

Productization for Consistent Data & Product Understanding in Mergers and Acquisitions

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Abstract— Mergers and acquisitions (M&A) often lead to combined or supplementary offerings, where the products, or services of the merging or acquiring companies are integrated into a new combined product portfolio. Nevertheless, integrating the offerings can be challenging due to structural differences or inconsistencies in the products. Systematizing product-related data assets may also be necessary to ensure a smooth integration process and optimization of operations. A structured, consistent foundation for product data might be needed to combine, migrate, and manage data across different systems. Nevertheless, the systematization of data assets during M&A may also be challenging. This study explores combining the offerings through product structure and productization focus to address the challenges in the consistency of products and data. An example of integrating offerings during M&A is presented. The findings indicate the potential of productization logic through a commercial and technical focus on the product structure in unifying the offering and gaining consistency in data. The approach may allow for identifying complementarities and overlapping offerings and resources to achieve synergies in marketing & sales and delivery. The presented logic may serve as a vehicle for integrating the business processes and information technology (IT) systems of two companies by providing a uniform structure for product data that different business processes create, use, and store in various IT systems.

I. INTRODUCTION

In mergers and acquisitions (M&A), companies try to reach synergy benefits that may, for example, be operational or marketing-related [1,2]. In an M&A situation the products, or services of the merging or acquiring companies are often integrated into a new combined product portfolio, which consists of combined or supplementary offerings. In addition, various things may need to be integrated, such as the companies' business processes and information technology (IT) systems [3]-[5]. The systematization of data assets may also be necessary to ensure a smooth integration process and effective combining and migrating of data. The levels of companies' integration and IT integration often go hand in hand: the more complete the company integration, the more the IT systems are integrated [6]. The data and products being inherently linked make integrating the offerings one of the main tasks during mergers and acquisitions. However, integrating the offerings is challenging if the companies have different or inconsistent structures for modeling their products [7]. A consistent product structure is important as it provides a structure for linking product master data to the offering, and links to business processes and the visibility over product elements [8]. Solid

master data is one of the success factors in IT system integration, as unified master data enables the successful execution of business processes [9]. Thus, defining and integrating product master data is one of the vital tasks when integrating IT systems and business processes [9]. This ensures that the product can be successfully developed, sold, delivered, and cared for. A consistent product structure can be a key for supporting the consistency of master data.

Describing an offering structurally by involving both commercial and technical perspectives, links to creating a uniform understanding of the offering within a company and works as a foundation for a company-wide data model to link products, data, business processes, and IT systems [10]. The commercial view of the offering shows what the customer can buy, whereas the technical view shows the building blocks needed to produce the offering [11]. The activity of clarifying the offering from the viewpoints of what is sold and how it is produced, can be referred to as productization [12]. The productized offering links the structural consideration to the engineering lifecycle and allows the effective addressing of products in different lifecycle stages with a varying focus [13]. The commercial and the technical structures must be interlinked. For example, each commercial sales item that a customer can buy should have a corresponding technical version item with unaltered fit, form, and function. Traditionally, product structures are well known in manufacturing industries and in the case of physical products, where the technical side of the offering is often referred to as bills of materials (BOM). Nevertheless, also services can be represented structurally by describing service processes and linking to necessary resources [14,15]. For example, manufacturing firms can productize their offerings as services even though their production outputs would be physical [16]. This supports product management if the offering is sold as a service.

Comparing the offerings of several independent companies has been conducted previously by systematically describing the commercial offerings with a uniform product structure for cooperative marketing purposes [7]. However, it seems that using the logic of commercial and technical product structure to productize a joint offering has not been considered in the context of M&A. The present study attempts to use this kind of logic to integrate the offerings of two companies for the good of finding and realizing synergies in an M&A situation. The use of the logic aims to support forming foundations for the systematization of product data. ChatGPT was utilized

when editing the appearance of the references in the reference list of this paper.

II. METHODOLOGY

A literature review was carried out to cover the relevant aspects of mergers and acquisitions, productization, and product data management. This was done by following certain systematic through keyword searches in Google Scholar, and Scopus databases. The keywords involved the above-mentioned themes and their combinations. The literature review, however, is not a systematic review as the reporting does not follow the necessary principles but the authors include only aspects deemed relevant for the chosen aims. Any specific date range is not enforced while supporting the necessary holistic understanding is emphasized. In addition to the literature review, empirical data has a significant role in this study.

