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Multi-level interaction effects during digital innovation activities: A case study from a digital innovation unit in the paper processing industry

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Developmental Paper

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Abstract

Implementing digital innovation (DI) is important for organizational long-term success. In order not to jeopardize existing routines and processes, organizations are pursuing DI in separated digital innovation units. This is a popular approach to reach ambidexterity on the organizational level, i.e. executing exploration and exploitation equally well. However, recent research brings attention to the individuals in organizations and how they can manage contradictory elements and the positive and negative interaction effects between them. Thus, the goal of our research is to understand, which interaction effects emerge for organizational members within a digital innovation unit and how they address them. We develop an initial model of interaction effects, generated through a single case-study in the paper-processing industry. It includes several dimensions, through which exploration and exploitation emerge on the individual level and shows which combinations lead to negative or positive interaction effects. Finally, we discuss our findings and provide managerial implications.

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¹ This study is part of a larger research project.

1 Introduction

As digitalization has the potential for optimizing efficiency, decisions and long-term success, the ability to involve digital innovation into existing processes, infrastructure or tools, and develop new businesses on the basis of digitalization, becomes more and more important for organisational long-term success. Digital innovation (DI) means that value-adding novelties such as services, products or processes can be created, adopted and utilized through incorporating digital technology (Hund et al., 2021). As for pursuing DI, changes from existing logics, processes or routines can become necessary and negative interaction effects and tensions can emerge between competing concerns (Hund et al., 2021). For instance, new abilities need to be developed in order to use the opportunities given by digital technology without jeopardizing existing practices (Svahn et al., 2017).

This phenomenon of pursuing “two organizationally incompatible objectives equally well” (Birkinshaw and Gupta, 2013, p. 291), is referred to as ambidexterity and has been studied in a large, yet still growing body of literature. Exploration and exploitation are at the core of ambidexterity, referring to the innovation and discovery of new possibilities (i.e. exploration) and the refinement and exploitation of old certainties (i.e. exploitation) (March, 1991). Early approaches have addressed ambidexterity on an organizational level, arguing to structurally separate the competing concerns (e.g. Tushman and O’Reilly, 1996) or conduct them in a sequential manner (Siggelkow and Levinthal, 2003). More recent research now brings attention to the microfoundations of ambidexterity, locating individuals at the core of managing contradictory concerns (Mom et al., 2009; Rosing and Zacher, 2017). Accordingly, individual ambidexterity “captures the extent to which employees pursue both explorative and exploitative activities in their work roles” (Kauppila and Tempelaar, 2016, p. 1022). In line with this perspective, competing concerns arising in the context of digital innovation on the organizational level emerge as tensions on an individual level, i.e. between employees or for managers (Svahn et al., 2017).

Exploration and exploitation have often been described as inherently competing logics, resulting in negative effects when juxtaposed. For instance, it was argued that both forms of organizational learning compete for the same limited resources (e.g. human and financial resources or managerial attention) (March, 1991), that “the myopia of learning” might lead to favouring one mode over the other (especially exploitation over exploration) (Levinthal and March, 1993, p. 95) and that different mindsets were needed for the two incompatible modes. In contrast, scholars also describe positive interaction effects between both logics, based on an orthogonal understanding of their position towards each other (Gupta et al., 2006). For instance, Lavie et al. (2010) refer to spill over effects, according to which “exploration generates opportunities that the organization can later exploit” and “exploitation can produce income that can be then invested in future exploration” (Lavie et al., 2010, p. 116). As scholars argued, it is essential for emerging interaction effects whether exploration and exploitation are located within the same or in complementary domains (Gupta et al., 2006).

However many findings remain on organizational levels, without analysing interaction effects emerging on the level of organizational members, for instance during operative work tasks (e.g. He and Wong, 2004). While it is a popular approach to address competing demands in the context of digital innovation structurally on high organizational levels, i.e. through building up dedicated digital innovation units (DIU) that work alongside core businesses and are integrated on management levels (Simsek, 2009; Svahn et al., 2017), the effects on the microfoundations of ambidexterity, i. e. for organizational members remain largely unexplored. Especially when it comes to DIU members, insights that present interaction effects from their perspective and how they deal with them are missing. This is surprising, as a large body of knowledge deals with ambidexterity on the individual level (Rosing and Zacher, 2017) and

scholars show increasing interest in understanding on how individuals can deal with conflicting demands, such as paradox management (Miron-Spektor et al., 2018; Smith and Lewis, 2011). Thus, the goal of our research is to identify which interaction effects emerge for organizational members within a digital innovation unit and how they address them:

RQ: Which interaction effects emerge for organizational members in digital innovation units during digital innovation activities.

We are using ambidexterity as theoretical lense. This perspective fits with the research goal, as it allows to see dualities of exploration and exploitation within the particular setting and thus derive interaction effects between them. So far, individual ambidexterity research has regarded tradeoffs between exploration and exploitation (e.g. Laureiro-Martínez et al., 2015; Rosing and Zacher, 2017) as well as between other conflicting demands, such as creativity versus attention to detail (Sok and O'Cass, 2015) or sales productivity versus service quality (Agnihotri et al., 2017). In contrast, we find only initial insights about changes becoming necessary to pursue digital innovation versus existing routines, in particular on the level of individual actors (Brunswick and Schecter, 2019; Hund et al., 2021; Svahn et al., 2017). Thus, this research is interested in the individual level perspective. Further, while most studies are focusing negative interaction effects, i.e. tensions or trade offs, positive interaction effects, i.e. synergies remain mainly unexplored. Overall, still a small part of ambidexterity literature deals specifically with interaction effects between competing demands, in particular on the individual level (e.g. Cao et al., 2009; Gupta et al., 2006). Thus, we are approaching this gap, i.e. interaction effects on the individual level and in the particular context of digital innovation.

In order to build an initial model of interaction effects on a microfoundation level in the context of digital innovation, previous insights from ambidexterity literature are combined with insights, generated through a single-case study in a digital innovation unit of an incumbent firm in the paper processing industry. Resulting from that, the study can present dimensions, through which exploration and exploitation emerge on individual levels. Further it contributes to enrich knowledge on interaction effects on the individual level, by showing that next to combining exploration and exploitation within a single dimension, the conduction of only exploration across multiple dimensions is harmful for individuals and thus the success of organizations. Instead, both modes are suggested to be conducted across different dimensions (Gupta et al., 2006).

With this study, we first contribute to digital innovation literature as it is argued how thereof emerging interaction effects, i.e. tensions and synergies emerge and can be managed within a digital innovation unit from a microfoundation perspective (Hund et al., 2021). Second, we address how digital innovation activities should be operationalized in an exploration-oriented innovation unit in order to manage tensions and enhance synergies. With conceptualizing exploration and exploitation as multi-dimensional constructs, the research extends existing research according to which ambidexterity can be conceptualized as multi-level construct (Krause-Söhner et al., 2022). Third, we contribute to ambidexterity literature in two ways: we support existing findings, according to which separate units need to hold both, exploration and exploitation, for sustainable success (Hill and Birkinshaw, 2014; Weiss and Kanbach, 2022) and show how both modes can be executed on an individual level (Rosing and Zacher, 2017). Finally, we advance current knowledge about balancing exploration and exploitation by showing how both modes exist and are actively addressed on a micro-level across different dimensions (Birkinshaw and Gupta, 2013; Pertusa-Ortega et al., 2021).

