Sustainable Production through Advanced Manufacturing, Intelligent Automation and Work Integrated Learning, J. Andersson et al. (Eds.)

doi:10.3233/ATDE240204

Making the Digital Strategy a Bridge Between Industry 4.0 Initiatives and the Business Plan – Reports from Two Case Studies Towards Manufacturing SMEs

Mattias STRAND[a,1] and Magnus HOLM[a]
[a] *University of Skövde, 541 28 Skövde*

ORCiD ID:
Mattias Strand https://orcid.org/0000-0002-8619-3776
Magnus Holm https://orcid.org/0000-0002-1699-3778

Abstract. In this paper we discuss the results of two extensive case studies targeted towards Swedish SMMEs, partly aimed at investigating the current state of practice regarding the strategic work in the companies and its alignment to digitalization initiatives. The case studies were conducted during 2022 and 2023 and includes a vast empirical material, including several site visits, more than 30 interviews, several meetings with the managerial boards of the two companies and workshops, as well as studies of strategic document, product portfolios and Gemba walks. The paper presents a suggestion for how to formulate a one-page digital strategy, which aligns the digitalization initiative with the overall strategy of the company, as well as a vision for the digital transformation initiative. In addition, the one-pager also includes prioritized stakeholder groups, expected effects and prioritized activities. Moreover, we also motivate the reasons behind a one-pager, as well as the topics included therein. Finally, we give some ideas for future work, including the importance of implementing the one-pager in more companies, as a way to further validate its applicability and long-term influence on and relevance for the strategic work in SMMEs.

Keywords. Digital Strategy, Digital Transformation, Digitalization, Small- and Medium Sized Manufacturing Companies, Digital Maturity Index

1. Introduction

Many manufacturing companies are currently investing a lot of resources in trying to understand and capitalize on the opportunities offered by novel digital solutions. Hence, digital transformation (DT) has become a key process in the era of Industry 4.0. A process that affects the operational value creation process, as well as, catalyzes new ways of doing business and leads to fundamental changes in manufacturing companies [1]. DT is, given its broad scope, a concept that including several action fields for a manufacturing company, e.g. culture, strategy, organization and people, besides the obvious field of technology [2]. Müller and Hopf [3] claim that most large manufacturing organizations are forced to and have embarked on a DT journey, to remain prosperous and competitive, whereas many small- and medium-sized manufacturing (SMME)

[1] Corresponding Author: Mattias Strand, Mattias.strand@his.se

companies still are in their starting blocks often due to a shortage of resources for R&D, as well as limited room for investments, external consulting support and internal competence development. In relation, much research on DT is currently focusing on larger enterprises and thereby the knowledge regarding the unique prerequisites and problems related to the digitalization of SMEs is underdeveloped [4]. At the same time SMEs are crucial for the economy and constitutes a vast majority of all companies. Statistics from the EU shows that the SMEs constitutes more than 99% of all companies. In alignment, they also employ over 50% of the workforce and contributes with more than 50% of the value added [5]. The same importance emerges if delimiting the scope to the manufacturing industry. Several recent studies on DT and Industry 4.0 adoption in SMMEs are partly motivated by the imperative importance of SMMEs [6-8] through the role they play for the economy. In addition, if reviewing existing knowledge regarding DT in SMMEs, there are a lot of studies published, assisting in explaining the reasons for the slower adoption pace. Problems and hinders faced by SMMEs have been covered in several studies. On a more general level, [6] concludes that misunderstandings and underestimations regarding the complexity of embarking on a DT journey seem to contribute to a slow implementations pace in SMMEs. In more detail, Müller and Hopf [3] raise a number of issues, including inappropriate organizational structure, inadequate skillsets, a lower risk-appetite and fewer resources for R&D. Also Cotrino, et al. [9] emphasize that SMMEs are struggling with the Industry 4.0 technology adoption and raise the lack of a strategy as a fundamental reason for the struggle. To further second the importance of a strategy, Ghobakhloo and Ching [10] specifically suggest that SMEs should create strategic roadmaps, as this facilitates digital technology adoption. They find that this is one of the discriminators between nonadopters and adopters. The importance of an existing strategy is also strongly advocated by Kane, et al. [11] p3 claiming that "*the ability to digitally reimagine the business is determined in large part by a clear digital strategy*" and Albukhitan [12] p. 666 manifesting that "*a well-defined digital transformation strategy is critical for the overall success of digital implementation in a manufacturing setting*".

