediaries can mutually benefit from other intermediaries and create value needs to be sufficiently addressed (Inkinen & Suorsa, 2010, De Silva, Howells & Meyer, 2018).

The underlying aim of this work was to understand how the collaboration process of innovation intermediaries with their client organisations enables the creation of innovation in the field of digital innovation by overcoming occurring barriers. The more complex goal of the research was to understand this process in detail and to find out how collaboration with intermediaries enables innovation even though the collaborating firms lack the absorptive capacity to use external knowledge and resources successfully.

To create this understanding, a framework focusing on absorptive capacity was developed, which made it possible to represent the collaborative process in a way that the process to examine could be set out. The collaboration process was divided into five essential categories in which intermediaries actively interacted in the context of AC. In this regard, government-funded projects in the digital context were chosen as an equally important context for intermediaries and their clients to provide a delimited and equally relevant framework for the research.

9.2 Main Findings

Existing literature on innovation intermediaries is mainly concerned at an organisational level with the characteristics and typologies of these organisations (Karlsen, Lund & Steen, 2023). In contrast, knowledge transfer activities in connection with the concept of absorptive capacity focus on the question of what capabilities organisations need to be able to benefit from external knowledge to create innovations and gain a competitive advantage (Cohen & Levinthal, 1990, Zahra & George; Flor et al., 2013). Since Spithoven, Clarysse & Knockaert (2010) published one of the first studies on the linkage of intermediaries and absorptive capacity, more than ten years later, there is still clearance needed on how intermediaries contribute and compensate absorptive capacity of client firms. (Spithoven, Clarysse & Knockaert, 2010; Alireza & Utz, 2020).

This thesis has clearly shown that intermediaries are able to compensate for the lack of absorptive capacities of firms in the areas of recognition, acquisition, assimilation, transformation, and exploitation to different extents. Consequently, their clients and not neglect themselves can successfully take advantage of project opportunities to develop and profit

from innovations. The vast majority of firms lack the absorptive capacity to independently transform external knowledge and resources into innovative projects and, consequently, products or services.

It became evident that intermediaries are more than just a supporting factor for the companies to absorb external knowledge within the framework of funded projects. Instead, they are the essential link that bridges various barriers to actively facilitate knowledge exchange. This understanding strengthens the position from point 2.1.2, which sees intermediaries as active drivers instead of passive supporters.

The findings of this study have shown that the role of intermediaries in the conceptual framework (Figure 14) needs to do justice to their role. Although intermediaries clearly influence the absorptive capacities of their clients and equally influence the external knowledge that flows to the intermediaries, the position presented as a marginal element representing an external element in the process is insufficient. The role of the intermediaries is a direct and essential one in the innovation process under study. For this reason, Figure 46 shows this finding in the form of the adapted framework. The former position of the innovation intermediary is coloured grey to show that this position does not go along with the findings. This position shifts much more directly into the actual innovation process. The new position of the intermediaries, which is clearly shown as the finding of this thesis, is coloured black. The black arrow indicates the direction towards the centre of the process. By moving the intermediary position from that of an external element directly into the knowledge exchange process, the intermediary role of actively enabling the flow of knowledge by bridging the absorptive barriers is appreciated.

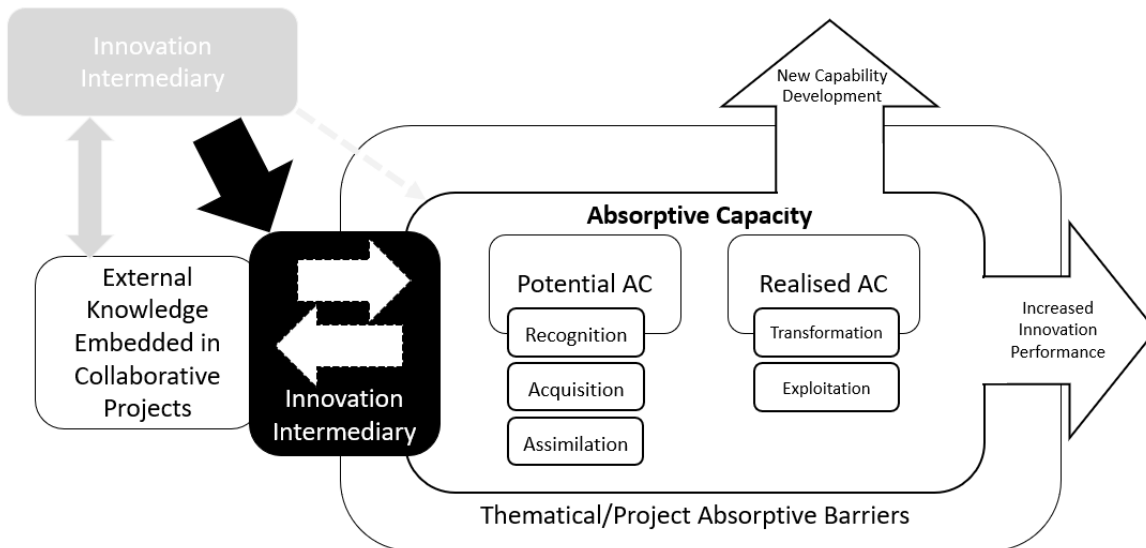


Figure 58: Innovation Intermediaries the Essential Link

Through the findings obtained during the analysis of this thesis, it became clear which absorptive capacity barriers the clients could not overcome without the help of the intermediaries and how the intermediaries could support them in overcoming them through concrete interactions. Further, it was able to outline the determining influence of the thematic and project context on absorptive capacity barriers in digitalisation. In addition, it was possible to show how the intermediaries benefited within this process's framework.

9.2.1 Influence of Thematical and Project Context on Absorptive Capacity Barriers

Generally, the underlying innovation problem determines the approach to solving it and the associated organisational approaches and practices (Felin & Zenger, 2014). Therefore, before discussing the interactions with which the intermediaries have helped clients create value based on external knowledge, it was essential to understand the companies' absorptive capacity barriers in the analysed digital projects.

In line with the existing literature on innovation intermediaries, the context in which they operate is an essential influencing factor in their actions. It was able to demonstrate this importance in detail in all five areas of recognition, acquisition, assimilation, transformation, and exploitation by applying the absorptive capacity framework. In each of the five areas, specific barriers emerged that the organisations had to overcome to carry out their collaborative innovation projects successfully. Depending on the component analysed, it was possible to identify core barriers that posed the most significant challenges to the clients. All five components are interrelated and interpreted as mutually dependent conditions for the next component, starting with recognition.

In the area of recognition, the most significant barriers were awareness, interest, identifying suitable funding opportunities and finding partners. Once these were overcome, the clients were confronted with processing their ideas, forming a consortium, the different partner perspectives and developing a fundable concept. Once a consortium has been granted access to a funding project, the actual knowledge exchange begins. In the area of assimilation, communication, unequal denominators, different cultural and geographical backgrounds as well as false self-assessments were the main problems. To transfer acquired knowledge, the need for synergies, the adaptation of theoretical knowledge and the practical implementation is challenging, in addition to the difficulty of linking science and practice. Further, to benefit from the projects, the project partners had to achieve long-term benefits, assess their success and achieve an impact. The strong self-focus proved to be a particular obstacle. Figure 47 illustrates the outlined barriers which occurred during the analysed projects. The black heptagons represent the most important areas where the identified absorptive barriers occurred. These are clearly assigned to the respective absorptive capacity components, shown in the white-filled circles. An essential element of this representation is the flow from category recognition

to category exploitation. The black arrows represent this linked relationship. Only if the barriers of the respective components could be at least partially overcome it was possible to master the next component, which, for all five components taken together, finally results in an increased innovations performance.

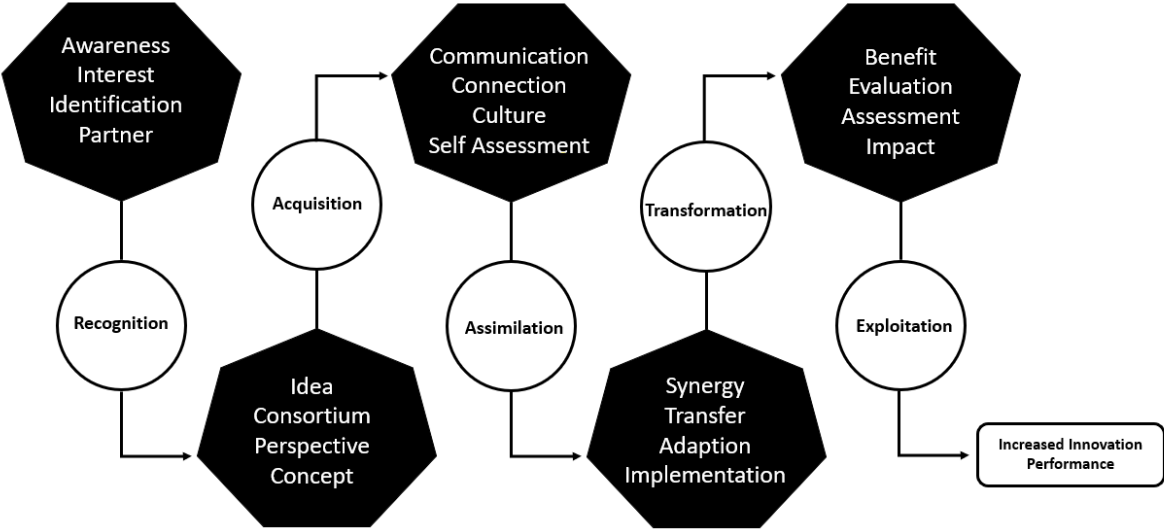


Figure 59: Absorptive Barriers Funded Collaboration Project

What goes beyond previous findings is that depending on the analysed absorptive capacity component, the thematic and the project context in which the clients interacted significantly impacted the upcoming barriers. The influence of both factors differed greatly depending on the component examined.