2 Theoretical foundations

When studying organizations, there are various “ways to talk about organizations” (Weick, 1979, p. 26) and any approach to do so “is built on specific assumptions about the nature of

organizations and how they are designed and function” (Daft and Weick, 1984, p. 285). Thus, this chapter is meant to inform about the underlying assumptions and theoretical background of this study.

2.1 Digital innovation

Digital innovation (DI) is gaining importance, as a large number of products and services in our daily life are infused by digital technologies (Lyytinen et al., 2020). In contrast, knowledge about the phenomenon itself, its nature, processes and consequences did not develop that fast and is spread across multiple disciplines, resulting in a huge amount of different definitions (Hund et al., 2021; Lyytinen et al., 2020). For instance, marketing research is interested in implications of DI on individuals, such as the trust perceptions of customers in digital innovation (Konya-Baumbach et al., 2019), while research in economics elaborates how DI can be created through collaboration across domains (Pershina et al., 2019). Next to that, more holistic questions emerge, such as the impact of DI on our societies or its consequences for (de)globalization (Lyytinen et al., 2020). In this regard, scholars have recently reviewed existing definitions and thereon conceptualized DI comprehensively as “*the creation or adoption, and exploitation of an inherently unbounded, value-adding novelty (e.g., product, service, process, or business model) through the incorporation of digital technology*” (Hund et al., 2021, p. 6).

Accordingly, DI is made out of digital technology which again encompasses digital objects (Hund et al., 2021). Digital objects can be nonmaterial objects (i.e. without having a physical mode, such as news articles, procedures or application software), or a combination of nonmaterial and material (i.e. objects that have spatial attributes and are manifested physically) parts (Faulkner and Runde, 2019). No matter of their physicality, digital objects are used, enacted and interpreted by individuals or social groups in different ways, so that they acquire numerous identities and meanings in different contexts from different actors (Faulkner and Runde, 2019). Thus, researchers have recently stressed the social component next to the technical side and argued that digital objects turn out to digital technology, once social actors attribute a meaning or purpose to them (Hund et al., 2021).

Thus, in line with acknowledging “the socio-technical nature of digital innovation” (Hund et al., 2021, p. 12), it becomes crucial to understand “how digital enters into, mediates, infests, and expands the repertoires of behaviors across individuals, teams, organizations, communities, industries, and societies” (Lyytinen et al., 2020, p. 281). For instance, managers responsible for digital transformation need to inspire and convince organizational members on multiple levels about the benefits resulting from digitalization, to be able to recognizing the needs of employees and to help them in overcoming potential barriers (Singh and Hess, 2017). Further, scholars showed that competing concerns can emerge for incumbent firms when embracing digital innovation (Svahn et al., 2017) and that DI can lead to emerging tensions (Hund et al., 2021). For instance, Ciriello et al. (2019) showed in the context of PowerPoint, a digital artifact, that employees experienced three types of paradoxical, i.e. interrelated but conflicting, tensions.

2.2 Ambidexterity on the organizational and individual level

We adopt an ambidexterity perspective to study the interaction effects emerging in the context of digital innovation, in particular for organizational members of a digital innovation unit. These lenses allow us to see competing logics that we refer to as exploration and exploitation (March, 1991) and interaction effects between them (Gupta et al., 2006).

Ambidexterity, “the ability of humans to use both hands with equal skill” (Simsek, 2009, p. 597), has been used metaphorically for organizations’ ability to execute two different modes of organizational learning equally well, that is the innovation and discovery of new possibilities (i.e. exploration) and the refinement and exploitation of old certainties (i.e. exploitation)

(March, 1991). As both activities “address two organizationally incompatible objectives” (Birkinshaw and Gupta, 2013, p. 291) and result “from hosting multiple contradictory structures, processes, and cultures” (Tushman and O’Reilly, 1996, p. 24), some scholars have followed the idea that the activities need to be separated and that organizations can either be explorative or exploitative (Gupta et al., 2006; Tushman and O’Reilly, 1996). According to these assumptions, OA can only be reached at high organizational levels, for instance through bringing together separated organizational units, which have an exclusively exploration or exploitation orientation (Simsek, 2009).

In contrast, others follow an orthogonal view on OA, understanding both activities as being a duality and “simultaneously achievable” (Birkinshaw and Gupta, 2013; Farjoun, 2010; Gibson and Birkinshaw, 2004; Gupta et al., 2006, p. 696). Consequently, exploration and exploitation can be combined within multiple organizational levels, rather than on high levels only (Simsek, 2009). How both activities are combined, i.e. how the OA-configurations look like on the different levels, is context specific (O’Reilly and Tushman, 2013). Accordingly we understand that within OA-configurations, exploration and exploitation must not be pronounced at equally high levels, but can be coupled on higher and lower levels depending on the contextual organizational needs (Atuahene-Gima, 2005; Krause-Söhner et al., 2022; Nerkar, 2003).

While a large number of research on ambidexterity is limited on the organizational perspective, individual ambidexterity has been recognized as important microfoundation of organizational ambidexterity during last years (Kauppila and Tempelaar, 2016; Pertusa-Ortega et al., 2021). Acknowledging that the ambidexterity dilemma is faced by any job role across multiple levels and that organizational members can contribute to balancing competing demands in organizations (Pertusa-Ortega et al., 2021), it becomes crucial to understand “how an organization’s members can deal with contradictory demands and integrate exploration and exploitation” (Kauppila and Tempelaar, 2016, p. 1020; Schnellbacher et al., 2019). Individual ambidexterity can be defined as „as a multidimensional construct that captures the extent to which employees pursue both explorative and exploitative activities in their work roles“ (Kauppila and Tempelaar, 2016, p. 1022). Investigating individual ambidexterity among managers, Mom et al. (2007) explained exploration activities with „searching for, discovering, creating, and experimenting with new opportunities“ and exploitation activities with „selecting, implementing, improving and refining existing certainties“ (Mom et al., 2007, p. 910). In this vein, scholars have more recently conceptualized non-managerial exploration as „behaviours related to experimentation, searching for alternative ways to accomplish a task, and learning from errors. When exploring, individuals deviate from routines, try out something new, and do not rely on established knowledge“ (Rosing and Zacher, 2017, pp. 695–696). And exploitation as „relying on previous experience, putting things into action, and incrementally improving well-learned actions. Exploitation involves doing things as they have always been done and relying on existing rules and routines.“ (Rosing and Zacher, 2017, p. 696). Through these actions, individuals can either increase (exploration) or decrease (exploitation) the variability in their action repertoire (Rosing and Zacher, 2017).

Within ambidexterity research on the individual level, a large number of scholars have addressed not only that organizational members need „to perform contradictory activities and switch between different mindsets and action sets” (Bledow et al., 2009, p. 322) and „to pursue both exploitation and exploration activities and find synergies between them“ (Pertusa-Ortega et al., 2021, p. 356), but deal with the question how they can do this. In this vein, Papachroni et al. (2016) argued, that the way how organizational actors manage arising tensions depends on how they interpret them. They showed that the interrelation between competing demands is interpreted differently among hierarchical levels. For instance, innovation was interpreted on operational levels „as a means to higher efficiency, with the two poles seen as complementary“, while senior managers saw „the two poles were conflicting or interrelated rather than complementary” (Papachroni et al., 2016, p. 11). More recently, Miron-Spektor et al. (2018)

addressed the question how individual actors manage tensions through paradox lenses. They argued that with a paradoxical mindset, individuals can reveal the potentials and energizing effects of emerging tensions. Thus, competing logics emerging on organizational level can emerge for organizational members in different ways, depending for instance on how they interpret them and with which mindset they approach them.