In addition, Nwaiwu, et al. [7] report, following the results from an extensive survey towards Czech SMMEs, that the alignment between the business strategy and Industry 4.0 management model is one of the major critical success factors for a long-term successful digital transformation. Arcidiacono, et al. [13] also conclude that a strong strategic vision is a proactive approach to Industry 4.0 adoption. This will facilitate a gradual grasping of Industry 4.0 concepts and application scenarios, allowing SMEs to plan their next steps. However, Grooss, et al. [14], as a result of their extensive literature review, state that manufacturing SMEs must realize the importance of developing a strategy, but even more importantly, they need to aligning their digital strategy with the business goals and strategic business plan. They emphasize the importance of securing that the goals of the digital strategy support the goals of the business plan, since this is a necessity for developing core business functions in the company. In alignment, Wiesner, et al. [15] advocate the importance of taking the long-term strategy of the company into account and build a step by step development process, which can help SMEs to identify their specific strategic goal within the constraints. In alignment, Cotrino, et al. [9] argue that the lack of a strategy per se causes problem, advocating that SMMEs first of all must realize the importance of formulating a strategy, before embarking on implementations project.

Therefore, it this paper, we present the results of two case-study conducted in two Swedish SMMEs under 2022 and 2023, partly aimed at supporting the companies in creating a link between individual digitalization initiatives and the existing business strategy. However, to be able to elaborate on how to create the linkage between the over-arching business strategy and ongoing digitalization projects, the case studies also involved the development of a first draft of a simple and intuitive digital strategy, which would be easy to comprehend as well as would serve as the bridge between the business strategy and the digitalization projects. Finally, in order to understand the business context, creating a backdrop for the interpretative approach of this work, we also needed to create a common understanding on the state of the art within the SMME, with respect to digitalization initiatives and their digital maturity.

The rest of this paper is organized as follows. The frame of reference is elaborated in Section 2. In Section 3 details are given regarding the research method applied. In Section 4, the findings from the two case studies are presented. Section 5 includes the analysis of the empirical material and the results of the work. Finally, the paper is concluded in Section 6 by discussing the results of the work in a broader perspective along with some ideas for possible research paths.

2. Frame of Reference

In this work, we align to the Digital Transformation Framework developed by Bumann and Peter [2]. They propose, as a result of a meta-analysis of 18 digital maturity models, six fundamental action-fields or business dimensions that are vital to consider in any DT strategy. The dimensions were identified through a commonness analysis, meaning that the six dimensions included in most models made it to the framework. These actions-fields/business dimensions are; strategy, organizations, culture, technology, customers, and people/employees. **Figure 1** illustrates the Digital Transformation Framework with actions-fields/business dimensions and subdimensions to consider in the process of digitally transforming an industrial organization.

Bumann and Peter [2] also argue that the actions-fields/business dimensions are intertwined and over-lapping They are also strongly linked to other dimensions not making it to the final six, such as leadership, which is highly influencing all strategic work or business plan revisions in any company. For clarity, since it may be confusing to include the actions-field/dimension strategy as part of a DT strategy, Bumann and Peter [2] promote, in alignment with others (see above), the imperative importance of actually making sure that a company do formulate a digital strategy, which also becomes communicated. In addition, in relation to the dimension strategy Bumann and Peter [2] also include the importance of safeguarding the availability of sufficient resources and the importance of exploring and evaluating new trends.