The comparison of the cases in digital transformation with those in digital transition field produced valuable insights into how the respective classification and the existing capacities and absorptive barriers were influenced. It became clear that this classification strongly influenced the existing capacities of the participants and determined to a large extent where the existing AC and the required capacities needed to overcome the barriers differed particularly strongly.

Due to the different focus, the type of knowledge transferred differed depending on the thematic context. Once this is the case, the challenges and the type of AC are required to differ significantly (Schmidt, 2005; Murovec & Prodan, 2009). This connection became apparent by comparing the two areas.

Surprisingly, it was found that firms that tend to be classified as digital transformation had a different spectrum of absorptive capacities compared to firms, mainly SMEs and start-ups, in digital transition. Above all, the potential absorptive capacity in recognition, acquisition and assimilation tended to be weaker in digital transformation. In contrast, companies from the area of digital transition had well-developed capacity in the potential area but needed to catch up in the framework of realised AC. This result may be surprising, as companies that want to undertake a digital transformation depend on external knowledge and benefit particularly from drawing on these sources to compensate for their deficits in the digital area and link them to their strengths (Siachou et al., 2021). Such integration is complicated for organisations to achieve, as they often need more knowledge for effective and efficient digital transformation. Knowledge of this process is vital as traditional organisations need to gain more understanding about digitalisation to achieve digital transformation.

The second factor that has had a significant impact on absorptive barriers was the project context. The influence of the project context revealed that it is crucial to consider the collaboration process of intermediaries with their clients not only as a micro-level, bilateral process. The specific relationships and systemic interactions can be visible only by considering the whole system (Stuck, Broekel, Revilla Diez, 2016).

In the case studies analysed, the intermediaries operated in different projects with direct or indirect client involvement. In the context of direct involvement, they were on an equal

footing as consortium members with the other project participants, all of whom were clients. In the case of indirect involvement, their clients were not members of the actual project consortia and indirectly involved during project tasks.

The influence of the specific funding projects was enormous and significantly determined the barriers that occurred. This connection showed that the existing barriers go beyond those of traditional collaborative innovation processes and require separate consideration. However, this meso-level is usually not covered in studies on innovation intermediaries, although the importance of the project level became evident in this paper. The literature indicates that acting as an intermediary is only possible if systemic components are included (Inkinen, Suorsa, 2010; Cunningham & Ramlogan, 2012).

Through the influence of the thematic and project context, a holistic picture emerged concerning the emerging absorptive barriers. The thematic context in which clients operate significantly influences the presence of absorptive capacities. In addition, the thematic context determines to a large extent which needs and expectations companies have of collaboration. The aim of digital transformation or digital transition influences the focus of the organisations. On the other hand, the project context influences the absorptive capacity barriers, i.e. the requirements of the respective projects on the absorptive capacities of the participating organisations. In addition, the project context determines the specific requirements of the projects, the risk for the individual partners, and the opportunities that any project brings with it. Direct intermediation projects have significantly different characteristics than indirect intermediation projects. Consequently, the project context determinants differ depending on the allocation.

If the existing absorptive capacities, needs, focus and expectations align with the absorptive barriers, the project requirements, risks and opportunities, a successful match can be achieved. This match possibly results in project benefits and the creation of an impact.

The role of the intermediaries is explicitly to create this match. Their neutral position in the project enables this vital role. This finding outlines the strong context dependency the intermediaries confront in their project role. Figure 48 illustrates this relationship between thematic and project context regarding absorptive capacity and barriers.

The four thematic boxes at the respective corners represent the four ends of the matrix according to which the absorptive barriers and the intermediary interactions were subdivided. In each case, the most important criteria are noted. The respective project context factors impact the variance of the Absorptive Barriers and bring their differences in requirements, risks and opportunities. In contrast, the thematic context determines to a large extent the available absorptive capacities of the respective companies and can strongly influence this. Both context categories influence the role of intermediaries, as a significant challenge for intermediaries is to match their clients' absorptive capacities and barriers. In the context of the findings in Chapter 7, however, a clear imbalance could be identified here. While the project context strongly drove the intermediaries' interactions, they adapted very little to the respective thematic backgrounds of their clients. This lack of adaptation to the thematic, digital orientation made it much more challenging to match the two categories. This partly prevented the intermediary interactions from increasing the innovations performance of their clients in a more targeted way.

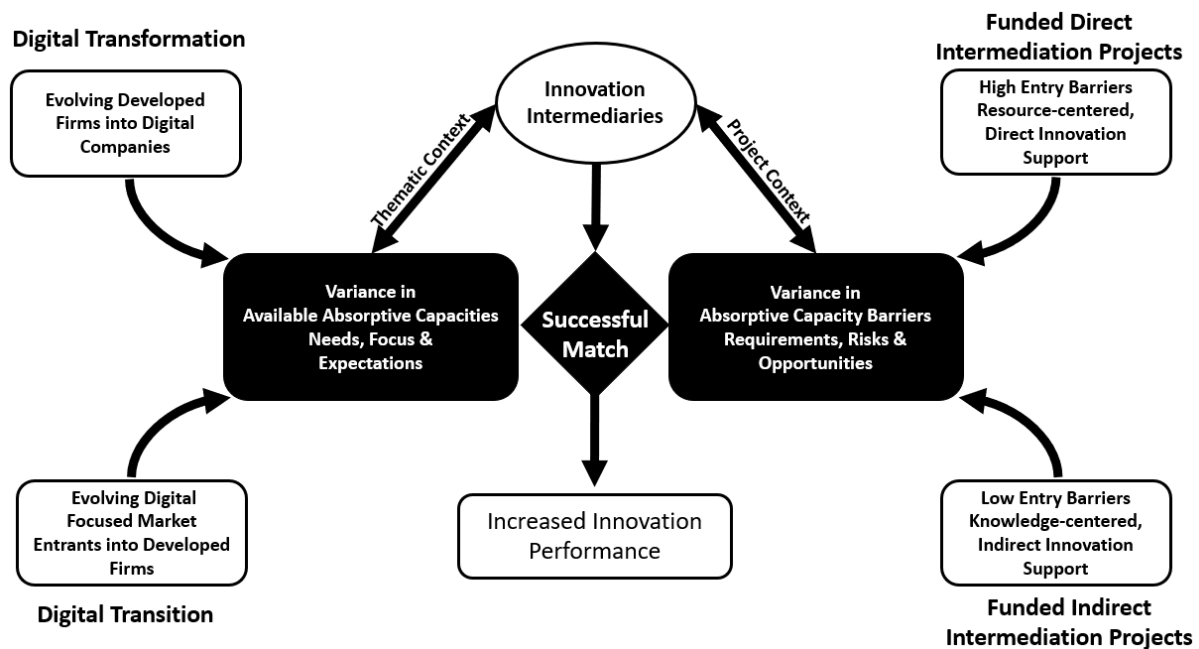


Figure 60: Context-Dependency Innovation Intermediaries

This recognition has led to two remarkable results. First, implications are enabled by comparing the requirements for AC and the actual AC available in the respective subject areas. This correlation results in intricate combinations for the companies to achieve themselves; thus, the discrepancy between existing barriers and capacities is apparent. For example, when looking at the recognition component, it becomes clear that many companies engaged in digital transformation are unlikely to overcome the high recognition barriers in projects requiring direct involvement in the consortia. They mainly need a more robust absorptive capacity to recognise the value they could gain from participating in a funded collaborative innovation project. Consequently, it would be implausible that such companies would consider starting such a project without the help of an intermediary showing them this added value.

These correlations are also influenced by the antecedent factors generally taken into account within the framework of absorptive capacity, as described in section 3.1.2, such as previous knowledge or corporate strategy, and that exceptions can therefore occur. Nevertheless, the

findings have clearly shown that depending on the thematic and project context, there are contexts in which the required and the available absorptive capacities differ, directly influencing the intermediaries' necessity. It was possible to highlight these findings in a high degree of detail, analysing all five absorptive capacity components,

Second, the different roles of intermediaries depending on the projects result in differences in project-influenced barriers. They determine the transferred knowledge in the framework of the project. Due to the direct involvement of clients, knowledge in direct intermediation projects is more strongly influenced by the clients than the intermediaries. In contrast, the knowledge transferred in projects with indirect intermediation is very much shaped by the intermediaries. As a result, this knowledge is more abstract and theoretical.

Consequently, clients need higher capacities to make sense of this knowledge. This correlation shows that indirect intermediation projects have weak points and that how intermediaries support the firms can also have a limiting factor. If the intermediaries are too much in focus, the generated impact will be minor or more challenging to achieve due to a less targeted implementation of the projects. This finding indicates that although intermediaries are a distinct type of organisation, as described in the literature review, they cannot exist independently, as their main task is still to support other parties in the innovation process.

In summary, the immense impact of both influencing factors is essential to understand where firms need support from intermediaries due to a mismatch between barriers and available AC. There is a close connection between the two factors highlighted in this paper, with great importance for the cooperation between intermediaries and their clients.

9.2.2 Intermediary Interactions to Compensate Missing AC

The findings in chapter 7 identified several interactions that intermediaries executed to help their clients. They compensated for their clients' lack of absorptive capacity through specific interactions and enabled them to overcome absorptive barriers. Consequently, the importance of these interactions and the specific assignment to the respective components of absorptive capacity became apparent. For each component, the intermediaries had a specific role that united the interactions to overcome the absorptive barriers.