2.3 Positive and negative interaction effects

The emergence of negative interaction effects, trade-offs and tensions has been at the core of initial ambidexterity research (e.g. Levinthal and March, 1993; March, 1991). It was argued that both modes compete for the same limited resources (e.g. human and financial resources or managerial attention) (March, 1991), that “the myopia of learning” might lead to favouring one mode over the other (especially exploitation over exploration) (Levinthal and March, 1993, p. 95) and that different mindsets were needed for the two incompatible modes. However, in order to reach the potential of ambidexterity, exploration and exploitation need to be balanced (March, 1991; Tushman and O’Reilly, 1996). How this balance should be designed differs among scholars’ perceptions and is context specific (O’Reilly and Tushman, 2013). Accordingly, exploration and exploitation must not be pronounced at equally high levels and with equal proportions, but can be coupled on higher and lower levels or that one mode might be executed in a minimized but still sufficient amount while the organization invests more in the other mode (Atuahene-Gima, 2005; He and Wong, 2004; Levinthal and March, 1993; Nerkar, 2003). We are following this assumption, acknowledging that exploration and exploitation need to be combined in order to find out “what the relative balance should be between exploration and exploitation” (Birkinshaw and Gupta, 2013, p. 294). Accordingly, not a middle point needs to be maintained on the continuum between exploration and exploitation, but both modes can be combined across levels to specific degrees, that we call ambidexterity configurations. In addition to that, recent studies have addressed the dynamic nature of ambidexterity, including the possibility to dynamically adjust and thus balance exploration and exploitation over time (Luger et al., 2018).

Due to the paradoxical nature of exploration and exploitation, the link between them is not only resulting in tensions, but can be referred to as a “double-edged sword” (Lewis, 2000, p. 763), allowing potential positive interaction effects, i.e. synergies to emerge between them (Gupta et al., 2006; March, 1991). This assumption is based on viewing exploration and exploitation as orthogonal towards each other (Gupta et al., 2006) and as interrelated processes (Lubatkin et al., 2006) with potential positive effects between them. For instance, Cao et al. (2009) notice that “exploratory and exploitative processes can in fact be supportive of one another and argue that each may help leverage the effects of the other for several related reasons” (Cao et al., 2009, p. 784). Accordingly, high exploitative effort can enhance an organization’s effectiveness to explore new knowledge and develop resources for supporting new markets and products. Analogously, successful exploration in one domain can improve exploitative efforts in another domain (Cao et al., 2009, p. 784). Katila and Ahuja (2002) describe positive interaction effects between search scope (i.e. exploration) and search depth (i.e. exploitation) in the context of product innovation. And Lavie et al. (2010) refer to spill over effects, according to which “exploration generates opportunities that the organization can later exploit” and “exploitation can produce income that can be then invested in future exploration” (Lavie et al., 2010, p. 116).

In this vein, recent research is less focused on the incommensurability of exploration and exploitation, because “ambidexterity cannot be treated monologically” (Papachroni et al., 2016, p. 25) and “a ‘monodextrous’ approach to ambidexterity” (Papachroni and Heracleous, 2020, p. 10) would be unable to catch the complexity of organizational reality or how organizational members experience and respond to tensions. Rather, a paradoxical perspective is used that

enables to analyse ambidexterity as a multi-domain concept (Gupta et al., 2006; Papachroni et al., 2016). For instance, Gupta et al. (2006) trace synergies between exploration and exploitation back to when they are located in complementary domains, such as different technologies or markets, that are not competing for the same resources. This multi-domain analysis is suggested not only on the organizational level or between different and loosely coupled subsystems or individuals (Gupta et al., 2006), but increasingly on the individual level (Papachroni et al., 2016; Papachroni and Heracleous, 2020). Accordingly, individuals are not necessarily tied in the assumed contradiction of exploration and exploitation but can accomplish “hybrid tasks” (Papachroni and Heracleous, 2020, p. 11) that have dual types of outcomes. For instance, when scholars review an academic manuscript they rely on existing knowledge (i.e. exploitation), but simultaneously might reflect on how the research paper could inform their own research (i.e. exploration). Or when musicians are improvising, they rely on rehearsed techniques (i.e. exploitation), while composing a new melody (i.e. exploration).

3 Research approach

3.1 Underlying theoretical paradigm of this study

This chapter should serve for clarifying the theoretical paradigm of this study, underlying and informing the methodology and methods used for approaching our research question (Crotty, 1998). In line with the overall goal to understand emerging interaction effects from the viewpoint of organizational members, i.e. “the day-to-day world of lived experience from the perspective of those who live it – people’s subjective reality” (Locke and Golden-Biddle, 2004, p. 105), an interpretative approach is applied. This approach allows the investigation of what different meanings people develop of worklife situations, how these are influencing their behaviour, and how the specific context is shaping these processes (Locke and Golden-Biddle, 2004). In using an interpretative approach, researchers act in an investigating and interpretative way, recognizing that interaction processes in social life can result in shared understandings or meanings and that they can be different among persons and places (Locke and Golden-Biddle, 2004). Studying phenomena through particular theoretical lenses (here: interpretivism) informs the methodology and methods suitable to do this (Crotty, 1998). Based on the paradigm of interpretivism, the current study is thus applying methodologically a more grounded theory building approach for discovering theory based from data (Gioia et al., 2013; Gioia, 2021) and using a case study as qualitative research method (Crotty, 1998).

3.2 Case study as research method

In line with the underlying interpretative paradigm of the current study, that allows “to explore in detail how context shapes meaning, experience, and behavior” (Locke and Golden-Biddle, 2004, p. 105), conducting a case study is assumed as most suitable method for this study. In contrast to other methods, such as experiments or surveys, case studies allow to investigate a phenomenon within its natural setting and “to cover contextual conditions – believing that they might be highly pertinent to [the] phenomenon of study” (Creswell, 2014; Yin, 2009, p. 13). This becomes particularly relevant as through case studies, contemporary phenomena can be investigated, even if their boundaries towards the real-life context are not clearly visible (Yin, 2009). Thus, conducting an empirical inquiry as a case study draws attention to what can be learned from a single case and its uniqueness, but less about “to optimize production of generalizations” (Stake, 1995, p. 8).

The research presented in the current study was approved by both, the group company’s and the digital innovation unit’s management. This enabled the first author of this study to access the DIU under investigation. Her role as researcher, her identity and her interests were fully disclosed from the beginning of the fieldwork. The first author conducted the interviews and

participated in regular meetings of the DIU as silent observer. Together with the second author she adopted an insider perspective. An outsider perspective was employed by the third and fourth author, who were both not working in the unit, nor participated in interviews and observations. This two-perspective approach was employed to reduce the risk of biases and increase the study's rigor and credibility (Evered and Louis, 1981). The particular context of the case under investigation as well as data collection and analysis methods are presented in the following.