Moreover, besides the importance of an existing digital strategy that is known and guides the DT process, the vitalness of aligning the ongoing digitalization initiatives to the over-arching business strategy and the goals of the organizations, has been thoroughly established in previous section. However, detailed considerations regarding the benefits of an existing digital strategy and indications on the relationship between the DT maturity of a company and the existence of well-aligned strategies need some further elaboration. Following the results of an extensive survey conducted by Kane, et al. [11], it becomes evident that the existence of a digital strategy may even work as a token on the digital maturity level of the organization at hand. They identify and motivate a clear correlation between more digitally matured companies and the existence of a DT strategy,

including many organizational perspectives besides the actual technology. For Kane, et al. [11] the result of their survey brings such strong motives for the importance of the strategy, that they even chose to title their paper "Strategy, not technology, drives digital transformation". Moreover, they also identify distinct characteristics separating companies in early phases of their digital transformation, from more mature companies. If considering the Top-3 barriers hindering a digital transformation, identified by Kane, et al. [11], companies in early phases often faces barriers which all relate to the overall transformation process of the company (i.e. lack of strategy, to many priorities, and lack of management understanding). On the contrary, the Top-3 barriers for more mature companies are to a large extent more operational. To many priorities is still a barrier, but we interpret Kane, et al. [11] to include a difference, in that more mature companies as progressed further and the amount of strategically motivated project continues to expand, as the company mature and continuously identifies relevant and sound digital solutions for implementations. The other two top barriers are security concerns and insufficient tech skills.

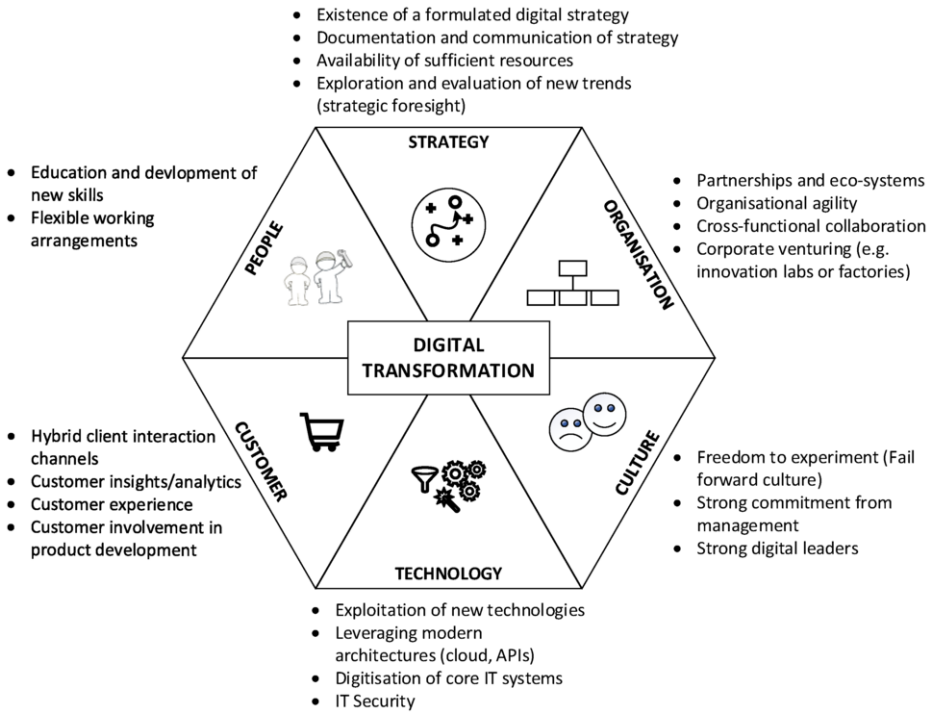

Figure 1. The Digital Transformation Framework (Bumann and Peter, 2019, p. 31).