At the beginning of the project process, the recognition activities, closely linked to search activities and problem identification, companies with a lack of absorptive capacity have issues. They cannot start an open innovation process because they need to recognise the value of such a process or gain the knowledge to initiate it (Kokshagina, Le Masson & Bories, 2017). In the context of the project activities investigated in the study, the analysis of the lack of absorptive capacity of the companies revealed that they often either need more awareness of participating in funded projects or need to learn how to identify suitable funding opportunities and find consortium partners. A lack of recognition capacity further decreases the interest in participating in collaborative funding projects because they cannot evaluate the entailed value beforehand. Further, they need to attract potential partners. Suppose one follows the principles of AC here. In that case, the receiving, as well as the delivering organisation, must have a similar knowledge base to recognise and, above all, to evaluate new knowledge (Lane & Lubatkin, 1998).

As the findings on recognition showed, through the help of intermediaries, it was possible to connect organisations which initially did not meet this criterion. The intermediary helped them recognise the added value and enabled matchmaking that the organisations would not

consider possible or valuable. This lack of absorptive capacity often leads organisations to interact with intermediaries (Chiaroni, Toletti & Chiesa, 2016). The findings of this study confirmed this role. However, the intermediaries' interaction went beyond this understanding and companies were actively contacted that would not come up with the idea of cooperating with the intermediaries or other companies by themselves. In summary, the intermediaries proactively initiated the projects.

In the acquisition phase, the project context's specific demands on the organisations became apparent. In acquisition, the intermediaries had a dual role within the framework of the funded projects. On the one hand, their interactions to overcome the acquisition barriers provided concrete access to external knowledge. At the same time, they also provided access to resources. This role of intermediaries in enabling clients to access and mobilise new resources through their supportive activities is an integral part of understanding how intermediaries contribute to the creation of innovation processes, a question that is still not fully answered (Katzy et al., 2013; Polzin, Flotow & Klerkx, 2016). By managing the project application process, they were able to help their clients obtain needed funding while providing access to external knowledge as part of the projects.

The nature of the findings regarding assimilation had a different character than those presented in recognition and acquisition. In contrast to the project context-driven barriers of the acquisition presented above, the component of assimilation and the associated intermediating actions can be assigned to enabling the knowledge transfer and thus directly linked to the concept of AC. At this point, the central intermediary role was to enable the knowledge transfer between the partners independent of the nature of the knowledge. They were responsible for successful communication, provided tools, ensured the integration of all partners, identified their strengths and weaknesses, and set the broad direction of the exchange.

Communication is essential in the context of assimilation, which is much more challenging to implement in practice than in theory. As soon as a lack of communication or misleading communication becomes a factor, the partners have significant problems understanding each other and the knowledge they have gained from the other. This role of communication is also emphasised in the context of AC, as it is a fundamental prerequisite for a functioning knowledge transfer (Zahra & George, 2002). Communication is a decisive factor in intermediation interactions and is crucial to their success (Diener, Luettgend & Piller, 2020). As communication between the individual partners on all aspects of the projects plays an important role, it was important for the intermediaries to bring the actors on a shared basis and to ensure that they speak the same “language”. These difficulties arise mainly against the background of different origins or cultural backgrounds. The intermediaries can solve them mainly through their previously described dual role as network managers and as contact partners for all individual partners.

Along with the finding regarding assimilation, the transformation component required the intermediaries to accelerate and target the previously enabled knowledge transfer. In this role, they had to actively promote and stimulate this exchange, balance the consortium and support the idea management. Through transformation, the externally received knowledge is worthwhile for the client organisation. The transformation of knowledge is a fundamental function of intermediaries, already highlighted in the early research on this topic (Van der Meulen, Nedeva & Braun, 2005). In contrast to this role, however, the intermediaries in the projects studied only rarely actively undertook the transformation of knowledge for the different parties. Instead, they tried to create the framework conditions so that it was as easy as possible for the individual partners to transform the received knowledge for their purposes and to use it in their processes.

The last component, exploitation, revealed the need for intermediary support beyond the pure project duration and requirements. When companies have strong AC in this area, it is easy for them to use received knowledge and to make better use of the knowledge they have received from partners (Zhang & Baden-Fuller, 2010). High AC enables companies to value the results of the projects and the services received from the intermediaries and to recognise the value of the collaboration (Knockaert, Spithoven & Clarysse, 2014). The findings suggest that the intermediaries tried to increase the merit value for their clients through various interactions, but this only succeeded to a limited extent. The intermediaries, however, were mainly focused on a merit value for the whole project network or an impact on the underlying ecosystem.

When the intermediaries' clients had to evaluate the success of the projects and the share of the success of the involved intermediaries, they often found it difficult, especially in the case of the latter, because they had no clear indicators. This mixed appreciation is due to the nature of the intermediaries' services, which are difficult to quantify (Dalziel, 2010). This difficulty is a problem attributable to the characteristics of innovation intermediaries. It also illustrates their distinction from more profit-oriented players and is also one of the reasons for their unique financial situation (Klerkx, & Leeuwis, 2008).

In the case of support beyond the actual project duration, especially concerning the commercial usability of the solutions developed, the unique character of the intermediary's financial background became apparent. As soon as the project funding ended, the intermediaries' hands were tied to a certain extent in continuing to support the clients. It became visible that there was a great need for marketing and capitalisation of the project throughout the project, which the intermediaries could not fulfil. Especially the SMEs involved, which have fewer capacities, need to have all the necessary capabilities to develop commercial innovations after

the development of the invention, which is a specific problem (Haapanen, Hurmelinna-Laukanen & Hermes, 2018).

The new solutions must compete with existing technologies, especially in digital transition, which is challenging. It is challenging to replace long-established technologies, and the acceptance of new solutions only sometimes depends on their intrinsic merit compared to existing solutions (Rip & Kemp, 1998). Especially when developing digital solutions, companies must always keep an eye on market requirements, as these change very quickly (Elverum, Welo & Tronvoll, 2016). Figure 49 illustrates the roles the intermediary overtook during the five components of absorptive capacity. The individual components of absorptive capacity are shown as interlocking elements. They merge into one another and form a kind of project cycle. The black boxes outline the role of the intermediaries for each component.

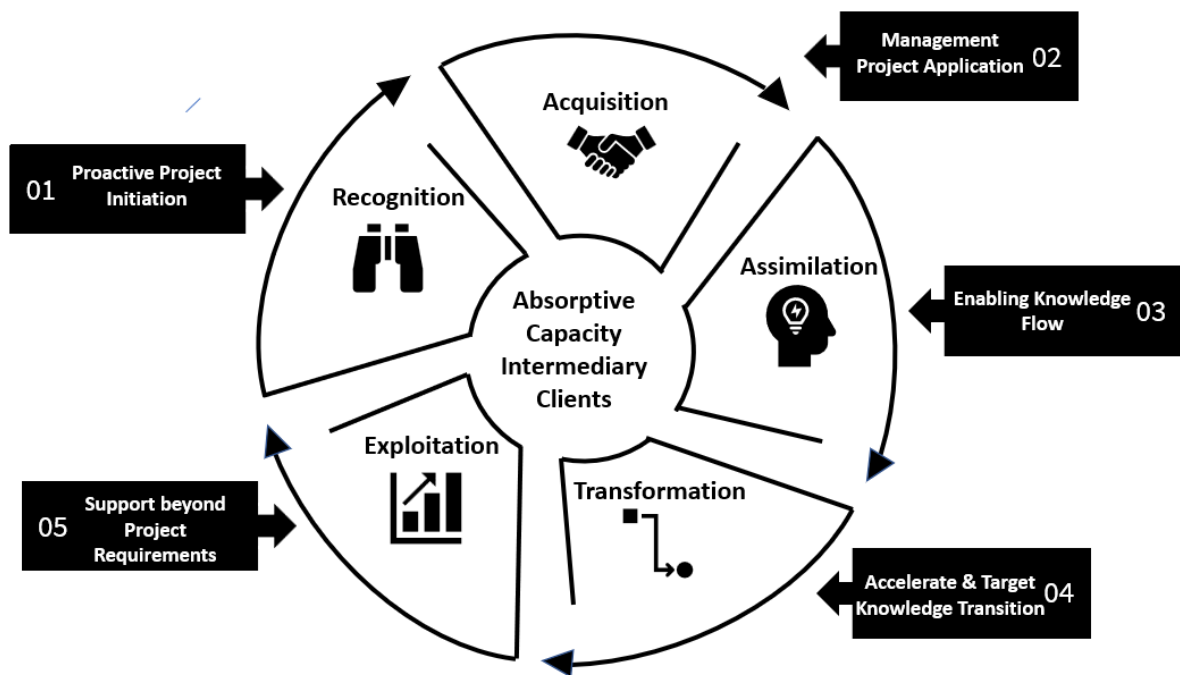


Figure 61: Five Roles Intermediaries in Funded Collaboration Projects

9.2.3 Benefits Intermediaries

For a holistic view and understanding of intermediaries, it is essential to capture the role of intermediaries for their clients and how the intermediaries themselves have benefited from the projects studied. Research needs to pay more attention to this part of understanding intermediaries, focusing mainly on how intermediaries create value for their clients rather than themselves (Knockaert & Spithoven, 2014).

In the context of this study, six different main benefits of the intermediary could be identified. These were equally divided between financial and non-financial benefits. What goes beyond the existing findings on the topic are the specific findings on the respective influence of the project context and the thematic orientation. Both determinants strongly influenced how the intermediaries benefited from the collaboration funding projects.