3.2.1 Empirical Research Context

We investigated the specific context of a DIU that has been founded by an existing manufacturing group company, facing rising challenges with regard to its existing product portfolio and changes in its core industry and aiming to advance into digital businesses and to enhance (digital) innovation (Yin, 2009). The parent company can look back on almost 150 years of history and grew to one of the European market leading group companies in the manufacturing industry for envelopes, packaging and shipping solutions. During the last few years however, the company and its entire branch were facing major challenges due to rising raw material prices and supply shortages, as well as a competitive market environment (e.g. increasing digital communication) and declining market volumes (Okholm et al., 2018). The company addressed these challenges by launching a comprehensive realignment and complemented its core business by implementing two further strategic fields: the development and manufacturing of lightweight packaging and the creation of digital businesses and services.

The DIU under investigation was implemented for engaging in the field of digital businesses and services and was founded in 2019. Thus, the core company addressed the question, how digital innovation activities can be embedded into the existing organization (Barthel et al., 2020) through using an increasingly popular approach that is to “create a fast lane for digitalization topics alongside the traditional [...] business” (Raabe et al., 2020, p. 845). It is assumed that decoupling them from the core organization, “intruding effects between the core organization and the innovative unit are sought to be minimized” (Barthel et al., 2020, p. 782). The investigated DIU's objectives are twofold: on the one hand, it should realize digitalization through both, exploring and advancing digital business models for the external market and on the other hand it should simultaneously drive digitalization within the core organization. Thus, it is in line with recent research, according to which digital units have dual objectives, i.e. “to explore novel business areas” while also aiming “at building up and transferring digital expertise to the rest of the company” (Fuchs et al., 2019, p. 639) and fits with provided definitions of DIUs (Fuchs et al., 2019; Kohli and Melville, 2019).

3.2.2 Data Collection

For the purpose of data collection three main data sources were used for gaining a comprehensive understanding (Gioia et al., 2013; Yin, 2009): semi-structured interviews, documentary data, and field notes from observations during virtual meetings and on-site. Using multiple techniques helps to take different perspectives and supports the finding grounding within the data (Jick, 1979; Yin, 2009). The triangulation of data allows to crosscheck data and to confirm the findings (Rowley, 2002).

Publicly available documents

An understanding of the organization's branch, history, and challenges was generated through publicly available documents. This included articles, websites, and documents that were published by the company. This data was not used in terms of extensive document analysis, but as important source of background information, that helped to understand the organizational context.

Interviews

Interviews can be seen as “[o]ne of the most important sources of case study information” (Yin, 2009, p. 106). Interviews were conducted with all organizational members from multiple hierarchical levels of the DIU, which enabled a comprehensive understanding of the topic under investigation. The interviews lasted about 60-100 minutes and were conducted in a semi-structured way in German language (interviewees’ language). The interviews were conducted virtually via Zoom, a software tool for video conferencing. This format was chosen due to the restrictions of the COVID-19 pandemic. All interviews were recorded and transcribed. The interview guide, which was used, was structured into three main sections. First, the informants were asked to provide information about their professional career and their current work assignment. This enabled the informants to familiarize with the interview setting, while the interviewer could familiarize with the terminology, that was used by the informants and gain an overview on the interviewees’ previous relationship with the group company (Fontana and Frey, 1994). Second, the informants were asked to explain the role of the DIU within the group company and describe their relationship. The final phase was dedicated to questions on the allocation of tasks and responsibilities within the DIU and on the working life within the unit, i.e. between the different teams and their members. Potential informant bias was addressed in different ways. First, informants from multiple levels and in different functions were interviewed. This helped to address subjective bias and explore a broad range of perspectives. Second, interviews were completed with documentary and observational data.

Participant Observation

The reasons for including observation as a data source were mainly to gain deep insights into the organizational context and the relationships between the particular actors and “to explore the realms of subjective meaning of those interactions” (Morgan and Smircich, 1980, p. 498). Observations were mainly conducted by participating in weekly meetings of the unit, which were all conducted online. The observer did not engage in discussions but made notes during and after the meetings, adding first interpretations. In the case of incomprehensibilities, questions were reviewed with DIU members. When the pandemic restrictions declined, a personal visit on site was conducted for gaining a richer understanding. During this visit, the first author of the current study had the possibility not only to gain more insights into the DIU’s natural worklife but also to visit the core company’s production site and common meeting points of both, DIU and core company members.

An overview of all data is summarized in Table 1.

Data Type [displayed as]	Data Source	Data
Data Collection Phase (February-September 2022; Status: completed)		
Documentary Data [D_1; D_2;...]	Internally and externally published documents	Customer magazine; newsletter articles; internal newsletters; blog articles; web-sites
Interview Data [I_1; I_2;...]	Semi-structured interviews with all DU employees (11) on multiple levels	Complete survey with all DIU members across multiple hierarchical levels: eleven interviews (recorded and transcribed); more than

		800 minutes of interview data (13:29:11 hours)
Observational Data [O_1; O_2;...]	Participatory observation in 20 weekly virtual meetings of all DIU members and one visit on-site.	Written field notes and detailed memos

Table 1: Overview on data

3.2.3 Data Analysis

Following the research goal, data was analysed inductively, iterating between data, literature and emerging concepts, themes and dimensions (Gioia et al., 2013). Through the interaction between empirical data and existing theoretical frameworks, new theoretical ideas could be generated (Alvesson and Kärreman, 2011). The transcription and coding process of data was supported by the software MAXQDA (Rädiker and Kuckartz, 2019). In the first step, the goal was to understand the context-specific OA-configurations and definitions of exploration and exploitation (O'Reilly and Tushman, 2013). In order to do so, conceptualizations and dimensions of exploration and exploitation from existing literature (see Table 2 as an example and Appendices A and B for an overview) were combined with empirical data (see Figure 1 and 2).