Cotrino, et al. [9] argue, as indicated above, that the lack of a strategy per se causes problem. They also propose a 6-step roadmap, aimed at supporting SMMEs on their DT endeavor, with the first step being dedicated to Develop a strategy. This is a step in the right direction, but unfortunately, their roadmap does not include any concrete advice on the format of a digital strategy or how to align the digital strategy to the business strategy/business plan. Thereby it does not offer a complete support alleviating the strategies integration problem brought forward by Grooss, et al. [14]. Moreover, Nwaiwu, et al. [7] also raise the importance of aligning the Industry 4.0 initiatives to the business

strategy. In addition, they also argue for the importance of safeguarding the close relationship between the business strategy and specific internal capabilities and procedures of the company. Following this argumentation, one may also argue that there is no one-size-fits-all solution for SMMEs, this implies that the strategic plan for successful Industry 4.0 transition must be contextualized to each particular manufacturer. This claim is also in alignment with the work by Ericsson, et al. [8] highlighting the importance of studies towards SMMEs (in their case within the automobile SME supplier segment) that actually considers the strategic work conducted in specific companies, instead of presenting strategic recommendations based on generic findings for the overall automotive industry. Grooss, et al. [14] p. 9 also suggest that "*future research should study the practical implementation of digitalization initiatives as they progress*". In our perspective, it is evident that there is a lack of concrete, in-depth studies on SMMEs, that may increase the cohesive body of knowledge regarding the importance of a strategy and complement existing reports describing the alignment of Industry 4.0 initiatives with overall business goal.

3. Research Method

The purpose of the paper is to investigate how SMMEs may aligning the Industry 4.0-/digitalization initiatives undertaking to their business strategy. Precise measurement instruments are not available for this purpose, due to the complexity of the organizations and the different business dimensions that come into play, e.g. strategy, leadership, technology, culture and organizational structure. Instead, we rely on the knowledge and experiences of our research subjects in the company, as well as formal documentations (e.g. business strategy and digital plans), and our subsequent analytical interpretations of the material collected. Hence, we adopt an interpretive stand, treating subjective phenomena based on local perceptions [16, 17]. In addition, due to the exploratory nature of this work, where the studied phenomena are local and emergent, we followed the guidelines by Walsham [18] and Klein and Myers [19] and conducted interpretive case studies in two companies.

However, to structure the material collection in the case studies, we followed the steps of the Digital Maturity Index (DMI) maturity model presented by Becker, et al. [20], including material collected through interviews, company-internal documentations, Gemba walks, workshops and information from the companies' websites. Since DT is an undertaking including the whole company, we covered managerial functions as well as production business units and supportive functions (e.g. production planning, IT, production development). Following an interpretative position, the interviews were open-ended, but took a stand in the predefined questions included in the DMI-tool. Hence, during the interviews, many follow-up questions were stated, allowing the respondents to elaborate upon personal experiences and perspectives on digitalization projects being started. In addition, the respondents were also asked to include additional ideas were digital solutions could contribute to alleviate problems or increase the efficiency of the particular part of the production process or supporting function which they represented. In sampling the respondents, a broadness of perspectives and responsibilities was the main argument, since a diversity of perspectives and responsibilities was assumed to contribute with a rich material for understanding how digital solutions were considered and also how the digital initiatives could be coordinated into a digital strategy. Finally, the case studies also involved an interpretative approach, based on workshops, in trying to understand how the management group of the company considered the different

actions-fields/business dimensions proposed by Bumann and Peter [2]. In total, the two case studies included 28 interviews (ranging between 1-3 hours), 4 Gemba walks (in the production facilities), 12 workshops (ranging between 2 hours and full-day workshops), and hundreds of pages of company internal documents (e.g. business plans, production strategies, sales strategies, communication strategies, IT-policies, sustainability polices, and TQM-policies). The material collecting activities were rather equally distributed between the two case companies.

