Principles of Operational Agility: A Case Study of a Swiss Telecommunication Company

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Management research has begun to investigate operational agility, the capability of organizations to adapt rapidly and incrementally in response to changing conditions. The purpose of this study is to bridge the discrete research areas of agile development and agile manufacturing, which exist within literature on operational agility, and to derive the principles of operational agility itself. It therefore combines previous research with evidence from an explorative single case study. The study identifies eight principles of operational agility which may guide practitioners to form organizations that can adapt rapidly. By deriving these principles, this case study is one of the first academic contributions to elaborate on an operating model that aims for agility on both an enterprise and business unit level. Overall, our findings enhance the understanding of operational agility, while revealing new insights into the transformation process of a leading agile organization.

Principles, Operational Agility, Agile Development, Agile Manufacturing, Agile Transformation, Case Research

Prinzipien der Operativen Agilität: Eine Fallstudie eines Schweizer Telekommunikationsunternehmens

Die operative Agilität und damit die Fähigkeit von Unternehmen, sich schnell und inkrementell an veränderte Bedingungen anzupassen, wurde zum Forschungsgegenstand moderner Managementforschung. Das Ziel dieser Studie besteht darin, die in der Literatur getrennten Forschungsbereiche der agilen Entwicklung sowie der agilen Produktion zu verbinden um Prinzipien der operativen Agilität abzuleiten. Daher kombiniert die Studie frühere Forschungsarbeiten mit Erkenntnissen aus einer explorativen Fallstudie. Die Studie identifiziert acht Prinzipien der operativen Agilität, die Praktikern bei der Bildung von sich schnell anpassenden Organisationen helfen können. Durch die Ableitung dieser Prinzipien ist die vorliegende Fallstudie einer der ersten akademischen Beiträge zur Ausarbeitung eines Betriebsmodells, das auf Agilität sowohl auf Unternehmens- als auch auf Geschäftsbereichsebene abzielt. Unsere Ergebnisse verbessern das Verständnis der operativen Agilität und eröffnen gleichzeitig neue Einsichten in den Transformationsprozess einer führenden agilen Unternehmung.

Prinzipien, Operative Agilität, Agile Entwicklung, Agile Produktion, Agile Transformation, Fallstudie

1. Introduction

Agility is indispensable to superior enterprise performance (*Berghaus/Back* 2016; *Denning* 2018; *Kotter* 2014) because it enables organizations to cope with continuous change. An annual industry survey revealed that "56% of respondents anticipate an upcoming agile transformation" for their organization (*Scrum Alliance*, 2018). To elevate agility from a team level to an organizational unit level (cf. *Birkinshaw* 2018; *Hobbs/Petit* 2017; *Moreira* 2017; *Rigby et al.* 2018), large companies attempt to scale agile development and its successful team practices (e.g., Scrum). The most widely adopted framework for scaling agile development is the Scaled Agile Framework, or SAFe (*VersionOne* 2018). Despite the substantial increases in the use of agile practices, only a minority of organizations (4%) report greater adaptability to market conditions (*VersionOne* 2018). The difficulty in realizing the expected benefits on an enterprise level corroborates the finding that "firms are still learning how to achieve operational agility" (*Denning* 2018, 136). However, achieving high operational agility is currently one of the most substantial challenges for large and cross-functional companies wishing to remain competitive in their core business markets (*Rigby et al.* 2018).

Management research has investigated the concept of agility from various perspectives. *Teece et al.* (1997) introduced the theory of dynamic capabilities, which can be understood as an overarching concept for agility that clearly differentiates its strategic and operational aspects (*Helfat/Winter* 2011; *Schilke et al.* 2018). Strategic agility relates to radical change, such as market entry, market exit, or business model renewal (*Doz/Kosonen* 2010; *Helfat/Winter* 2011; *Kotter* 2014). Operational agility concerns incremental, continuous change in an enterprise's core and adjacent business (*Denning* 2018). While strategic agility has been studied extensively (e.g., *Di Minin et al.* 2014; *Doz/Kosonen* 2010; *Eisenhardt/Martin* 2000; *Kotter* 2014; *Schilke et al.* 2018; *Weber/Tarba* 2014), operational agility has received little research attention so far (*Appelbaum et al.* 2017; *Felin/Powell* 2016; *Weber/Tarba* 2014). Although operational agility is a desired attribute for many innovative firms, the existing literature does not fully explain its principles.