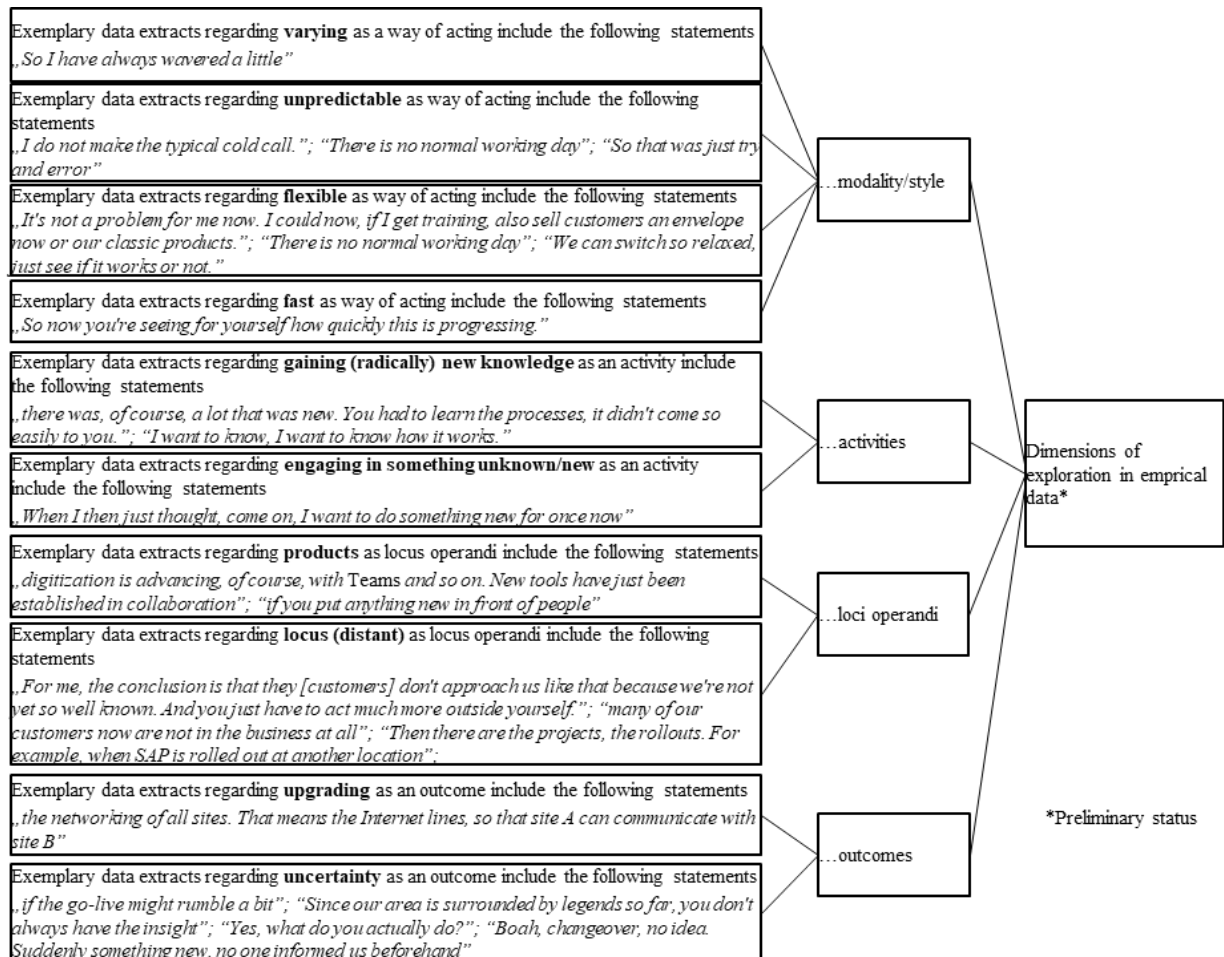


Figure 1: Data structure on derived exploration-exploitation dimensions, preliminary status

In the second step, these context-specific conceptualizations were assigned to specific situations. To observe exploration and exploitation dimensions within specific situations, allowed

us to identify how they dynamically interacted and which effect they had. In the third and final step, we were observing each of these interaction effects and their antecedents in more detail, identifying why they emerged as synergies or tension, and elaborated an initial model of interaction effects from that.

Description: The dimension activities shows that exploration and exploitation can be seen as specific activities conducted by organizational members. Exploitation activities mainly refer to the usage, commercialization or improvement of existing capabilities, knowledge or assets. Further, it refers to executing things, like producing them. It mainly differs from exploration activities as existing things as in the focus of exploitation activities.			
Derived from literature	Derived from empirical data		
Illustrative statements	Data sources:	Illustrative statements	Data sources:
- "refinement, choice, production, selection, implementation, execution." March (1991) - "activities such as standardization, upscaling, and refinement" - "Exploitation refers to incremental learning focused on diffusion, refinement, and reuse of existing knowledge" - "exploitation, or improving the efficiency, delivery, or profitability of the existing business model." - "the use of past knowledge" - "marketing existing or incrementally modified products that capitalize on existing product competencies" - "development of new knowledge about the firm's existing markets, products, and capabilities" - "ability to improve continuously its existing resources and processes" - "exploitation involves information search within a well-defined and limited product/market solution space closely related to the firm's previous experience."	- March (1991) - Belderbos et al. (2011) - Kane & Alavi (2007) - Groysberg & Le (2009) - Gupta et al. (2006) - Voss et al. (2008) - Vorhies et al. (2011) - Yalcinkaya et al. (2007) - Athuahene-Fina & Murray (2007)	- So a little bit of everything that I've already done; I prefer to pick up colleagues or existing customers or even interested parties, if they are already interested; For me, it is important now in our case, to bring this issue forward; It's a lot about thinking about how we can simply make this known? What kind of marketing measures can we do? - I was in charge of that and also implemented it in the end; It's an ongoing process, yes. There is always something to update, optimize, we have only supplied input - But these functionalities are there. And I would see driving them forward as one of the main tasks. - We take over the support task area and support the colleagues. So the processes that are already clear, so to speak, and that are already implemented and live and so on.	[L_5] [L_9] [L_11] [L_8]

Table 2: Exploration-exploitation dimensions derived from literature and empirical data (exemplarily)

4 Findings

4.1 Exploration-exploitation dimensions as microfoundational basis of interaction effects

Preliminary findings indicate that exploration and exploitation manifest in different dimensions during digital innovation activities.

4.1.1 Modality/style

The data revealed several statements that referred to *how* things and activities were. Thus, this dimension was named “modality/style”. Regarding exploration, statements that could be allocated to this category referred to being unpredictable (e.g. through statements like “so that was just try and error”), flexible (e.g. through statements like “we can switch so relaxed, just see if it works or not”) or fast-paced, a modality/style, which a large number of interviewees declared as one of the main differences between how the core company and the DIU worked. In contrast, less statements referred to exploration in the way of varying or being creative, which are both modalities that are presented in existing literature conceptualizations (see Appendices A and B).

4.1.2 Activities

Empirical data (especially interview data) revealed a narrow amount of different exploration activities. Statements could be allocated to “gaining (radically) new knowledge” and “engaging in something new”. This became visible through statements like “there was, of course, a lot that was new. You had to learn the processes, it didn't come so easily to you”, “I want to know, I want to know how it works” or “When I then just thought, come on, I want to do something new for once now”. Other forms of exploration activities, such as “creativity” and “varying” (see Appendix B) did not appear.

In contrast to that, data revealed, that a large amount of exploitation activities were conducted in the empirical setting. Statements were allocated to activities like “using existing knowledge”, “improving existing capabilities”, “commercializing” and “executing”. This became visible through statements like “a little bit of everything that I've done already” or “We take over the support task area and support the colleagues. So, the processes that are already clear, so to speak, and that are already implemented and live and so on”, “I was in charge of that [project] and also implemented it in the end” or “But these functionalities are there. And I would see driving them forward as one of the main tasks.”. While this finding was surprising at first, it became logical in a later stage of analysis– when it came to identifying interaction effects – that exploitation activities were necessary for organizational members to work for instance on explorative products. Exploitative activities regarding “making efficient” or “selecting” that can be seen in literature, were less prominent in the empirical data.

4.1.3 Loci operandi

Loci operandi can be products, markets or locations that either lie within (i.e. exploitation) or outside (i.e. exploration) the company's current boundaries (Kim and Atuahene-Gima, 2010, p. 520). In line with definitions on DIUs and their dual objectives, data revealed that the loci operandi, in which organizational members were involved, included both, exploration and exploitation. For instance, employees worked on products and services that laid out of the existing portfolio or addressed new customers outside the existing customer base (exploration). On the other hand, they worked on existing assets (e.g. websites) for the company, i.e. close customers (exploitation).