4. Findings from the case studies

The companies chosen for the case studies are deliberately rather alike, both with respect to staff size, economical values and primary line of business. Both employ around 100 people, they have an annual turnover in the span of 20 - 25 M€ and their primary line of business center around refining (e.g. cutting, bending, welding and assembling) thin metal sheets into products sold under the company's brand. In addition, the companies are also family-owned that has been run within the family for several generations and they both treasure and promote a high degree of the corporate social responsibility (CSR) often associated to family-owned SMEs [21]. The strong focus on the CSR manifests itself both within the companies as well as externally, through internal social activities, a high degree of care-taking of the employees and generous funding of external sport clubs and other non-profit organization. They are also similar in how they organize the company, with a management group running the strategic work and day-to-day managerial tasks, a production organization divided into departments focusing around the sequential value-adding procedures and steps of the production, and an administrative supportive organization including e.g. procurement, economy, sales and IT.

The findings from the two case studies is presented in accordance to the six action-fields/dimensions of the Digital Transformation Framework proposed by Bumann and Peter [2] (Figure 1). The reason for structuring the presentation of the empirical findings in this way is that we find it to give a broad understanding of the current state-of-practice in the two case companies, with respect to their digital transformation. In addition, by focusing on the actions-fields/business dimensions proposed by Bumann and Peter [2], we also identified hinders in the two companies, negatively influencing their digital transformation, as well as strategic goals, prerequisites, capabilities and even concrete activities. All being vital in the dialogue with the company for developing the blue-print for a digital strategy as well as for testing and validating the blue-print by allowing the two case companies to formulate their digital strategies.

4.1. Strategy

Both companies had general strategic documents expressing ambitions for the company's development, including statements regarding the core line of business, how they want to be perceived as an employer and sustainability goals. In addition, they were also surprisingly alike, when it came to how to formulate the overall business goal, including some key performance indicators. In general, they were expressed like: "*We shall have an annual turnover of XX M€, with a revenue on Y % while at the same time safeguarding a positive customer experience, including high-quality products and a delivery precision of ZZ %*". Moreover, both companies were lacking a digital strategy and we didn't find any other documentation that concretely expressed ambitions or future

capabilities expected from an increased digitalization. Furthermore, both companies are economically sound, with good annual revenues and a solid equity capital, which they claim willing to invest in novel digital technologies. Finally, with some variation in the degree of structure and the formality on how the identification of ideas and new trends is collected and communicated, both organizations are rather keen on following new trends. In being more detailed, one of the companies had a broader subject-focus, covering innovations in relation to novel manufacturing techniques as well as digital services and solutions, whereas the other company ta a larger extent solely focused on novel manufacturing techniques.

4.2. Organisation

As already indicated, both companies were similarly organized, following a very traditional organizational structure with a production organization divided into several sequential steps following the value-adding production process. Moreover, both organizations actively promoted and supported the importance of connecting with other companies and academia, as a mean to build network supplying access to new competences and skills. None of the companies had invested in any kind of a digital lab, but both companies had instead tried to create a more innovative climate by supporting the production organizations with dedicated IT-competences as well as production technology competences organized into support functions. Both case companies were also rather traditional in their project management and though expressing needs for becoming more agile, they managed projects in very traditional, waterfall-based ways. Finally, both companies actively promoted cross-functional collaboration within the organizations and gave examples of several projects and regular meeting, which served the purpose of bringing together different perspectives when addressing more extensive challenges or problems in relation to their digital transformation.

4.3. Culture

The result of the DMI-analysis revealed two companies investing a lot of time and effort in promoting a sound and positive organizational and work culture. However, with respect to a culture fostering a fail-forward culture allowing experimentation and failures as a way of learning, none of the case companies had actively worked to promote such cultural shift. Instead, rigid project management procedures and (with some variation) a rather conservative and fairness-based investment attitude conserved a careful and “safe” culture. However, their resources are more sparse and as indicated by Müller and Hopf [3] that may partly explain the rather conservative approach identified in many SMMEs. When it comes to a strong commitment of managers and the existence of a digital leader, the DMI-analysis showed very different outcomes. The company with a much broader subject-focus in their trend scouting, covering innovations in relation to novel manufacturing techniques as well as digital services and solutions also exhibited a much stronger commitment for digitalization and DT amongst many of the managers and although they did not had a dedicated chief digital officer, they certainly had a couple of managers in powerful positions that actively and strongly promoted the importance of developing the company by incorporating novel digital solutions. In the other case company, it became evident that even if digital solutions were focused on in cross-functional project and meeting, none of the managers were acting as a beacon for the digital transformation. Still, and as already indicated, regardless the existence of an

informal chief digital officer, none of the companies had a digital strategy and were not particularly agile.