This study aims at deriving the general principles of operational agility by drawing on agility concepts in the operational areas of development and manufacturing. To further enhance our understanding of how to achieve high operational agility, we focus on: "How can principles of agile development and agile manufacturing describe operational agility in large, cross-functional business units?"

We address this research question first by combining the findings from previous literature with evidence from an explorative single-case study. In a second step, we are comparing the identified principles of operational agility with the principles of agile development and agile manufacturing.

The remainder proceeds as follows: Section two provides an overview of existing theory related to operational agility, in particular from the disciplines of agile development and agile manufacturing. Section three describes the research methods in detail, while section four presents the results in the form of eight principles of operational agility. Section five discusses these findings in relation to existing knowledge about agile development and manufacturing and points out new and surprising insights. Section six concludes the study and mentions its limitations.

2. Theory Related to Operational Agility

Operational agility is about improving customer value in an existing market subject to changing conditions. It requires innovation adjacent to a business's current offering, but it does not include market-creating strategic moves (*Denning* 2018). Literature related to operational agility exists mainly in two domains with little mutual influence: agile development (e.g., *Conforto et al.* 2016; *Dingsøyr et al.* 2012; *Griffiths* 2007; *Hobbs/Petit* 2017; *Rigby et al.* 2017; *Serrador/Pinto* 2015); and agile manufacturing (e.g., *Gunasekaran* 1998; *Hallgren/Olhager* 2009; *Krishnamurthy/Yauch* 2007; *Mason-Jones et al.* 2000; *L. M. Sanchez/Rakesch* 2001; *Yusuf et al.* 1999). Where agile development stems from the field of product development, agile manufacturing has evolved in the field of production. However, neither of these domains provides a comprehensive foundation for operational agility beyond manufacturing and/or software development.

We consider these two research domains as a question of distinguishing between the horizontal (i.e., along the value stream) and vertical dimension (i.e., hierarchical). In a vertical dimension, operational agility requires agility on the level of teams, units, and the whole firm. While the concept of agile development is limited to the team and unit levels, agile manufacturing considers only the unit and firm levels. In a horizontal dimension, operational agility comprises development value streams and operational value streams. However, agile development is limited to development value streams, while agile manufacturing is mainly concerned with operational value streams. For this reason, a combination of these two domains seems to be necessary in order to explain operational agility.

2.1 Agile Development

The formulation of the *Agile Manifesto* (*Beck et al.* 2001) marks the beginning of the widespread adoption of agile as an approach to software development (*Dingsøyr et al.* 2012). The substantial benefits of agile practices have made them state of the art in development teams as well as project work (*Conforto et al. 2016*; *Frishammar et al.* 2018). Agile development differs from more traditional methods, such as Waterfall, in several key ways. For instance, agile development emphasizes continuous customer involvement, is guided by product features, utilizes numerous feedback mechanisms, and tends to require less documentation than traditional methods (cf. *Conboy et al.* 2011). To this day, Scrum is the most widely used agile practice in the area of development (*Rigby et al.* 2017). Agile development practices are centered around self-organizing, cross-functional teams and employ an iterative and incremental approach. Most research in this domain concerns the functioning of teams (*Dingsøyr et al.* 2012) and the effectiveness of associated methods and practices (*Rigby et al. 2017*; *Serrador/Pinto* 2015; *Sutherland* 2015). Studies on agile teams often address interpersonal relationships, learning processes, and physical dispersion (*Dingsøyr et al.* 2012).

Critics have pointed out that there is limited theoretical work focusing on the domain of agile development. One review states that studies "do not seem to be concerned about any theoretical underpinnings for their research exploration" (*Dingsøyr et al.* 2012). Similarly, *Conboy/Fitzgerald* (2004) claim that the widely adopted Agile Manifesto lacks grounding in management theory.