4.1.4 Outcomes

Outcomes show that exploration and exploitation can be used also for labelling what they result in. For instance, exploration is used for outcomes like innovation and uncertainty, while exploitation brings up reliability and creates value. The analysis showed that the DIU's employees were aware of that their activities might lead to exploration outcomes (e.g. uncertainty), especially for colleagues from the core company. For instance, a DIU member resumed that their business is “fabulous” [I_9] for the core colleagues and others might have rarely insights

into it, even if “that what [they] are doing is not hocus-pocus” [I_9]. Thus, the DIU’s members tried to create exploitative outcomes, especially in the form of reliability, so “that simply a bit of transparency is created. And simply also that the colleagues at the other sites know, what is happening here [in the DIU]” [I_9]. They did so for instance through integrating colleagues from other sites at a very early stage of projects and communicating transparently what digitalization activities were planned within the whole organization.

4.2 Interaction effects across exploration-exploitation-dimensions

Through analysing situations within the data on the basis of the previously derived exploration-exploitation dimensions, it became apparent that some combinations lead to synergies, while others lead to tensions. We could derive three cases that show how exploration-exploitation dimensions are combined and which interaction effects emerge from these combinations. Each case is shown graphically in Figure 2 and described in the following paragraphs.

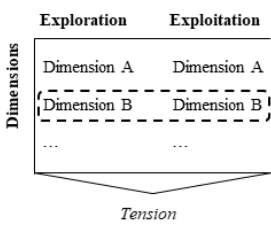
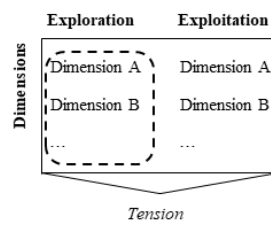
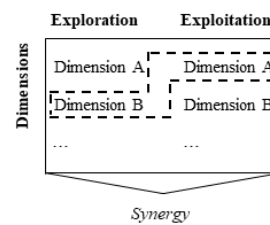
Case 1: Exploration and exploitation within the same dimension	Case 2: Only exploration across multiple dimensions	Case 3: Exploration and exploitation across multiple dimensions
 Tensions emerge when exploration and exploitation are combined within the same dimension	 Tensions emerge when only exploration exists on multiple dimensions	 Synergies emerge when exploration and exploitation are combined on complementary dimensions

Figure 2: Initial model of interaction effects

(1) Case 1 – Tension of differing expectations

Case 1 describes that tensions emerge for organizational members, when both, exploration and exploitation need to be conducted simultaneously in the same dimension. For instance this means that an actor is expected to do both, gaining radically new knowledge about a method or product while simultaneously using this knowledge for executing the method or producing the product. Within the data, this case appeared only limitedly and if, it became apparent in a transitional mode, in which the current state differed from expectations or requirements. For instance, it became visible in the dimension “activities”. In this case an actor expected his new job in the unit to be the sum of his previous experiences and mainly defined by using or improving existing capabilities (exploitation). But unless his expectations, the activities were mainly explorative (e.g. engaging in something unknown/new), which made tensions emerge for him. Another example emerged, when the unit members’ expectations differed from reality when they worked together with colleagues from the core company. In such cases, they expected them to work faster (modality/style dimension) or contribute more to the explorative products of the unit (locus operandi). When they did not feel their colleagues to contribute to the good of the whole company, they became disillusioned or showed a lack of understanding. This became visible through statements like “that could be a big mainstay at some point and would also secure the job of one or the other here for the next few years. But many people are perhaps not aware of it”, “Then I don't care either. But it's not really in the company's interest” And “Hey, that's us. We, that's all us. Not just us here and we're the *digitalies* and you're the *paper people*. We are us”.

(2) Case 2 – Tension of being overchallenged

Case 2 describes that tensions emerged when only exploration was conducted across different dimensions. For instance this means that a radically new product is to be developed through gaining radically new knowledge and conducting unknown activities with uncertain outcome. Within the data, this case appeared especially for those members that worked on new business models that should be commercialized outside the company. This was – as described above – one of the main objectives of the unit, i.e. to develop, implement and commercialize new businesses. For one employee, the described tension emerged, when exploration emerged across multiple dimensions: the explorative product had to be commercialized in ways that were not common for him (exploration) and the outcomes of his efforts were uncertain, too (exploration). As this tension was overchallenging for him, he tried to change the activity-dimension's characteristics from explorative to exploitative. To do so, he approached his colleagues from the core company and asked for support. This should change the activity-dimension from exploration toward exploitation, so that he could conduct his tasks as he was used to. In one case, he was supported, in the other case not. When he was supported, the product was related relatively strong to the company's existing core products, i.e. envelopes and shipping bags, combined with the possibility to add virtual messages. In the other case, the product was not related to the core company's existing products. Thus, in one case the surplus of exploration remained as tensions and in the other case it was loosened up through an exploitation-dimension, leading to a positive interaction effect.

(3) Case 3 – Synergy of being energized

Case 3 describes that synergies emerged when exploration and exploitation were not combined within a single dimension but intertwined across dimensions. For instance this means that a radically new product was developed by using existing knowledge or relying on existing partners, e.g. suppliers. Within the data, this case became visible in many settings, as the unit was designed in a way that exploration and exploitation were combined in many different ways and thus, actors were stimulated and energized, reaching their goals. As described in the previous example, actors also actively approached and tried to reach this combination of exploration and exploitation across dimensions.

5 Conclusion

This chapter summarizes the preliminary findings and puts them into relation to existing research. Further, managerial implications and an outlook on future research avenues, partly resulting from the limitations of this study, are provided.

5.1 Discussion

First, the findings show that exploration and exploitation should be combined within a digital innovation unit. While earlier studies have suggested to separate both modes structurally (e.g. Tushman and O'Reilly, 1996) or temporally (e.g. Siggelkow and Levinthal, 2003), the presented results show how they should be combined across dimensions in order to allow organizational members to experience synergies between them. Thus, the findings go in line with more recent studies, according to which both modes should simultaneously exist in a separate unit for enhanced organizational success (Callegari and Rai, 2021; Hill and Birkinshaw, 2014; Weiss and Kanbach, 2022). Therefore, initial insights are provided into how actors can influence the combinations of exploration and exploitation across levels. In contrast, previous work has declared only vaguely that ambidexterity can be achieved “by building a set of processes

or systems that enable and encourage individuals to make their own judgments about how to divide their time between conflicting demands for alignment and adaptability” (Gibson and Birkinshaw, 2004, p. 210). Regarding individual ambidexterity, existing neuroscience research indicates that neural activities related to exploration (i.e. attentional and cognitive control) can be exhausted after repetitive use, leading to short-sighted, i.e. exploitative decisions (Laureiro-Martínez et al., 2015). Further, even if cognitive processes related to exploration can be learned, they can be compromised by stress (Laureiro-Martínez et al., 2015). Lastly, it has been shown that exploitative choices activate those brain regions that are relevant for safe and predictable reward anticipation (Laureiro-Martínez et al., 2015). Thus, it is suggested that only in combining exploration and exploitation (through different dimensions), organizational members can experience synergies and thus contribute positively to the success of digital innovation efforts.

Second, the presented findings show, under which conditions conflicting logics, i.e. exploration and exploitation can lead to positive (or negative) interaction effects. While previous research has investigated this question mainly on the organizational level or across subsystems and individuals (e.g. Cao et al., 2009; Gupta et al., 2006), this study presents insights on a micro-level, i.e. for organizational members in a DIU. It is presented, that tensions emerge when both modes, i.e. exploration and exploitation are combined within the same dimension. This finding is in line with neuroscience research, according to which an exploitation activity that is currently conducted needs to be disengaged in order to enable engaging in an exploration activity. For instance, Laureiro-Martínez et al. (2015) argue that “Exploration entails disengaging from the current task to enable experimentation, flexibility, discovery, and innovation” (Laureiro-Martínez et al., 2015, p. 320). Further, it goes in line with previous ideas, e.g. dysfunctional dynamics according to which, “trying to handle both types of work [well-defined and ambiguous work] in the same process often leads to trouble” (Repenning et al., 2018, p. 34).