4.4. Technology

The production system of both companies may be characterized as a mixture of manual, semi-automated and automated steps, with rare instances of connected manufacturing equipment. Hence, the development of seamless data streams (horizontal and vertical) poses a rather dauting challenge. Still, as SMMEs they are probably not going to be market leaders anyhow, but the development of an interconnected production system, allowing the companies to reap the benefits of an increased digitalization were strongly hindered by the scattered production landscape, as well as by a shortage of in-house, technical competences, the absence of APIs to facilitate data transfer between different systems/equipment and strong dependencies towards specific vendor solutions. Still, both case companies had done extensive investments and developments in their basic IT-infrastructure, which at least caters for a solid ground when later on embarking on more advanced digital initiatives in their production.

4.5. Customers

Both companies had made extensive investments in digital solutions in relation to customer interaction. Evidently, they had prioritized the customer interaction higher than the development of the production system. The case companies argued that one of the reasons for such focus was the rather narrow scope such initiatives have in contrast to a digitalization of the whole production system. We still find it interesting to mention, since our perception is that most of the reports and articles published under the Industry 4.0 umbrella strongly focus on and investigate digital developments in relation to production systems and production equipment. Another reason primarily raised by one of the companies was changing customer behaviors, where customers' demands and expects digital channels or solutions supporting sales procedures as well as facilitating tailored adjustments of products. Finally, with respect to customer data collection and the opportunities hidden in using customer data for analytics and the generation of novel insights, one of the companies had actually developed digital services in relation to a product group. To be transparent, the other company had not considered such developments or the opportunities related to digitally based additions to existing business model, but that was also due to the particular products being produced, which were not immediately suitable for sensors or meters.

4.6. People/Employees

The results of the DMI-analysis revealed that both companies offered flexible work arrangements for staff members working in managerial or supportive roles. The companies mutually disclosed that the COVID-pandemic had forced them into more flexible work routines, supported by digital solutions, which have, in a post-pandemic situation, remained and become a normality in the day-today work. Finally, with respect to competence development and up-skilling/re-skilling procedures, both companies were considering the importance thereof. However, the findings from the case studies reveals two rather disparate approaches. One of the companies worked very informally, under the responsibility of individual managers and with a primary focus on upskilling

competencies within areas already existing within the company. On the contrary, the other company work very structured, in a collaboration between the management group and the HR-function, to boost skills within existing areas of expertise as well as to identify and develop novel skills for the future.