2.2 Agile Manufacturing

Research on agile manufacturing places a strong emphasis on organizational processes and structures, with a focus on manufacturing (*Mason-Jones et al.* 2000; *Kettunen* 2009). Agile manufacturing emerged as an alternative to the use of lean management in manufacturing firms. While lean is well-suited for commodity markets, agility is more applicable for fashion goods, which are characterized by demand uncertainty and short product life cycles (*Mason-Jones et al.* 2000). This indicates that lean and agile can be seen as complementary approaches that are sensitive to the context of an organization (*Cox/Chicksand* 2005). In contrast, *Yusuf/Deleye* (2002) present agile manufacturing as an evolutionary improvement to lean. They state that "agile manufacturing has been articulated as an umbrella system for integrating all preceding technologies and learning incrementally from them" (*Yusuf/Deleye* 2002). In summary, lean is mainly concerned with internal efficiency, whereas agile manufacturing is mainly concerned with responsive adaptation to turbulent markets (*Burgess et al.* 2002; *Yusuf/Deleye* 2002).

Several authors have discussed the drivers, enablers, and concepts for operationalizing agile manufacturing (e.g., *Gunasekaran* 1998; *Yusuf et al.* 1999; *Zhang/Sharifi* 2000). For instance, *Yusuf et al.* (1999) elaborated on a conceptual model comprised of 32 agility attributes drawn from the previous literature. *Zhang/Sharifi* (2000) differentiated agility attributes from the resulting higher order capabilities – responsiveness, competency, flexibility, and speed, for example – and provided empirical evidence for the value of agility attributes to business practices (e.g., customer involvement) and tools (e.g., Kanban). There have been only a few attempts to generalize the findings from the agile manufacturing domain to businesses outside of manufacturing. In one attempt, *Ganguly et al.* (2009) provided a framework for evaluating enterprise agility based on market share evolution, new product development cycle time, and new product development cost.

To conclude, there is little consensus about the nature of agile: whether it is a set of methods and practices, a management approach, or a philosophy based on the 12 principles promoted by the 'Agile Alliance' (*Conforto et al.* 2016; *Dingsøyr et al.* 2012; *Rigby et al.* 2017). At the same time, achieving high operational agility is currently one of the most significant challenges for companies who wish to remain competitive in their core business areas (*Rigby et al.* 2018).

3. Method

This research was conducted as an explorative single case study with two phases of abductive theory elaboration (cf. *Dubois/Gadde* 2002; *Ketokivi/Choi* 2014, *Yin* 2009). This design is particularly applicable to this study as it is: It is appropriate to address a broadly scoped and exploratory research question of qualitative nature. It is well-suited for theory building and elaboration by means of combining several concepts. It takes place in a non-controllable real-world context to study contemporary phenomena, and it can yield in high validity with practitioners and high relevance for the case organization. Finally, it supports an iterative, cyclical process among case data, literature, and emerging theory (*Yin* 2009).

Based on these characteristics, the case study was conducted using a single company renowned for its efforts to become increasingly agile. The company offers B2B and B2C telecommunication services, primarily in the Swiss market. Since its inception, the organi-

zation had grown more static and hierarchical, with purely functional organizational units. In recent years, the industry has experienced high volatility, fierce competition on price, and convergence with other industries, such as media and software. The company's main objectives have become operational excellence and new growth in adjacent, as well as radically new, business areas. This research focuses on the company's interdepartmental segment, Business Products, which comprises several organizational functions, including product development, marketing, and all customer-facing units. It serves B2B clients with customized offerings based on a set of standardized product modules.

As illustrated in *Figure 1*, data were gathered from multiple sources, including semi-structured interviews, a focus group, workshops, documents, and observations. Applying an emergent research design allowed us to achieve a comprehensive and in-depth understanding of the topic (*Yin* 2009). This resulted in an iterative research process with two phases, both comprising qualitative and quantitative data collection and analysis, in turn allowing for a simultaneous empirical and theoretical grounding in accordance with an abductive research approach (*Kovacs/Spens* 2005).