Third, the findings indicate that exploration and exploitation have an interwoven nature that – conducted on different dimensions – can lead to positive interaction effects. Thus, the presented research goes in line with previous literature according to which both modes are to be seen from a paradoxical perspective as duality (Andriopoulos and Lewis, 2009; Farjoun, 2010). While we called them synergies, also previous literature has declared – by referring to them as *tensions* – that they can be regarded by individuals “as opening up opportunities and [they] thus become inspired by tensions” (Liu et al., 2023, p. 179). Thus, competing logics must not necessarily be related with negative effects but can energize employees, enabling them to improve their job performance (Miron-Spektor et al., 2018). The presented findings therefore support the recent understanding of tensions as “double-edged sword” (Lewis, 2000, p. 763). However, while previous scholars have related the positive effects to a paradox mindset (Miron-Spektor et al., 2018), or regulatory foci (Liu et al., 2023), we argue that the combination of dimensions according to exploration and/or exploitation are a crucial factor of whether the interaction effect between them is positive (i.e. synergy) or negative (i.e. tension). Accordingly, it is assumed that incompatible combinations can be approached by organizations, their management and employees.

5.2 Managerial implications

The findings of this study support existing assumptions according to which both, exploration and exploitation need to be conducted in innovation units for sustainable success (Hill and Birkinshaw, 2014). However, the presented insights reach beyond existing knowledge as they provide insights about how combinations of both modes can have positive or negative impacts for organizational members. Three main practical implications can be derived from our results,

that might help managers to improve the ambidexterity of DIUs and enable their organizational members to experience less tensions and more synergies between exploration and exploitation.

First, we could show that exploration and exploitation lead to tensions for individuals, when they need to be combined within the same dimension. While exploration and exploitation might be combined simultaneously within one dimension on other organisational levels (such as the team or unit level, where both modes can be distributed among employees or roles), individuals are not capable to simultaneously conduct exploration and exploitation within the same dimension (Laureiro-Martínez et al., 2015). Thus, we argue that managers should not only expect their employees to develop specific mindsets to enhance ambidexterity. Rather, they should analyse tasks, processes and role descriptions in respect to how exploration and exploitation are combined within them. If both modes are existent within the same dimension and therefore cannot be fulfilled by their employees, they should adjust the combinations of exploration and exploitation. In contrast, if they are combined in a suitable way, i.e. across multiple dimensions, and therefore employees can achieve them, managers should encourage employees to further develop their mindsets (Miron-Spektor et al., 2018). Overall, managers should bear in mind that ambidexterity can be trained on the individual level, but that some combinations might still not be feasible for individuals.

Second, we could see that individuals can become overchallenged if they are experiencing solely a need for exploration. By analysing a DIU that stands for exploration in an otherwise exploitative-oriented incumbent firm, it became visible that exploitation should be included in exploration-oriented environments. Thus, managers should not assume that DIUs are and should be solely exploration-oriented entities. In contrast, individuals in explorative-oriented environments need exploitation for reducing uncertainty or ambiguity and managers need to encourage initiatives, that include exploitation in their worklife. Otherwise employees might become overchallenged and cannot perform according to expectations.

Third, as environmental conditions, in particular in the context of DI can rapidly change, managers need to bear in mind that combinations of exploration-exploitation dimensions, that once have been installed, might need to be adjusted over time.

5.3 Limitations and avenues for future research

Despite the above presented contributions and implications, the study has the following limitations. First, the allocation of empirical data towards exploration-exploitation dimensions is prone to subjective evaluations. Even if they have been constantly reconciled with literature, other authors might come to different results than we did. Second, the presented findings are limited to data, collected in a single DIU and not compared to other cases. Thus, further research should investigate whether the findings can be validated in similar or contrary cases. Third, while we regard digital innovation as a process, including activities of initiating, developing, implementing and exploiting, the model presented here is still static. It would be interesting to see, whether and how interaction effects develop in respect to the phases of digital innovation. Fourth, our data did not reveal, which particular dimensions might fit together in a better or worse way. Thus, future research should identify, which specific combinations are beneficial and which not.

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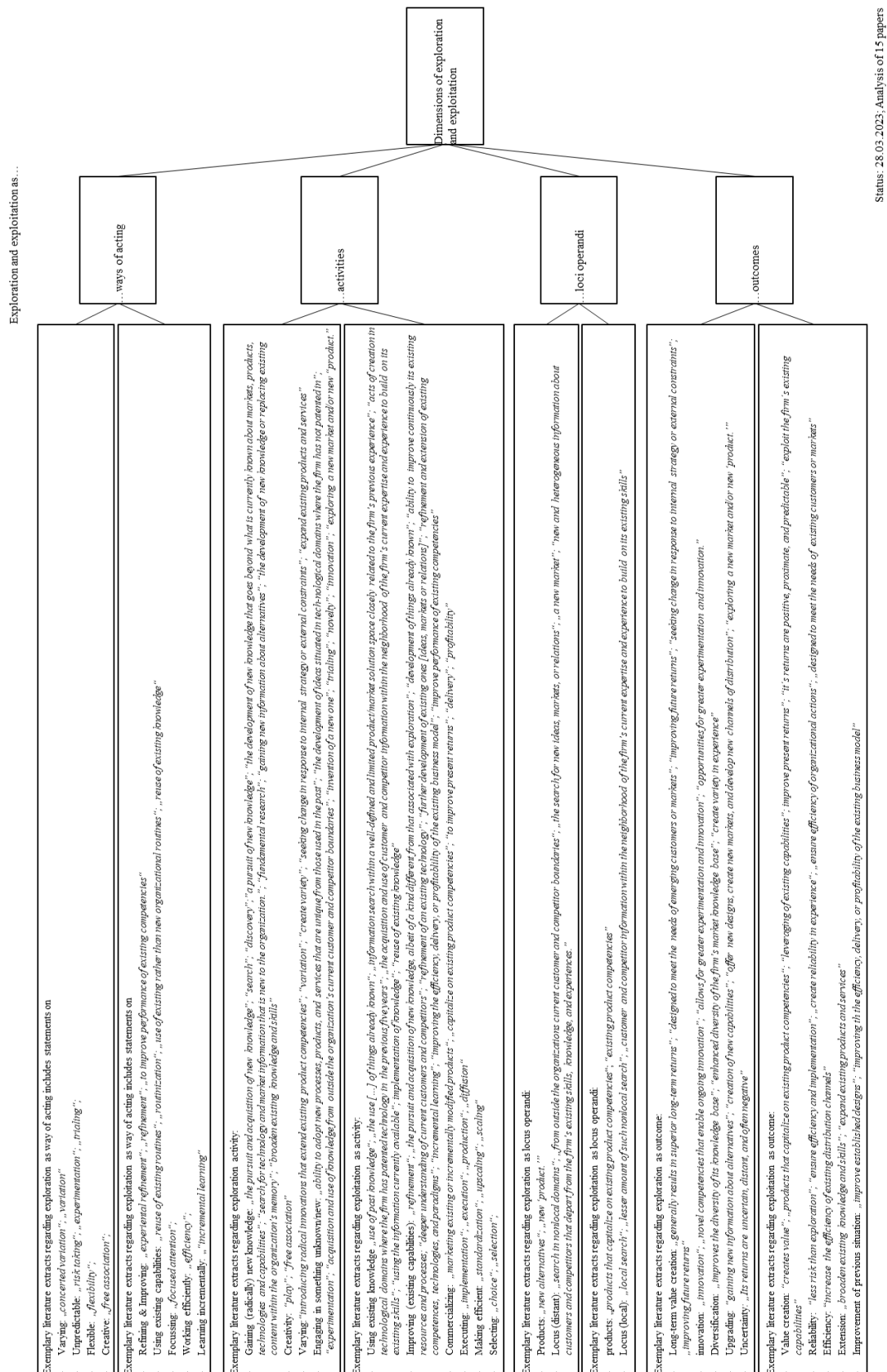
7 Appendix A – Overview on analysed literature for conceptualizing exploration and exploitation (Status: 19.04.2023)