The analysis of the financial benefits for the intermediaries provided essential insights into the resource mobilisation function of the intermediaries. As detailed in the two previous main findings, innovation intermediaries are essential to support firms in generating funding. In the same way, the intermediaries themselves are dependent on this funding. The study's results clearly outlined that for the intermediaries, there are apparent differences in the extent to which project funding contributes to their existence. It became apparent that indirect intermediation projects are significantly more lucrative for intermediaries. Only through projects that offer sufficient scope can intermediaries expand their portfolio in the long term. This choice clearly shows a challenge for intermediaries: due to their financial dependence, they need to select projects more than thematically, but the type and amount of funding play an important role. Thus, an essential ability of intermediaries is to balance their project portfolio so that the selected projects complement each other financially and thematically. Only then

can the intermediaries create the best possible offer for themselves and their clients. This finding confirms the importance of the intermediary perspective. It is essential for understanding the collaboration process, and the findings clearly show that it also directly influences the intermediaries' interactions and their collaborations with clients. Thus, the findings obtained in the thesis not only show that the intermediaries benefit from the funded projects, it becomes clear how and to what extent this happens. Figure 50 highlights the main findings regarding the benefits obtained by the intermediaries. The differentiation between the two factors, thematical and project context, illustrates each category's main benefits. The factors provided are critical for the intermediaries to form a thematically and resource-wise balanced project portfolio.

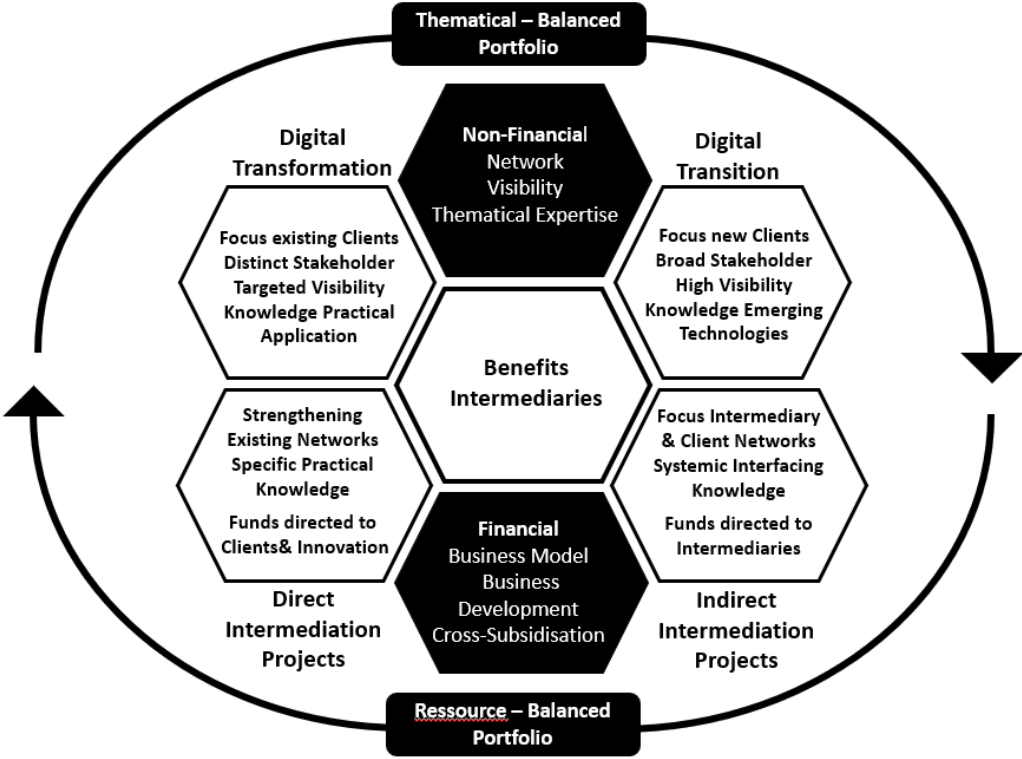


Figure 62: Benefits Intermediaries Funded Digitalisation Projects

When discussing the results regarding the financial benefits, the unique financial background of the intermediaries must again be considered, as this strongly influences the following factors. As mentioned in chapter 2.2, intermediaries have a particular position concerning their financing, and their business model cannot be directly compared to that of classic profit-oriented companies. Their services are often difficult to quantify, and a change towards more measurable services is contrary to the character of intermediaries (Klerkx & Leeuwis, 2008). The intermediaries interviewed in this study are primarily self-supporting but public or at least public-related organisations, between commercial enterprises and publicly funded bodies.

As outlined in the findings section, funded projects are their primary source of income, without which they could not sustain their operations. Although the intermediaries involved had other sources of income, such as membership fees, these only covered a small part of the running costs. This financial focus reveals that the intermediaries are heavily dependent on project-related funding. This income is therefore limited to a specific time frame, which makes long-term planning difficult (Mignon & Kanda, 2018).

Regarding the second factor, business development due to the projected income, the paradox in which the intermediaries find themselves due to their lack of profit orientation became apparent. The fact that they were not allowed to make a profit and are closely networked with the public sector made it difficult for them to make more significant investments or to actively pursue business development since new costs have to be covered. In contrast, this status enabled them to participate in many projects in the first place and thus to finance their activities.

As discussed in Chapters 2,4 & 5, joint-funded projects play a crucial role in this context as they enable intermediaries to generate value for the clients and not to be neglected

themselves. In addition, intermediaries generate internal value through their intermediary process, which, for example, increases knowledge due to the project work carried out.

This expertise is gathered in cooperation with other organisations. It makes an essential contribution to their activities as they can be transferred from one client or project to another and thus be used in many ways and very broadly (Geels & Deuten, 2006). In addition, the intermediaries build networks with stakeholders from different thematic areas as part of the project activities. These networks can be of considerable value for future cooperation and projects (Kant & Kanda, 2019).

There are significant differences between direct and indirect intermediary projects. Especially the networking aspect between the intermediaries in the context of indirect projects and the resulting increased chance of renewed project participation is a significant, hidden benefit for the intermediaries.

9.3 Implications of the findings

Based on these outlined main findings of this research, the next session outlines the resulting theoretical and practical implications.

Absorptive capacity is a valuable and essential tool to understand why some companies benefit from external knowledge and others struggle (e.g., Cohen & Levinthal, 1990; Vanhaverbeke, Van de Vrande & Cloudt, 2008; Huang & Rice, 2009). Especially when linked to the practical concept of open innovation, it creates a synergy as it allows to understand why some companies benefit more from open innovation than others and where particular barriers for organisations lie (Vanhaverbeke, Van de Vrande & Cloudt, 2008; Lewandowska, 2015).

These are exceptionally high in complex contexts such as digitalisation (Murovec & Prodan, 2009).

9.3.1 Theoretical Implications

This thesis gained insights into the role of intermediaries by looking at the collaboration process with clients, including critical external factors and the concept of absorptive capacity. The role of innovation intermediaries is extensive in the existing literature, which covers various organisations and activities (Dalziel, 2010).

For this reason, this research initially pursued the approach of obtaining findings on a substantial role of innovation intermediaries through a clear delimitation, researched entirely and in detail. This approach narrowed down the results to the role of intermediaries in funded projects and highlighted findings that offer clear added value.

The literature review identified innovation intermediaries as active participants in the innovation landscape, acting as a mediating link between government, science and firms to drive innovation processes (Dalziel, 2010; Clarke & Ramirez, 2014; Vidmar, 2018; Kivimaa et al., 2019). They were found to be particularly active when parties struggled to interact with each other, bridge gaps, and reconcile market asymmetries (Howard Partners, 2007). In this role, they operate primarily in volatile, innovative thematic fields that are highly complex and strongly characterised by change (Sørensen, Mattsson & Sundbo, 2010; Kivimaa et al., 2019).

The results of this thesis underline the proactive character that innovation intermediaries assume in their actions. Due to their central role in the researched collaboration processes, they represent more than a mediating factor or a link. They act as connecting actors, but in many cases, they are the architects of the underlying projects and the associated networks. Without

the help of innovation intermediaries, projects such as those explored in this thesis are hardly feasible. Intermediaries do not only help different parties come together. They actively create the framework conditions that such a connection requires. In this role, they act as project developers who proactively provide their clients with ideas, funding opportunities and networks. In this way, they not only support innovation processes but also enable them and launch them.

Suppose the activities of intermediaries are described in section 2.1.2. In that case, many activities coincide to a certain extent with the role of intermediaries as architects of funding projects as described in this thesis. Due to the practical importance of the context of funding projects for intermediaries, the findings of this research indicate that the role of project development should be considered as a separate category of intermediary activities.

Furthermore, this thesis has shown that intermediaries act precisely at the points where their clients lack the necessary absorptive capacities to overcome occurring barriers. The study identified a set of interactions that intermediaries can use to support firms in all five components of AC in the absence of internal capacities.

The results provide added value compared to previous findings of intermediary studies in this area of AC. The findings cover all intermediary interactions related to the five AC components in the context of funded digitalisation projects. In contrast, previous research only focused on parts of the absorptive capacity (Spithoven, Clarysse & Knockaert, 2010, Kokshagina, Le Masson & Bories, 2017). The obtained observations allow a complete picture, again showing the strong connection between innovation research and the role of intermediaries. It underlines the need and the use of connecting the rarely linked concepts of innovation intermediaries and absorptive capacity.

In general, one crucial factor sets innovation intermediaries apart from other organisations like KIBS. They do not operate in a natural market environment; their decisive role is artificially created through funding.