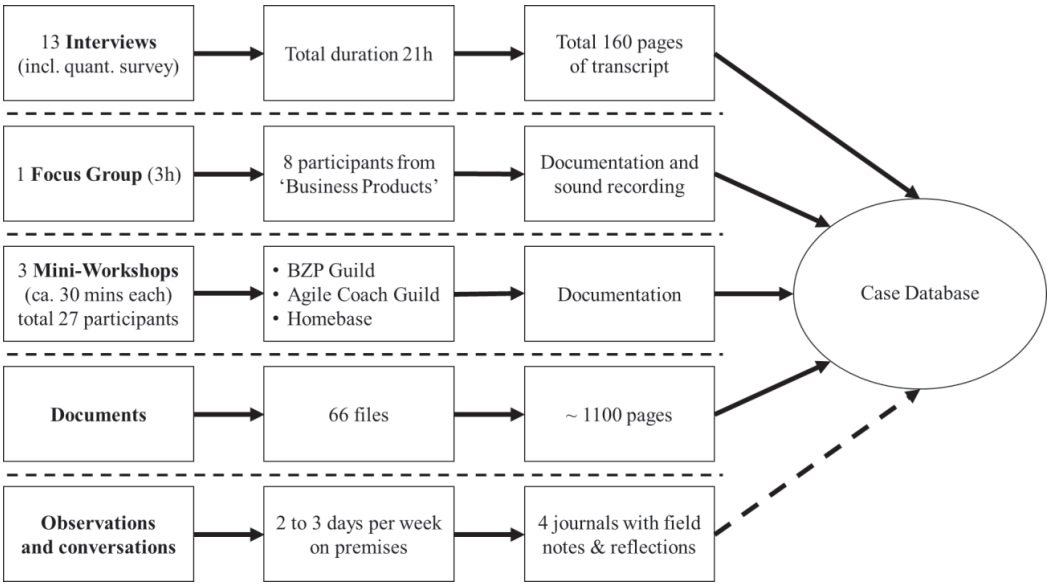

Figure 1: Compilation of the data collected in the case database. The dashed line indicates that data from the research journals were not digitally added to the database.

The purpose of the first phase was to conduct in-depth case exploration by collecting data in interviews and surveys. The first step involved conducting face-to-face interviews, each of which lasted for one-and-a-half to two hours. Sample selection was purposive and adaptive, starting with the company's head of transformation. All further participants were selected by snowball sampling (*Miles et al.* 2014, 48f). The interview guide began with questions concerning the interviewee's background, which were followed by questions on the current condition of the processes and the implementation of agility, and concluded with questions about the target condition, i.e., how processes should ideally run in the future. The interviews were recorded and transcribed verbatim. All data were com-

piled into a digital database using Nvivo to ensure reliability (*Yin 2009*). The coding process was conducted in four steps: (i) the transcripts were fractioned by openly coding individual statements into broad topics such as "end-to-end perspective" or "customer-orientation"; (ii) each topic was reviewed individually to ensure internal consistency; (iii) the broad topics were coded into principles and delineated through axial coding, i.e. by analyzing the relationships between the topics (*Strauss/Corbin* 1990); (iv) the principles were further delineated into sub-principles (e.g., "end-to-end accountability" or "early and quick learning from market feedback") through selective coding and iterative testing against the case context as well as the literature (*Kovacs/Spens* 2005). After the individual interviews, a focus group session was conducted to test the preliminary theoretical concept of operational agility that had been derived from the interview data.

The purpose of the second phase was to elaborate on the theoretical concept by validating it iteratively, evaluating the preliminary findings against the existing literature, the focus group, and the three mini-workshops. The first workshop was conducted with agile coaches, product owners, and scrum masters as a means of testing the preliminarily defined challenges against different contexts. The outcome was an analysis of the challenges in transforming towards operational agility. The second workshop was conducted with ten decision-makers from the product and marketing divisions of Business Products. They provided feedback on how relevant the list of proposed principles was to achieving operational agility. The third workshop was held with eight senior change agents leading the company's agile transformation. They prioritized the list of preliminary principles for operational agility according to importance.

During the first and second phase, the authors also had access to internal documents and recorded their observations in journals. Document analysis was conducted primarily as a means of understanding the case company's internal processes and organizational structure, the context of the agile transformation, their product architecture, and the SAFe framework.

To ensure high case study quality, we applied the measures proposed by *Yin* (2009): construct validity was ensured by using multiple sources of evidence, as well as by circulating a draft review of the case study report to our key contact within the company. Internal validity was achieved using the process of pattern matching described above. The study achieved external validity by using theory in this single case study. Finally, the case study protocol and the case study database increased reliability.

4. Results

Our data reveal eight principles of operational agility. We found high congruence among the principles addressed in the interviews, although the 13 interviewees work in different organizational units. Six of the eight principles were described by eleven or more participants. The following subsections discuss each of the eight principles, and provide corresponding representative quotes from the interviews.