No.	Article	Status of Analysis	
1	Andriopoulos, C. and Lewis, M. W. (2009) ‘Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation’, <i>Organization Science</i> , vol. 20, no. 4, pp. 696–717.		Not analyzed
2	Atuahene-Gima, K. and Murray, J. Y. (2007) ‘Exploratory and Exploitative Learning in New Product Development: A Social Capital Perspective on New Technology Ventures in China’, <i>Journal of International Marketing</i> , vol. 15, no. 2, pp. 1–29.	Analyzed	
3	Baum, J. A. C., Li, S. X. and Usher, J. M. (2000) ‘Making the Next Move: How Experiential and Vicarious Learning Shape the Locations of Chains’ Acquisitions’, <i>Administrative Science Quarterly</i> , vol. 45, no. 4, pp. 766–801.		Not analyzed
4	Belderbos, R., Faems, D., Leten, B. and van Looy, B. (2010) ‘Technological Activities and Their Impact on the Financial Performance of the Firm: Exploitation and Exploration within and between Firms*’, <i>Journal of Product Innovation Management</i> , vol. 27, no. 6, pp. 869–882.	Analyzed	
5	Benner, M. J. and Tushman, M. (2002) ‘Process Management and Technological Innovation: A Longitudinal Study of the Photography and Paint Industries’, <i>Administrative Science Quarterly</i> , vol. 47, no. 4, pp. 676–707.		Not analyzed
6	Fang, C., Lee, J. and Schilling, M. A. (2010) ‘Balancing Exploration and Exploitation Through Structural Design: The Isolation of Subgroups and Organizational Learning’, <i>Organization Science</i> , vol. 21, no. 3, pp. 625–642.		Not analyzed
7	Groysberg, B. and Lee, L.-E. (2009) ‘Hiring Stars and Their Colleagues: Exploration and Exploitation in Professional Service Firms’, <i>Organization Science</i> , vol. 20, no. 4, pp. 740–758.	Analyzed	
8	Gupta, A. K., Smith, K. G. and Shalley, C. E. (2006) ‘The Interplay Between Exploration and Exploitation’, <i>Academy of Management Journal</i> , vol. 49, no. 4, pp. 693–706.	Analyzed	

9	He, Z.-L. and Wong, P.-K. (2004) 'Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis', <i>Organization Science</i> , vol. 15, no. 4, pp. 481–494.		Not analyzed
10	Holmqvist, M. (2004) 'Experiential Learning Processes of Exploitation and Exploration Within and Between Organizations: An Empirical Study of Product Development', <i>Organization Science</i> , vol. 15, no. 1, pp. 70–81.	Analyzed	
11	Jansen, J. J. P., van den Bosch, F. A. J. and Volberda, H. W. (2006) 'Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators', <i>Management Science</i> , vol. 52, no. 11, pp. 1661–1674.	Analyzed	
12	Kane, G. C. and Alavi, M. (2007) 'Information Technology and Organizational Learning: An Investigation of Exploration and Exploitation Processes', <i>Organization Science</i> , vol. 18, no. 5, pp. 796–812.	Analyzed	
13	Kim, N. and Atuahene-Gima, K. (2010) 'Using Exploratory and Exploitative Market Learning for New Product Development *', <i>Journal of Product Innovation Management</i> , vol. 27, no. 4, pp. 519–536.	Analyzed	
14	Lavie, D., Kang, J. and Rosenkopf, L. (2011) 'Balance Within and Across Do-mains: The Performance Implications of Exploration and Exploitation in Alliances', <i>Organization Science</i> , vol. 22, no. 6, pp. 1517–1538.		Not analyzed
15	Lavie, D. and Rosenkopf, L. (2006) 'Balancing Exploration and Exploitation in Alliance Formation', <i>Academy of Management Journal</i> , vol. 49, no. 4, pp. 797–818.	Analyzed	
16	Levinthal, D. A. and March, J. G. (1993) 'The myopia of learning', <i>Strategic Management Journal</i> , vol. 14, S2, pp. 95–112.		Not analyzed
17	March, J. G. (1991) 'Exploration and Exploitation in Organizational Learning', <i>Organ Sci</i> , vol. 2, no. 1, pp. 71–87 [Online]. Available at https://doi.org/10.1287/orsc.2.1.71 .	analyzed	
18	Miller, K. D., Zhao, M. and Calantone, R. J. (2006) 'Adding Interpersonal Learning and Tacit	Analyzed	

	Knowledge to March's Exploration-Exploitation Model', Academy of Management Journal, vol. 49, no. 4, pp. 709–722.		
19	Posen, H. E. and Levinthal, D. A. (2012) 'Chasing a Moving Target: Exploitation and Exploration in Dynamic Environments', Management Science, vol. 58, no. 3, pp. 587–601.		Not analyzed
20	Sidhu, J. S., Commandeur, H. R. and Volberda, H. W. (2007) 'The Multifaceted Nature of Exploration and Exploitation: Value of Supply, Demand, and Spatial Search for Innovation', Organization Science, vol. 18, no. 1, pp. 20–38.	Analyzed	
21	Vorhies, D. W., Orr, L. M. and Bush, V. D. (2011) 'Improving customer-focused marketing capabilities and firm financial performance via marketing exploration and exploitation', Journal of the Academy of Marketing Science, vol. 39, no. 5, pp. 736–756.	Analyzed	
22	Voss, G. B., Sirdeshmukh, D. and Voss, Z. G. (2008) 'The Effects of Slack Resources and Environmental threat on Product Exploration and Exploitation', Academy of Management Journal, vol. 51, no. 1, pp. 147–164.	Analyzed	
23	Voss, G. B. and Voss, Z. G. (2013) 'Strategic Ambidexterity in Small and Medium-Sized Enterprises: Implementing Exploration and Exploitation in Product and Market Domains', Organization Science, vol. 24, no. 5, pp. 1459–1477.		Not analyzed
24	Yalcinkaya, G., Calantone, R. J. and Griffith, D. A. (2007) 'An Examination of Exploration and Exploitation Capabilities: Implications for Product Innovation and Market Performance', Journal of International Marketing, vol. 15, no. 4, pp. 63–93.	Analyzed	

8 Appendix B – Conceptualizations of exploration and exploitation in existing literature



Status: 28.03.2023; Analysis of 15 papers

Figure 3: Data Structure on exploration and exploitation conceptualizations, derived from literature