As clearly stated in this thesis, innovation intermediaries are a distinct group of organisations, but they are not self-sustaining. They are a partially dependent policy instrument. All intermediaries that participated in this research are dependent on funding. Or conversely, without the artificially created funding frameworks, zero of the fourteen participating intermediaries would be viable. This result clearly underscores the intermediaries' dependence and their specific roles and characteristics. Funded projects are not only one of the primary sources of income for intermediaries and thus a large part of their business model but also great importance for resource mobilisation for innovation creation (Polzin, Flotow & Klerkx, 2016; Mignon & Kanda, 2018). For this reason, as explained in more detail in the annexe, many resources are used in this area, especially at the supranational EU level (e. g. Interreg CENTRAL EUROPE, 2022).

The role of intermediaries outlined in this research is not feasible in a free market environment. This dependency also applies to organisations that are promoted to a different extent due to their profit orientation. Intermediaries that want to profit must make their activities measurable to compete with other business organisations (Klerkx, & Leeuwis, 2008). However, this is only one condition. They also need to build a market-oriented business model that thrives on their services, not funding. However, this is not possible in the context of the intermediary role explored in this thesis.

For this reason, the business model of intermediaries is an apparent factor that should be considered in their differentiation from other organisations. Innovation intermediaries act

between companies, the scientific community, and the state, and to do so in the manner described above, they must be subsidised. This recognition should be maintained in the future in order to be able to define the form of organisation clearly - innovation intermediaries are based on subsidies and are not independent market participants. Consequently, this factor provides a clear dividing line that distinguishes innovation intermediaries from other business organisations.

This demarcation already shows a fundamental recognition of this research - in the field of innovation intermediaries, one approach fits it all is no longer expedient. On the one hand, the term “innovative intermediate” must be clearly defined; otherwise, the results will be too blurred. On the other hand, other limiting factors greatly influence the actions of intermediaries.

This research has clearly outlined that both the thematic and project context in which intermediaries operate significantly influence their activities. Consequently, the findings support the view that there is not one AC but several specific types. The field of digitalisation alone is almost endless. It covers a vast range of topics, first and foremost the two major thematic areas of digital transformation and digital transition with their challenges and opportunities as well as different stakeholders (Eidhoff et al., 2016; Hennig, 2016; Juric & Lindenmeier, 2019; Khin & Ho, 2019; Yu et al., 2021; Della Valle & Oliver, 2021). The major differences in the requirements of both categories, and consequently for intermediaries, were clearly illustrated.

On the one hand, intermediaries need sufficient thematic expertise; on the other hand, they need to know what their clients need (Shapira & Youtie, 2016). Only when this is fulfilled can they fulfil their stated role as project developers. Nevertheless, there needs to be more

understanding of innovation intermediaries' role and specific activities in digitisation (Rossi et al., 2021).

By thematically narrowing down the area of digitisation, it was possible to show which specific requirements intermediaries must fulfil in digital transformation and digital transition. The clients and projects can be assigned to clear framework conditions. The thematic context clearly determines the available absorptive capacities of the clients. This thematic-specific knowledge requires a much stronger position in the research on innovation intermediaries. In other areas, such as sustainable transformation, for example, there is a broad literature that deals with these thematic characteristics and specifically addresses them (e.g., Van Lente et al., 2003; Kivimaa et al., 2019; Kanda et al., 2020; Sovacool et al., 2020). To gain a more precise understanding of how intermediaries operate in digitalisation, an area that this research has shown to be highly relevant to intermediaries in practice, a clear focus is essential.

In addition, the combination with the project perspective, which makes factors visible beyond the pure organisational level, has revealed important insights and connections. The project context determines the absorptive barriers organisations must overcome to collaborate in funded projects. The discrepancy between both categories has to be compensated by the intermediary to make a successful project possible. Here, it became apparent that the interaction level of the intermediaries, i. e. whether the clients were integrated into the project at the same level or were indirectly involved in the project, caused significant differences. These results underline the added value of looking beyond the organisational level, which has only been considered in a few studies in the field of intermediaries (Karlsen, Lund & Steen, 2023).

It became clear that the knowledge transferred in the project becomes much more theoretical and abstract in projects in which the intermediaries involve their clients only indirectly.

Mainly, intermediaries only have a limited internal perspective of their clients and specific expertise (Keinz & Marhold, 2020). This result once again highlights the dependence of intermediaries. Although intermediaries are a distinct type of organisation, as described in the literature review, they cannot exist independently. Their main task is still to support other parties in the innovation process.

In addition to this theoretical added value this work brings to the field of intermediaries in combination with AC and digitalisation, several insights could also be obtained regarding the added value for the intermediaries themselves. Only if intermediaries create added value for themselves through their activities can they survive and develop long-term (Polzin, Flotow & Klerkx, 2016, De Silva, Howells & Meyer, 2018). The findings of this thesis clearly show that the intermediaries generate this merit value for themselves within the framework of the funded projects. The very different share of intermediary funding, which depends on the type of project, must be considered to understand how intermediaries operate.

The results indicate that the intermediaries benefited differently from the collaborative projects. These differences must be considered to understand how intermediaries build their project portfolios. It has been shown that the financial aspect of the projects sometimes conflicts with the thematic merit, which leads intermediaries to opt for more financially lucrative, primarily indirect, intermediation projects, even though this does not necessarily bring the most significant merit to their clients. This issue needs to be weighted more heavily to understand which projects intermediaries are developing.

Another influencing factor that has received too little attention is the lack of feedback between the intermediaries' value creation and their clients (De Silva, Howells & Meyer, 2018). However, the feedback between added value for the intermediaries and the clients must take

place sufficiently. In that case, it is possible that the intermediaries, on the one hand, put their own added value in the foreground and, on the other hand, make decisions based on their existing and newly acquired knowledge that ignore the needs of the companies and the actual need for support.

The value creation of firms and intermediaries, but especially between intermediaries themselves, needs to be put into the context of their intermediary functions and the resulting consequences. However, this point is essential for understanding intermediaries as support organisations not only for their clients but for the whole innovation system in which they interact (De Silva, Howells & Meyer, 2018). The intermediaries also influence each other in this value-creation process (Inkinen & Suorsa, 2010). However, there are few results on the mutual benefits between intermediaries, which are essential concerning their longer-term benefits or in the context of a supra-regional perspective. The results of this study indicated that the intermediary network is of great worth for them, particularly regarding indirect intermediation projects. Therefore, the focus on intermediary networks as a vital point of their business model needs to be more decisively considered.

Concluding, innovation intermediaries are a well-researched field, but there is too little understanding of how they operate in a direct thematic context, such as digitisation, or a concrete systemic context, such as funded collaborative projects. Despite their immense importance, these factors are not sufficiently recognised in most existing studies on innovation intermediaries. By using a practical, holistic case-study approach and linking it to the theoretical concept of AC, this study has highlighted the importance of these factors for the role of innovation intermediaries, but also the role of innovation intermediaries themselves for open innovation processes in this context.

9.3.2 Practical Implications

One of the biggest learnings from this research is the intermediaries' central role during government-funded projects. As pointed out in the literature, the exact functioning and importance of intermediaries can only be understood by looking at them in the context and system in which they interact and going beyond a purely organisational perspective. As problem-solvers, intermediaries can help companies overcome barriers in all five components of AC and successfully participate in funded collaborative ventures despite the lack of internal AC, which would be difficult to imagine without their involvement. From the beginning, the declared aim of this research was to produce theoretical and practical added value regarding the role of innovation intermediaries. For practice, this research has implications for three different parties – client organisations, policymaker and intermediaries.

Along with innovation intermediaries' role in funded projects, there is an essential insight for potential clients - cooperation with intermediaries offers considerable opportunities.

Especially for companies, be they SMEs, start-ups or long-established enterprises, with limited capacities of their own, intermediaries offer excellent opportunities, especially in combination with funded projects. Currently, there are various funding possibilities for firms in almost all areas and sizes. Surprisingly many firms are still deterred or at least reluctant by the idea of state funding. This bias can be due to various reasons, such as formal requirements, a particular dependency, or concerns about the actual benefits.

Collaboration with intermediaries can offer them a simple and resource-saving way to deal with this topic. A funded innovation project does not have to be the company's primary business model. However, it does offer opportunities, especially in digital transformation and

transition, to work on and develop topics that would not be dealt with in regular day-to-day business due to a lack of financial or non-financial resources.

Intermediaries can support companies in many ways and offer far more than just supporting services. The strategic use of these services can bring significant added value to the companies. The analysed start-ups already clearly indicated that with an essential awareness of the topic, a large variety of funding and support services offer added value. However, it is also evident that intermediaries offer only partial support in the sense of independent service providers but that the companies themselves are required to generate added value with the support.

An important implication for intermediaries is the danger of losing the balance between their development and the value they offer to the companies. Especially indirect intermediation projects discussed in this analysis leave the intermediaries a certain freedom in using the funds they should use to develop the most significant possible impact for themselves, the companies and the ecosystem. Due to the current funding structure of the intermediaries, it is understandable that some funds are used for their further development and are not directly used for the project. However, this must not lead to a situation where the practical added value generated by a project suffers, and a project only becomes an empty shell well formulated in theory.

This point is also crucial for policymakers. Intermediaries are vital for economic promotion, especially in combination with funding projects. However, the analysis has shown that a specific limit exists, especially in indirect intermediation projects. In the course of these projects, the imparted knowledge becomes more theoretical and abstract, which leads to challenges for the clients in terms of usability. It is essential to balance the two project categories with

direct and indirect company involvement to achieve sufficient impact through the projects. The findings regarding the absorptive barriers in recognition and acquisition are essential for implementing direct projects. Policymakers and issuers of the funding guidelines should recognise the high barriers for companies during these projects. Although the intermediaries are a meaningful and targeted aid, it must be carefully considered whether it is in line with the considerations of the funding bodies that smaller and younger companies, which are mainly dependent on support, cannot obtain these projects on their own.