5. Analysis and Results

The companies definitely shown evidence on sharing some of the many challenges related to companies that have just started to embark on their DT journey. Following the finding of Kane, et al. [11] the company had too many priorities and did lack a digital strategy which could guide the overall planning in the company as well as act as a guiding star when prioritizing internal resources, such as IT and production development resources. Hence, a primary focus, as well as major result, of the case studies became to develop a blueprint for a digital strategy as well as supporting the companies in such development. Still, one of the primary input values from both case companies was that such strategy needed to be short and condensed. Both companies indicated that in order to make the digital strategy vivid and something that could become a living part of the strategic discussions in the management group, it also needed to be very concrete. To illustrate, please consider the following quotation stated by a manager in one of the case companies (translated from Swedish): "*The digital strategy must be short and very concrete! If it becomes yet another extensive document, I fear that it will only become a paper tiger!*" The concreteness and shortness were also considered as vital in order to facilitate the anchoring of the digital strategy throughout the companies. In addition, related academic work (see previous sections for more extensive accounts) also contributed with input and guidance, that influenced the final result. First of all, Grooss, et al. [14], advocate the importance of aligning the digital strategy with the business goals and strategic business plan. In our interpretation, it became evident that a digital strategy must include also some overarching formulations regarding the vision of the company or concrete statements regarding measures or key performance indicators, as a means of guiding the digitalization initiatives being prioritized. Also Wiesner, et al. [15] advocate the importance of taking the long-term strategy of the company, which may help SMMEs to identify their specific strategic goal within digitalization. Consequently, we mean that the digital strategy also needs to include some general statement regarding the overall aim with an increased digitalization. Moreover, Nwaiwu, et al. [7] also raise the importance of aligning the Industry 4.0 initiative to the business strategy in general, but also the importance of aligning specific internal capabilities, catered for by digital solutions, to the business plan. We interpreted this that expected capabilities, created by novel digital solutions, also must be included in the digital strategy, to assure a red-line between the business goals and expected capabilities originating from specific activities. Finally, Kane, et al. [11], promotes the importance of avoiding to many priorities amongst companies in early phases of their digital transformation. In addition, both case companies had a plethora of different projects and activities running, making it hard to e.g. follow the progress of individual initiatives, allocating sufficient resources (people and funding) to all initiatives and to prioritize the internal competence development needed to make benefit of and to maintain technical solutions being introduced. Hence, we concluded that the number of activities and expected capabilities needs to be limited. In addition, we also identified a need to include prioritized stake-holder groups (external and internal). Especially in one of the case-companies, it became evident that such prioritization was vital, since many of the expected capabilities became related to all

types of customers, regardless of product categories or to the whole production system, making the capabilities and activities formulated too general or too broad. In addition, we also concluded that the different components needed different time spans, in order for the strategy to give the intended guidance. Naturally, the overall goal needed to be long-term, whereas capabilities and activities were prioritized in shorter time spans.

The importance of the time constraints also became very important later on in the studies. During the process of externally validating the blue-print of the digital strategy, by letting the case companies develop their own instance thereof, we bumped into a "human-relations/fairness" reason. Especially one of the companies raised a concern with the need to harder prioritize. In trying to do that during our workshop and in their internal work with formulating their digital strategy, it became evident that it created tensions in the management group. Inevitably a strategy is not only focusing on what to prioritize and do, it also makes it much more concrete and clearer what NOT to focus on. In consequence, the strategy premieres some individuals' ambitions and initiatives in front of others. From an outside perspective, this may be interpreted as a leadership problem, which it somehow is, but at the same time, it is also vital to remember that these family-owned firms treasure and promote a high degree of the corporate social responsibility (CSR) [21], which may hinder a cultural shift into a more prioritizing and results-based mind-set. By allocating time to different activities and focuses on developing certain capabilities, the tensions in the leadership could be somehow settled, since it also opened up for a long-term dialogue around sought after/expected internal capabilities, that were decided within the scope of the digital strategy, but just had to be focused on a bit later.

In addition, since digital strategy is a highly popular research subject, as well as a subject gaining a lot of attention in the private and public sector, we also reviewed a lot of literature and web pages, trying to find inspiration for how to develop a short digital strategy, with the necessary components identified above. We did find some examples, sometimes referred to as digital strategy canvas or digital roadmap, but they were still deemed as not sufficiently concrete enough, to extensive or lacking one or several of the important components presented above. Hence, we developed the following blueprint for a one-page digital strategy **(Figure 2)**, which aligns to the overall business goals of the SMME (the text in the illustration is translated from Swedish). The digital strategy blue-print was also applied in the two case-companies, as a means to externally validate its applicability, where the two case companies, in workshops guided by us and in additional internal work sessions, started to implement their own instances of a digital strategy.