4.1 Product and Process Independency

Establishing product and process independency is a precondition for agility on an enterprise and business unit level. Many of the existing systems had originally been built in an integrated manner. This integration led to a scenario in which customer-oriented systems

were competing for the resources of internal infrastructure suppliers (e.g., the product development function). The consequences were a lack of overall accountability and an excess of time-wasting prioritization discussions. This increase in unfocused efforts led to a subsequent lengthening of time-to-market. According to the interviewees, these kinds of dependencies existed in relation to technical platforms and infrastructures, as well as organizational units and processes. The case company decided to invest substantially in decoupling technical platforms and infrastructures, such as 5G, as well as organizational solutions like SAFe large solutions. Only when sub-units acted independently they were able to achieve gains in terms of flexibility, speed, and effectiveness. One interviewee explains: "All this presupposes that you have a high degree of autonomy, but at the moment we simply don't have it, because of organizational structures and partly because of system structures" (transcript, p. 149).

4.2 End-to-End Flow Optimization

The notion of "end-to-end" refers to a comprehensive understanding of value chains. Flow efficiency is a strong driver for reduced lead times and time-to-market. End-to-end flow optimization requires four drivers: procedural alignment, end-to-end accountability, social proximity, and deep integration of suppliers. In terms of procedural alignment, the case company recognized that implementing product-oriented development value streams using agile practices was not sufficient. Customer service has reorganized its function from a multi-level generalist/specialist structure to a structure of squads that include product-specific specialists. To strengthen end-to-end flow, the case company has planned to establish end-to-end accountability and performance management. A single decision-maker is going to delegate end-to-end accountability to a pair of people: per product module, one for market and one for production. This would mean a formal delegation of decision authority, allowing for the establishment of performance management with an end-to-end perspective. Regarding collaboration along the value chain, both social proximity and supplier integration are important drivers for improving speed and quality across teams and organizational boundaries. Interviewees related the positive effects of cross-functional teams and physical co-location, for both internal teams and for teams with deeply integrated suppliers. Cross-functional development teams eliminated the need to redo work by uncovering discrepancies between the product requirements and features early on in the process. Two interviewees state on the one hand: "I'd really expect us to move more towards flow efficiency instead of resource efficiency" (transcript, p. 72), and on the other hand: "One of the main advantages is that you have much less silos. … You think much less vertically and much more horizontally" (transcript, p. 6).

4.3 Iterative and Incremental Approach

An iterative and incremental approach refers to an approach that utilizes short development cycles and allows a company to serve changing market needs quickly with a minimal viable product (MVP). Business Products has established an agile go-to-market process to commercialize product increments and to ensure operating performance by introducing the minimal marketable product (MMP), with intermediate maturity. The MMP marks the beginning of active communications for a product, which has implications for service and sales processes as well as pricing. Understanding the concrete specifications for the

MVP, MMP, and 'fully viable product' stages proved difficult. Many MVPs turned out not to be market viable. Interviewees complained about a lack of involvement by, or understanding of, the sales and service segments of the organization. Second, an iterative and incremental approach improves market responsiveness through early and quick incorporation of customer feedback. While Business Products has benefited from its ability to prototype and improve on new products in an iterative and incremental approach, it is still difficult to incorporate feedback after the launch of an MVP. An interviewee highlights: "Two benefits that you see are actually early customer feedback… I would actually formulate that as a question now. Are we really doing enough to get good feedback for an MVP? And the second question is whether we really already have an innovative approach that can generate sales at an early stage, e.g., with a discounted version" (transcript, p. 102).

4.4 Market Sensing and Customer Orientation

This principle concerns the organization's ability to sense market opportunities and to maximize customer value in its activities. To enable market sensing, the company founded a competence center for human-centered design (HCD) several years ago. It supports all units with qualitative market research, user testing, prototyping, and methodological training. In terms of day-to-day work, interviewees emphasized that empathy for customer situations must complement hard market data, especially in terms of identifying non-explicit market needs. With regards to customer orientation, interviewees stated that activities should be determined by market demand, which in turn requires decision-making according to optimal customer value. At the time of the study, Business Products was developing a decision framework for the collective evaluation of initiatives based on best available customer insight. Interviewees state: "Customer focus is actually well advanced with our HCD [competence center for human-centered design]" (transcript, p. 129), as well as: "We believe we have a very good connection to the touchpoints, channels … what the market needs, what the needs are. …In the framework of prioritization, in the framework of evaluation of these impulses, we are not customer-oriented. … The one who internally screams the most gets what he wants" (transcript, p. 177).