It has become clear that in the projects analysed, the intermediaries are not an add-on but an essential component without which the projects are not possible. This realisation should be taken into account in the development of new funding guidelines. In addition, policymakers should pay more attention to the needs of companies, especially concerning digital transformation and digital transition. Financial resources are the cornerstone, but beyond that, different requirements have emerged. The companies involved in digital transition, in particular, should gain more understanding. Many of these companies are still in the start-up stage and need to mature from a business point of view. However, their technical expertise in emerging technologies often exceeds that of intermediaries and policymakers. The impact of the thematic context on the absorptive capacities and general strengths and needs of the companies can be used as a guide for the further development of the digital funding landscape that the intermediaries contain.

In addition, the framework and interactions developed in this work are helpful, practical tools for intermediaries to analyse and evaluate their activities. This evaluation enables them to identify weaknesses and imbalances in their service portfolio. Although the framework of the funded projects is only a part of the intermediary services, it is of great importance, especially for the intermediaries, due to the high resources involved. By analysing their services in this

area and further developing their portfolios, intermediaries can improve their position concerning funded projects and thus mobilise more resources for themselves and their clients.

9.4 Research Reflections

In addition to this thesis's implications and main findings, this subchapter highlights the research reflections. These contain an evaluation regarding the influence of the research context and its limitations with areas for further research.

9.4.1 Effects of the Research Context Digitalisation

Most business research treats context as a homogeneous, one-dimensional construct. However, a few significant contributions outline the advantages of understanding context as a complex, multi-dimensional part (Poulis, Poulis & Plakoyiannaki, 2013). As detailed outline in the literature review, the core of this research, the collaboration of innovation intermediaries with clients, strongly depends on various influencing factors. Furthermore, the nature and origin of the collaboration process are crucial. Consequently, one of the main insights gained through this research is the recognition of how strongly the role and interactions of innovation intermediaries are context dependent.

From the beginning, one of the aims of this thesis was to find out how strong the influence of the interaction context is on the collaboration process between intermediaries and their clients. To illustrate this, the literature review and the selected data have a robust contextual reference.

The approach taken in this thesis was clearly to emphasise the influence of context and not to isolate the results from any external influences. The chosen case study method proved to be a suitable methodological instrument, as it allowed sufficient consideration of the chosen focus to illustrate the context-driven collaboration process. In combination with innovations, intermediary context-dependency is a more appropriate term than context-driven. As explained in detail in the main findings, it has become evident how dependent the researched intermediaries are on the context in which they interact. This context is artificial, partly even created for them, and therefore requires a more critical position to understand the intermediaries' actions in practice.

In addition to the environment in which the intermediaries operate, the thematic context was a particular focus of this work. A primary goal of this study was to gain more insights into the role of intermediaries in digitalisation. The scope of digitalisation is enormous. This synonym unites countless technologies, goals, approaches, and innovation processes. In the literature review, in particular 2.2.6 and 2.2.7, the aim was to divide this seemingly endless field into parts. This thesis does not claim to have introduced a universally valid subdivision of digitalisation. There are countless ways to divide, define and understand this topic. However, the digitalisation spectrum between the endings of digital transformation and digital transition was valuable and adequate for this research.

Thereby it was mainly able to outline one immediate recognition. When discussing digitalisation, caution is advised because many different subject areas go hand in hand with it. This mass of topics is still developing, and the digitalisation spectrum is becoming even more diverse.

Consequently, the two poles referred to in this thesis as digital transformation and digital transition will become even more pronounced (Harwardt & Schmutte, 2022). On the one hand, the challenges of ever-faster digitalisation inescapably confront nearly all business organisations. On the other hand, many companies are accelerating this development with emerging technologies and digital approaches. Consequently, a significant challenge for innovation intermediaries and policymakers will be to meet the needs of both groups to stay globally competitive.

This thesis indicated the different requirements and effects of the digitalisation spectrum on the role of intermediaries to contribute to this recognition. It will only be possible to offer companies more targeted support and achieve more substantial benefits and impacts if it fully addresses the specific digitalisation requirements.

However, the question remains to what extent the thematic context of digitisation limits the results to this area. Vice versa, to what extent it is possible to transfer the findings to other technological and subject areas. Two connections are essential to bridge the gap to other topics. First, although digitalisation has its characteristics, the entailed changes and the interaction between the physical and digital worlds impact many areas (Bilgeri, Wortmann & Fleisch, 2017; Madsen & Møller, 2017). Due to the interconnectivity of digitalisation with other thematic areas, there is a cross-sectoral dependency on digital applications. Therefore, the findings are relevant for other subject areas and can often be understood as part of or a fundamental prerequisite for other areas. However, this does not mean that findings on innovation in the digital area automatically lead to progress in other subject areas (Renn, Beier & Schweizer 2021). Second, the spectrum of transition and transformation is applicable in other thematic areas. In principle, this delimitation applies to all thematic areas that can be traced back to technological change, radical vs incremental innovation and emerging technologies (e.

g. Abernathy & Utterback, 1978, Jetter, Satzger & Neus, 2009; Taylor & Helfat, 2009; Çalışkan, 2015; Rotolo, Hicks & Martin 2015).

In conclusion, this reflection on the research context underlines the direct aim of this thesis on the influence of digitalisation.

9.4.2 Research Limitations and Areas for Further Research

While this study was able to answer the primary research questions and meet the objectives, some limitations lay the groundwork for further research and leave some of the underlying questions partially answered.

As already explained in several points in this thesis, the subject area of innovation is extensive and highly context-dependent. With a focus on digital technologies, it was possible to narrow down the subject area to a specific, significant area with its characteristics, but this also resulted in limitations concerning research results. The fact that the researched data can all be assigned to this field made it possible to achieve a high degree of detail concerning the research questions. Despite the importance mentioned above for other topics, the validity of the findings in other subject areas cannot be guaranteed.

To obtain different results and determinants from other thematic areas, research with a larger, more quantitative scale would allow generalisability. Research with larger-scale methodologies would allow to complement and test the results quantitatively. Although it is challenging to evaluate the entire collaboration process of intermediaries and companies quantitatively, one approach would be to pick out a specific component and test it on a large scale.

This specific perspective could produce more robust results on the individual components, providing further insight into the concrete interaction of intermediaries in the funded project environment. Although, the limitation to the digital context is nevertheless comprehensive. The thematic context of the analysed cases can be assigned to this field. Various technologies, company types and project types are analysed, which limits the applicability of the results to specific fields of technology.

Another limitation of the research project conducted in this context is the data basis. Although five high-quality and meaningful cases were analysed, an increase in the number and focus of the cases analysed could add value in terms of the breadth and detail of the results obtained. Two essential points would be crucial for such larger-scale research to generate real added value. On the one hand, additional cases must be thematically complementary to each other. On the other hand, it is necessary to maintain a practical, temporally relevant framework, which requires excellent access to actors and data in the field of relevant projects.

The project cases analysed all relate to funding projects funded nationally and supranationally within the framework of the European Union. It could offer added value to apply the analytical framework to projects outside the European area to identify any similarities or differences in the interactions, to obtain a more general understanding of the activities of intermediaries in the digital context.

The chosen qualitative methodology also has limitations regarding the results' subjectivity. Although the data coding and analysis process followed a predefined approach that can be traced through the applied framework, a certain degree of subjectivity cannot be dismissed due to the execution of the complete coding by the researcher himself. Adding further

researchers in the process or extending to mixed-method research could further reduce this limitation and validate the results even more.

Although the projects analysed and actors interviewed in the research were able to provide insight through their expertise and experience, the results regarding the projects were snapshots, mainly after the completion of the respective projects. A more long-term-oriented study could offer valuable results, especially regarding the benefits of intermediary activities, different activities and perceptions regarding the different project phases, and the generation of innovations. Depending on the type of project, this would require long-term and close cooperation with the actors beyond the respective project framework. It would be fascinating to expand the findings of this research. It became apparent how the intermediaries could compensate for the missing absorptive capacities of their clients within the framework of the projects. However, only long-term research could provide insights into whether the companies can strengthen their absorptive capacities in the long term through these interactions.

In contrast to a less detailed, more quantitative examination of some topics, there are also opportunities to obtain further essential insights about intermediaries with studies with a higher level of detail. Currently, there needs to be more theoretical knowledge regarding the exact role of intermediaries in cascade funding, for example. Intermediaries act there as recipients of project contributions and, simultaneously, as funding providers for the companies involved. An attractive dual role arises, particularly considering the findings highlighted in this paper. It offers added value for understanding intermediaries and, through a precise evaluation of their activities and the resulting improvements, also added value for the clients.

In principle, it would be essential to provide further weight to the influence of the numerous factors mentioned in future studies in the field of innovation inevitability in order to achieve results that can be implemented in practice.

9.5 Concluding Remarks

As already pointed out at the beginning of this thesis, innovation is of enormous importance for business organisations and human society. At the same time, however, there is hardly any other topic that is so difficult to grasp, delimit, visualise and, above all, replicate.

In the overall economic system, innovation intermediaries are a building block that, due to their increasing importance, is moving from a niche to the centre of regional, national and even transnational innovative ecosystems. However, their research encounters the same difficulties as all innovation research. Due to their difficult-to-define characteristics and the strongly varying understanding of their nature and functionality, it is challenging to enable practical relevant and transferable research. Despite the motivation of conducting research, it is essential that theory is still used to represent observed phenomena and does not serve its purpose.