6. Discussions and Future Work

First of all, the findings validate the work of [11] by presenting further empirical evidence that companies in the early stages of their DT are hindered by barriers such as the lack of a digital strategy and too many priorities. During the case studies conducted, it also became evident that the difference between automating and digitalizing can't be taken for granted, since we met several occasions where the concepts were used interchangeably. In addition, it also became evident that prerequisites for a successful digitalization, including e.g. intact horizontal data streams spanning the whole value-adding process, which, in turn, enables automated changes in the production equipment based on customer order data, poses challenges to existing production development procedures. During the empirical work of the case studies, we met a rather reductionistic approach on production development, where e.g. bottle-neck analyzes are used to

identify single production steps that needs to be streamlined. From an automation point of view, we may see the rationale behind such mindset, but if transferring such mindset into digital transformation, we fear that such initiatives probably would face severe problems. Hence, we also see a need to further educate on and advocate a more holistic approach underlying DT initiatives.

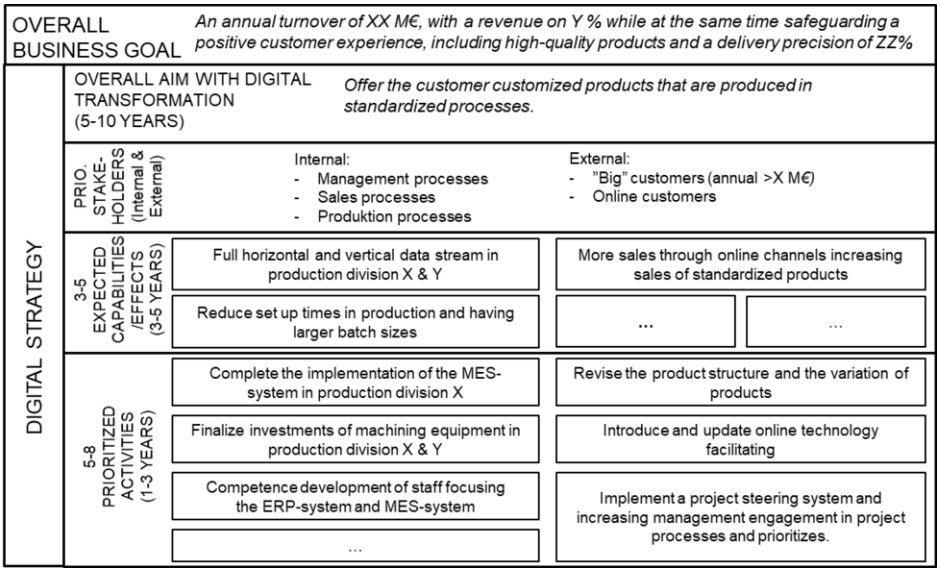

Figure 2. A one-page digital strategy for an SMME with generic examples.

Moreover, due to the generality limitations posed on a study including two companies, we advocate the importance of additional in-depth studies investigating the digital strategy work, and the impact of a close alignment between the digital strategy and the business plans on SMMEs DT endeavors. Thereby, we also adhere to the proposition by [8] claiming the importance of studies towards manufacturing SMEs that actually considers the strategic work conducted in specific companies, instead of presenting strategic recommendations based on generic findings, although we expand the scope needed beyond the automotive industry and include all types of SMMEs. Additionally, we also identified a need to redo the DMI-analysis in the same companies later on and reexamine the findings in relation to the Digital Transformation Framework proposed by Bumann & Peter [2], as a means to be able to investigate the progress done by the companies and to detail the hinders and prerequisites for DT initiatives presented in several academic studies. This need has also been expressed by Grooss, et al. [14] p. 9 suggesting the importance of monitoring and tracking the practical implementation of digitalization initiatives as they progress over time.

7. Acknowledgement

The research behind this paper is funded through the projects ASSAR-ERUF and Shiftlabs, funded by EU, Tillväxtverket, Västra Götalandsregionen, Skaraborgs Kommunalförbund and Skövde municipality. The authors are thankful to the companies and their staff engaged in this work.

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