4.5 Decision Architecture for Quick Response

Interviewees said that most of the benefits they had seen stemmed from a decision architecture that allowed for quick responses. This decision architecture is based on the ability to take investment decisions frequently (i.e., in short intervals) and the ability to take decisions decentrally, preventing long processing times. Business Products has adopted 10-week cycles, or "Product Increments" (PIs), that shorten their investment cycles. The decentralization of decision-making required both the adaptation of formal leaders and the empowerment of individual employees. The co-existence of a virtual process organization and a hierarchical structure turned out to pose significant challenges for decentralized decision-making. Despite the establishment of empowered agile teams, leadership and business steering tended to follow the organization's hierarchical structure. This duality created conflicts in decision competency, responsibility, and accountability. Interviewees explain both: "The speed of action we gain is mainly based on the fact that we can make decisions

in short-cycles" (transcript, p. 76), as well as: "Our management is quite lean, we are five team leaders for 80 people" (transcript, p. 140).

4.6 Small and Self-Organizing Teams

A team of five to nine individuals, called a "squad" (*Sutherland* 2015, 58-61), is the smallest unit of action in SAFe, as it is in most agile development methods. Self-organization has led to increased engagement and improved team performance. However, several interviewees also pointed out that empowerment and self-organization required more than just a formal communication of autonomy; it also necessitates trust, empowering leadership, and the wide adoption of a learning mindset. They said it is important to actively communicate the team's and the organization's vision on a regular basis, since this is the only way for teams and individuals to feel comfortable setting their day-to-day priorities. It gives clear guidance for individual actions and endogenous entrepreneurship. Interviewees point out that: "Every squad works differently. … There are people who work according to Scrum, others according to Kanban" (transcript, p. 145). Moreover, one interviewee highlights: "There are many non-monetary benefits: employee retention, lower absenteeism, etc. … People are more satisfied, with better operating results and improved quality at the same time" (transcript, p. 71).

4.7 Focused Work

Focused work is a driver of speed and efficiency on an organizational, team, and individual level. Focusing on a few initiatives has led to improved alignment toward common goals and to a substantial reduction in the need for coordination. One decision-maker pointed out that the adoption of agile practices on the team level had allowed them to experience the effects of frequent context switching. Business Products had implemented Kanban for portfolio management, which helped them to reduce WIP and improved their ability to implement changes more quickly. However, in the case company it remained difficult to determine priorities and limit WIP, particularly in contexts with many stakeholders or conflicting goals. Interviewees explain: "The challenge is WIP, or work-in-progress. You have to learn that you don't multitask too much. This is the success factor to achieving as much efficiency and value as possible … In the past, you could do that [parallelize] without restrictions. … You can't do that anymore" (transcript, p. 111), as well as: "Context switching – minus 30% efficiency – and you really notice that in the output, when working agile" (transcript, p. 118).

4.8 Continuous Adaptation of Structures and Processes

Interviewees initially emphasized the importance of continuous improvement and process adaptation. It was particularly relevant for implementing SAFe, but also crucial for maintaining high operational agility in the long-term. The notion of process adaptation is based on the idea of heuristics – i.e., learning by discovery. In the case company, heuristics are applied through an iterative PDCA process (Deming, 1986), manifested in retrospectives. However, it can be challenging to realize impact-oriented continuous improvement and adaptation with the goal of operational agility, if performance management does not support this concept directly. In the case of Business Products, leaders remarked insufficient awareness of performance indicators relating to operational agility, such as time-to-

market or operational efficiency. Interviewees also said that it was important to create new organizational setups to structurally account for the development and delivery of new products or services. Business Products created a virtual IT incubator organization comprised of around 150 employees from all functional areas within the existing organization as a means of entering a new adjacent area of business. Our interviewees say: "SAFe is just a bunch of best practices. It's Scrum, lean, and a mix of different frameworks. And it just doesn't fit in every context. You have to change it in every context to make sense. What we're doing now in the TV department doesn't have that much to do with SAFe anymore" (transcript, p. 147), as well as "We all had roles, except operations, under the same organizational umbrella back then, so business operations, INI [developers], design – really all the people you need" (transcript, p. 135).