This consideration was the practically conditioned motivation for this study: how can the cooperation between intermediaries and organisations be improved if it needs to be clarified what this looks like in practice? By selecting projects in the context of digital technologies, a project framework was chosen that made it possible to obtain theoretical knowledge about intermediaries and their work and, at the same time, map a practical, real-life context. This contextual perspective has been a constant thematic focus throughout the work, as it is essential for understanding innovation intermediaries' necessity, functioning and improvement.

In contrast to other types of organisations, intermediaries can only function and make sense in interaction with their systemic environment, which is why this environment decisively shapes and determines the character of intermediaries.

The identified barriers and the interactions with which the intermediaries help their clients to overcome them underline the problem-solving-focused action of the intermediaries. These barriers, whether they are absorptive, market or thematic in nature, form the basis for the actions and existence of intermediaries. Innovation intermediaries are not independent organisations. They are a tool to help companies to be more innovative. To conduct this role, they are dependent on funding, mainly proved through funding projects as analysed.

Especially in digitalisation, there are currently many funding opportunities. Considering the speed and complexity of digitalisation, it is no surprise that there is a great deal on offer and a great need for support. The question that partly arose during this research was whether this system is as effective as it is intended to be from a policy point of view.

Even the intermediaries who benefit most from the funding system partly doubt its usefulness or efficiency. Too often, projects emerge due to high requirements which offer attractive incentives for the parties involved, but the added value they contain could be better. This issue creates a particular paradox. On the one hand, the funding landscape is the inseparable reason for the existence of the researched intermediaries. This thesis has proven that these intermediaries have created outstanding expertise and networks. On the other hand, precisely this funding landscape prevents them from supporting their clients in a more targeted way. As this thesis shows, the intermediaries have an enormous competence in funding opportunities and the elaboration of eligible projects.

This complex knowledge does not directly generate any innovative added value but is a means to an end. This thesis has shown that the project context influence has a similar, if not greater, impact on the actions of intermediaries than the thematic context. Both factors are essential. However, there is a risk of imbalance if the project requirements threaten to outweigh the thematic orientation.

Building on a better understanding of the role of the intermediary in digitalisation and to further increase the use of intermediaries and improve the use of these remarkable organisations, policymakers should question the current funding landscape. It is necessary to prevent a disbalance by adapting the funding landscape to become less theoretical but more thematically and practically oriented.

Thereby, policymakers and intermediaries should consider the thematic perspective more strongly in the future to focus on the maximum value for their clients. This adapted focus could support companies in the digital field more targeted. An adjustment is necessary to maintain the connection in digitalisation topics, especially from a European perspective, not only at the top but in the broad range of companies.

This recognition entails a fundamental consideration: once the funding landscape induces intermediaries to carry out projects that create added value primarily in theory but not in practice, they fail in their fundamental task - to support firms in the so challenging grasp innovation process.

10. Literature

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Appendix 1: Innovation Policy

Not only do the companies and the market play a role in implementing technological change, but governments and local authorities are intensely involved in implementing and steering technological change. Thereby, they intervene with various guidelines regarding its implementation (Edler & Fagerberg, 2017). Just like the economy and technologies, the associated policy is in a constant state of change. Initially, this type of static intervention has its roots in research policy. Over decades, research policy entailed a growing proportion of technology, and other funding objectives have developed in addition to academic research funding. This development is mainly due to the increasing importance of private and public organisations outside academic structures. They are increasingly involved in collaborative projects with universities and other scientific institutions. This form of research collaboration has thus primarily replaced the classic approach of conducting research projects within academic structures and only transferring the results to industry (Perkmann et al., 2013). This new approach represents a shift from broader philosophical approaches to a more technically oriented funding policy with an instrumental approach and economic objectives (Lundvall & Borrás, 2005).

This development has led to the actual innovation policy currently being applied. Innovation *policy* can be defined as all public measures to generate, support and disseminate innovations. These measures originate from government bodies and can be implemented by different institutions and at different levels. Private and corporate innovation interventions are not included. The focus of the defined innovation policy thematically includes the creation and diffusion of innovations and their market introduction. The main difference to research and technology policy lies in the precise market focus and not the emphasis on primary research or pure technology development (Edler, Cunningham & Gök, 2016). In addition to supporting

policies, regulatory policies deal with issues such as labour law, control and audit of corporate activities, cartel issues and intellectual property (Birkinshaw, 2018).

This acceleration of inequality in the development of different regions has become one of the most important and most difficult challenges for policy development in industrialised countries (Rodríguez-Pose, 2018). Therefore, the main focus of the literature on innovation policy is on how innovation-driven economic growth can be promoted through government interaction. The problem of what policy can do to generate the desired economic growth on the one hand and to prevent social inequalities from widening on the other goes deep into the perennial debate about the role of the state in the market economy. The imperfections of a free-market economy are fundamentally opposed to the danger of creating unimagined negative consequences through state intervention (Bramwell, Hepburn & Wolfe, 2019). The regional funding policy includes all public measures formulated and implemented by local organisations for the region in the context of the available resources and priorities (Koschatzky, 2012). The financing of regional measures ranges from self-financing by the region to co-financing with other political levels. This policy level includes all public measures to promote research, technology, and innovation in a region but is implemented by political levels outside the region. This measure may be agreed upon with the local authorities. However, there is no need to (Koschatzky, 2014). Besides these local funding policies, there are activities of institutions, organisations or networks that develop and operate at a supranational level. This point is essential for the countries of the European Union, as the EU Commission regulates the underlying innovation policy for these countries. Accordingly, all relevant framework conditions, rules and measures are set at the supranational level (Adesadze & Burduli, 2018).

Due to these policies, governmental institutions play a significant role when considering innovation and technological change. Based on this close linkage, there is solid reciprocal feedback

between innovation researchers, policymakers and other shaping actors. While innovation research observes and learns from the established processes and created systems, the public site can directly profit from these implications and, in combination with its evaluations and economic impacts, create new instruments and approaches, which lead to new types of innovation policy interventions (Smits & Kuhlmann, 2004).

Appendix 2: KIBS vs. Intermediaries

Knowledge-intensive businesses (KIBS) provide input for the business processes of other organisations. This sector covers a broad spectrum of services in diverse fields. Preferably, KIBS collaborate with manufacturing firms on technological innovation and encompasses a broad range of R&D, marketing, and management services (Amara, Landry & Doloreux, 2009). As outlined above, the growing importance and speed of economic processes are closely linked to knowledge from the market base for this industry, whose main characteristics are the systematic generation and transmission of knowledge (Strambach, 2008).

Mainly KIBS deal with the application, combination, development, and identification of different types of knowledge. This knowledge is used to solve specific problems of their customer organisations (Miles, 2005). As a logical consequence of this business model, the knowledge-intensive industry is constantly in flux, making it challenging to define and classify the individual services offered. This volatility is because their capacities and interactions change so quickly that they can no longer be classified according to the chosen classification concept (Muller & Doloreux, 2009).

For this reason, it is not target-oriented to classify KIBS based on classic industry classifications. A decisive point in describing this industry is to outline its unique, decisive characteristic. One of the major, arguably the most important, capabilities of KIBs is the ability to link external received and their knowledge base to create problem-solving, helpful services for their client organisations (Hipp, 1999). This central capability is based on three primary characteristics of KIBS. First, as already raised, they are strongly dependent on knowledge. Second, either they create knowledge by themselves as a primary source of information or use available

knowledge to offer intermediate services for their customers. Third, they are predominantly supplied to companies and of competitive relevance (Miles et al., 1995).

In order to point out the characteristic of KIBS, Muller (2001) provides a general definition of KIBS: *“KIBS can be described as firms performing, mainly for other firms, services encompassing a high intellectual value-added”* (Muller, 2001, p2.). This definition provides a helpful introductory statement – however, it is not sufficient to acknowledge the broad spectrum of KIBS provided by this definition. For this reason, Toivonen (2004) provides a more sophisticated definition of KIBS as: *“business service companies, i.e., private service companies which sell their services on markets and direct their service activities to other companies or the public sector. They are specialised in knowledge-intensive services, which means that the core of their service is contribution to the knowledge processes of their clients, and which is reflected in the exceptionally high proportion of experts from different scientific branches in their personnel”* (Toivonen, 2004).

The difference from other businesses is the intangible, non-material nature of the provided services. Compared to labour- or capital-intensive services, this particularity leads to difficulties regarding their evaluation and measurement based on the need for measurable economic units (Strambach, 2001). These knowledge-intensive services are, on the one hand, the decisive determinant of these companies and, on the other hand, the kind of product they sell (Strambach, 2008).

This duality develops the understanding of KIBS from a pure supplier of knowledge to a producer and co-producer of knowledge in a bilateral rather than unilateral process. This perspective justifies KIBS's importance as innovators and drivers of economic progress and change. It does not reduce it to the ability to apply knowledge and externally developed technologies

(Muller, & Doloreux, 2009). With these broad contributions, KIBS are perceived as an important factor in creating innovation and an essential part of developing regional innovation systems.

Thereby, the importance of small and medium-sized enterprises should be considered, as they can be of great help not only in solving problems but also in gaining access to knowledge (Pinto, Fernandez-Esquinas & Uyarra, 2015).

However, the supporting function in the innovation process is only one part of what KIBs offers. Although KIBS support companies in the innovation process, they are also innovation drivers (Shearmur & Doloreux, 2019). Therefore, KIBS are closely connected to collaborative innovation activities. However, they should be identified with something other than innovation services as their core activities since only parts of their business models are designed for and focused on this type of activity (Gallouj, 2002). On the contrary, there is a closely linked category of companies dedicated exclusively to supporting and facilitating the innovation process - innovation intermediaries.

Comparing intermediaries and KIBS, it becomes clear that they are very similar. KIBS provide intermediating services in two senses. On the one hand, they act between companies and have no contact with the end-users. On the other hand, one of their main tasks is to link their clients and different sources of resources, which can be knowledge, markets, information or even regulations (Shearmur & Doloreux, 2017).

Comparing the knowledge-based services and the definition of KIBS discussed in the previous point with the functions of intermediaries, one thing becomes apparent – KIBS often act or function as an intermediary. This overlap leads to a frequently used distinction between innovation intermediaries focusing on their intermediary role and KIBS acting as an intermediary,

a by-product of their core business (Winch & Courtney, 2007). The importance of this typology is reflected in the existing research on intermediaries, as the two categories are often researched separately. The innovation research focuses mainly on the first category as the second type of intermediaries provides many activities unrelated to innovation (Howells, 2006). However, this distinction results from primary of the structure of the existing research on innovation intermediaries. Thus, the existing literature primarily focuses on the intermediary organisation as the core of the research. The differentiation of these two business models is crucial for this kind of research, as it mainly investigates the typology, function and understanding regarding these organisations (e.g., Vidmar, 2018; Dalziel, 2010; Howell, 2006; Piller & Diener, 2013; Hossain, 2012).

The main difference between the two types of organisations is their mainly different framework conditions. For example, KIBS, especially those with strong scientific and technological capacities, tend to be found in highly developed, economically metropolitan solid regions, as this is where the highest density of businesses, the clientele of KIBS, are located (Pinto, Fernandez-Esquinas & Uyarra, 2015). In contrast, innovation intermediaries are frequently purposefully located in areas where they should actively strengthen and build innovation capacities, which often corresponds to venues that are less developed in their entirety or a thematic sub-area (e.g., Inkinen & Suorsa, 2010).

In summary, the functions of KIBS and intermediaries overlap considerably. However, they cannot be categorised as the same type of organisation. KIBS are not to be understood as intermediaries because, as explained above, they partly take on intermediate roles but only perform them in the short term (Shearmur & Doloreux, 2017). Therefore, a distinction can be made concerning their role rather than their functions. In the case of innovation intermediaries, the whole identity consists of promoting the innovation process. In contrast, in the case

of KIBS, only individual roles in innovation intermediation and support are fulfilled, which leads to a different organisational framework (Shearmur, Doloreux, 2019).

Appendix 3: Principles EU Funding Policy

In this role, the EU Commission follows the principles of a free market economy. On this basis, State aid that undermines free competition in the internal market and affects competitive opportunities and trade between Member States is prohibited (Art. 107, TFEU). However, the European Union does recognise the importance of fostering research, development and innovation and has therefore developed its own holistic innovation policy. The innovation policy set out by the European Commission has the aim: *'of strengthening its scientific and technological bases by achieving a European research area in which researchers, scientific knowledge and technology circulate freely, and encouraging it to become more competitive, including in its industry, while promoting all the research activities deemed necessary'* (Art. 179, TFEU).

In order to achieve these goals, European research funding is regulated in supranational framework programmes. These have emerged from disjointed individual programmes.

Beyond the common funding framework, the legislature agreed that targeted government intervention can improve the functioning of markets and contribute to smart and sustainable economic growth. In the context of research, development and innovation, market failure can occur, for example, when stakeholders consider the positive impact of their interactions for other stakeholders and thus, from a public good perspective, too little effort is made in these areas. Similarly, other problems such as lack of access to finance or problems in inter-organisational communication can lead to market failures in innovation. For this reason, the European Commission considers it proven that aid in the areas of research, development and innovation is compatible with the existing mechanisms of the internal markets. However, this is only the case if they prevent a market failure as mentioned above so that an important

economic sector or a project of European interest can be promoted. In addition, the distortion of competition thus initiated must not be contrary to Community interests (OJ C198, 2014).

On this basis, the EU Commission has also drawn up a list of measures that are considered compatible with the prevailing market mechanisms. Five use cases are affected by this exception. The first category comprises aid for research and development projects. The decisive factor here is that the aided part of a project falls within the framework of basic research or applied research, the latter can be further subdivided into industrial research or experimental development. Aid in this category is mainly used to compensate for market failures in the area of knowledge spillover, inequalities in the flow of innovation or the lack of coordination of cooperation. The second category includes grants for feasibility studies related to R&D projects. The objective of these subsidies is to compensate for market failures due to lack of and/or asymmetric information. The third category is dedicated to the construction or development of research infrastructures. This is becoming increasingly important, especially in the area of cutting-edge research and research into key technologies, which is why the measure is intended to address difficulties in the coordination of such projects. The fourth category includes help for innovation activities. These also address the previously identified market failures and mainly relate to small and medium-sized enterprises that can use such aid for intellectual property, other intangible assets, highly qualified personnel and for the acquisition of innovation support. The fifth and final category is aid for innovation clusters. These are intended to address market problems in the context of coordination difficulties in establishing clusters and limiting the flow of information and interaction between these organisations. The aid therefore covers investments in the infrastructure needed by clusters as well as cluster operation for a maximum of 10 years (OJ C198, 2014). This extract shows the framework that all European federal measures must follow.

After presenting the federal framework of the EU and the prevailing system, the following section describes the implementation of these federations on the basis of community projects. These projects have their own characteristics and problems in which innovation intermediaries play an important role.

Appendix 4: Central Innovation Programm for SME's ZIM

The Central Innovation Programme for SMEs (ZIM) is a nationwide funding programme that is open to all technologies and sectors. The ZIM is intended to sustainably strengthen the innovative strength and thus the competitiveness of small and medium-sized enterprises. It is intended to contribute to economic growth, in particular by tapping value creation potential and raising the level of applied knowledge.

In the frame of ZIM, there is a possibility to apply for funding in the context of network management services and the R&D projects designed in the national or international innovation networks. The innovation networks consist of at least six independent small and medium-sized enterprises with a permanent establishment or branch in Germany. International innovation networks consist of at least four enterprises of this type as well as at least two foreign SMEs and one foreign institution that acts as a partner of the German management institution. In addition, other partners such as research institutions, university institutes, large enterprises, and other institutions such as associations may be involved. The basis of the cooperation is a joint idea for the development and exploitation of innovative products, processes, or technical services in a technologically or regionally oriented network or along a value chain. There is no restriction to specific technology fields or sectors. SMEs and research institutions cooperating with them receive grants for ambitious research and development projects that lead to new products, technical services, or better production processes. The technological innovation content and good market opportunities of the funded R&D projects are essential for approval. The ZIM aims to create framework conditions suitable for small and medium-sized enterprises. The companies can carry out research and development as individual projects or as cooperation projects with research institutions or other companies. In addition, the management and organisation of innovative company networks is promoted. For both cooperation projects and

networks, ZIM also supports international partnerships (Richtlinie Zentrales Innovationsprogramm Mittelstand, 2020)

The funding is carried out within the framework of the de minimis grants. The de minimis rule allows companies to be subsidised with public funds, provided that a certain upper limit is not exceeded. Government grants may not exceed the subsidy value of 200,000 euros per enterprise. An exception is made for commercial road haulage with an upper limit of 100,000 euros. Here, the fixed upper limit refers to the current and the two previous business years (InnovationsBank Berlin, 2021).

The external network management institution commissioned by the participating companies, or a research institution involved in the network is eligible to apply for funding for network management. Applicants and funding recipients are thus the network management institutions (indirect funding of the companies). In principle, companies and institutions (irrespective of their legal form) that do not pursue their own economic interests with the network (neutral intermediary) and have competences in the subject area applied for, in project management and in public relations can act as network management institutions (Bundesministerium für Wirtschaft und Energie, 2023).

Appendix 5: Programme go-cluster

The go-cluster funding programme is a national cluster policy measure of the Federal Ministry for Economic Affairs and Energy. The measure aims to support and promote cluster management organisations' further development. Since there is an increasing number of high-performance regional innovation clusters in Germany, the importance of professional cluster management organisations is growing. For this reason, 84 different cluster organisations are already in the programme. The programme offers several benefits to the participating organisations, ranging from financial support to certification and assessment of the organisations' performance to increased visibility in the national and international environment through the brand. In addition, various advisory services, seminars and networking opportunities with other members are offered. In principle, any cluster organisation from Germany can apply for admission to the programme, but some quality criteria must be met (Clusterplattform, 2023).

Appendix 6: Interreg Central Europe

Interreg is an initiative of the European Regional Development Fund and is a crucial component of the European Union's structural and investment policy. The funding programme promotes cross-border cooperation between different cities and regions. The topics are wide-ranging and include, for example, the economy, mobility or environmental protection. The Interreg programme is divided into cross-border, transnational and interregional cooperation. The administration of Interreg is not carried out centrally by the European Union. However, representatives of the respective cooperation areas jointly define the development priorities of the respective programme with the participation of economic partners, NGOs, municipalities and social partners. These are then implemented in cooperation projects involving various participants from different countries (Interreg, 2023).

Case D and E are part of the Interreg central Europe. Named Interreg B, projects involving regions from several European countries are promoted. It consists of 15 different programmes aimed at targeted transnational areas. Case D is part of Interreg Central Europe's capacity-building programme in carbon dioxide reduction, innovation, resource protection, mobility and transport. In total, the Interreg Central Europe Programme had a budget of 246 million euros from the European Regional Development Fund during the last seven-year period from 2014-2020. Altogether, Interreg had a total budget of almost 1.4 billion euros. Regions from nine countries are included in the programme, namely: Germany, Slovenia, Austria, Croatia, Czech Republic, Hungary, Italy, Poland and Slovakia (Interreg CENTRAL EUROPE, 2023).