5. Discussion

This case study identifies eight principles of operational agility using empirical evidence from the transformation process of a leading agile organization. The following discussion section first compares findings of this case study with existing research on both, agile manufacturing and agile development, and then explains their implications.

5.1 Operational Agility vs. Agile Manufacturing

In line with the principle of decision architecture for quick response, *Yusuf et al.* (1999) state that one requirement is that teams are decentralized in order to be able to make decisions. In this realm, they also address the requirement of self-organizing teams. Agile manufacturing considers the "continuous adaptation of structures and processes" as operational value streams are subject to demand uncertainty and short product life cycles (*Mason-Jones et al.* 2000). Finally, the market sensing principle of operational agility is represented in agile manufacturing (cf. *Kidd* 1994; *Zhang/Sharifi* 2000). However, operational agility is differentiated from agile manufacturing by four of our principles: product and process independence, end-to-end flow optimization, iterative and incremental approach, and focused work extend the attributes of agile manufacturing provided in previous research.

5.2 Operational Agility vs. Agile Development

An analysis of operational agility reveals the limitations of the idea of scaling agile development. We would therefore like to emphasize the differences between agile transformations that aim to implement agile development methods (e.g., SAFe) and agile transformations that aim to achieve agility on the enterprise or business unit level (i.e., operational agility). The transformation at the case company shows that scaling or translating agile development into sales and service functions does not suffice to achieve operational agility. Some aspects of agile development may be applied to other functions, as demonstrated by *Repenning et al.* (2018), however, they improve team performance rather than the organization's operational agility. To achieve high operational agility, development and other enterprise functions must transform as well. This requires moving beyond the mere propagation of agile methods across an enterprise. For practitioners, this means that moving toward high operational agility can come at a very high cost, especially in contexts with large and complex operational value streams.

The principles of operational agility go beyond the principles of agile development (*Beck et al.* 2001) by adding product and process independence as well as continuous structural and procedural adaptation. Previously, these principles have been touched upon only sporadically or partially. *Rigby et al.* (2018) briefly addresses product modularity by stating that "agile at scale requires modularizing." Among others, *Rigby et al.* (2017) advocate that teams should be empowered to customize their practices. But because contributions from agile development do not extend beyond the scope of one or several teams, they can disregard the principle of continuous structural adaptation.

5.3 Synthesis of Operational Agility

Firstly, our work suggests that research in agile development and agile manufacturing need to be understood as two complementary perspectives when discussing operational agility. While the case organization uses both development and operational value streams, prior research only demonstrated limited considerations of the interplay between these value streams. This research adds to that understanding by deriving the principles of operational agility. Operational agility depends on the principle of continuous adaptation of structures and processes, which has received limited attention in agile development but has been discussed extensively in agile manufacturing, where operational value streams are subject to demand uncertainty and short product life cycles (*Mason-Jones et al.* 2000).

Secondly, our work suggests practitioners that the mere propagation of agile methods across the enterprise does not suffice to achieve high operational agility. Operational agility is subject to increased complexity, because several value streams – i.e., those that are both developmental and operational – have to be either fully independent or dynamically aligned at a high rate of change. This case indicates that product and process independence is also crucial to high operational agility. Product and process independence has received scattered attention in agile development and agile manufacturing.

6. Conclusion

Interest in agile transformations has grown significantly in recent years. However, existing theories lack an enterprise level perspective. This research is one of the first contributions to address the foundation of agile in operational agility, considering this concept on an enterprise and business unit level, and combines earlier research from the domains of agile development and agile manufacturing. Based on case evidence and the existing literature, the study defines eight principles of operational agility. These principles show partial overlap with both agile development and agile manufacturing, and identify the additional principle of product and process independence.

In terms of the validity and reliability of the research, it is worth considering the following limitations. First, the agile transformation had not been completed during the study period. Second, generalized findings from this single case study may have limited transferability to other businesses or industries, in spite of the abductive research design. Organizational transformations are highly complex and typically exhibit unique dynamics. Thus, findings may differ across organizations, even within the same industry. However, the case company's agile transformation is based on SAFe, the wide adoption of which supports the findings' external validity.

This case study only serves to develop an initial model of operational agility and further theoretical and empirical work will be needed to elaborate on and test this model. Further research could address the critical success factors in transforming businesses toward high operational agility and discuss the differentiation between the strategic and operational aspects of agility. We hope that this case study advances the understanding of operational agility and the associated core transformation.

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