The empirical study focuses on two companies in an M&A situation, both of which are small machine shops. The larger company provides design and volume manufacturing of mechanics products, while the smaller one has focused on prototype, single part, and small series manufacturing. The larger company is acquiring the smaller one to extend its offering to better serve its customers. Both the sales revenue and the number of staff of the smaller company are around half of that of the larger company. The companies were analyzed to study the utilization of a uniform generic product structure to productize the companies' offerings in M&A. The objective was to use productization to clarify the companies' offerings to compare and integrate them into a new offering. Further, the objective was to draft foundations for product data systemization in the M&A context and to identify overlapping processes and resources.

Semi-structured interviews [17] were arranged in both companies to describe their current offerings and productization practices. The interviewees consisted of the CEOs, sales managers, product managers, and production managers. The process of describing the current offerings and constructing the integrated offering roughly followed the steps introduced by [7]. The logic of the commercial and technical product structure layers was applied to first describe each company's current machine shop services separately, and the service processes were linked to their respective resources that were used in service production. The commercial and technical structures of the offerings were compared to find any complementing or overlapping services or resources. After the analysis, the integrated machine shop service offering was constructed according to the uniform product structure logic. The integrated offering was presented to the company representatives for validation, feedback, and improvement.

III. LITERATURE REVIEW

Mergers and acquisitions are carried out due to strategic, financial, and operational motivations. Companies pursue M&A to achieve specific goals, improve competitiveness, or address challenges [18]. In M&A situations, the ultimate goal is to achieve a situation where the benefits outweigh the costs. After M&A, it is often desirable to achieve better profitability or

higher revenue than the sum of two separate companies. However, in the case of a killer acquisition, the acquiring company may not have an interest in integrating the acquired company's offering into its product portfolio [19]. Also, the combined portfolio may necessitate re-energizing through streamlining to increase revenues and profitability [20].

Even though literature does refer to combined product offerings, direct discussion on how one should combine them in the case of M&A seems to be deficient. A call for looking at product structure representations in M&A situations has been presented [21], while comparison of different structures is pointed as challenging [7]. Product focus during M&A does not seem to have been addressed through productization logic in conjunction with the commercial and technical product structure approach. The inherent linking of productization logic to portfolio considerations might make a relevant consideration in the M&A context. Productization has been seen as a multi-stage process that considers analyzing customer needs and combines tangible and intangible elements into a product-like entity [22]-[24]. The concept has been applied to physical products [13][22], services [14][24,25], and experience type of an offering [26]. The productization concept enables different views over the offering through the structural approach [7,13,14,16]. The structural approach can be carried through the engineering lifecycle where the focus varies by the lifecycle stage [13]. Productization logic is also linked inherently to active product portfolio management over the engineering lifecycle [27]-[28]. Productization is also found to provide benefits in supporting business processes [29] and have linkages to data and data management [10][30]-[33]. It is also the data management linkage that makes productization an interesting perspective for M&A situations as data is often an important asset.

A structured, consistent foundation for product data can be achieved with the help of productization [30][32]. This might be needed to combine, migrate, and manage data across different systems [30]. Due to e.g. potentially different ways of operation, it may be challenging to systemize the data assets during M&A. Productization, for example, has significance in creating the ability to achieve product-level profitability [10], which is relevant to the combined offering post-M&A. Also, from the perspective of business processes, it is essential that the product master data is well-managed and can be linked from the master system to other systems [9][29]. In some cases, systematic productization logic might be required to manage product data effectively [30]. Productization based on the commercial and technical product structure, while also considering different lifecycle phases of the products, creates a view of the product portfolio as a whole [8][13]. Product portfolio management can also play an important role post-M&A.

The goal of product portfolio management is to manage the products as a whole throughout their life cycle [23]. Already in the 20th century, it has been found out that in the context of the new product development, product portfolio management should focus on the total value that is to be gained, balance between different product development projects, and their alignment with the company strategy [34]. After an M&A situation, it is important to understand a new entity that needs to

be managed to be able to make the best possible decisions related to the product portfolio management. For example, it may be difficult to determine the comparable number of products if the product portfolios of both companies are not modelled. Product portfolio management must support the achievement of the company's strategic goals [27], and to guarantee this, product data should be of high quality [9]. A well-understood product portfolio supports the utilization of the data assets of a company for product portfolio management purposes [10]. Product portfolio management process has been suggested to be an integral business process that would guide more operational business processes by determining goals for them [28].

Especially after M&A situations, the importance of business process management is emphasized in the new entity. Business process management aims to achieve a continuous improvement of business processes [35]. To realize it in a lasting way, it is essential that the strategy of a company is taken into account in business processes [36]. While implementing the methodology, one should consider the targets of a company and focus on the digital transformation to make the competitive advantages more durable [37]. In addition, agility should be taken into account in the implementation [38].

IV. RESULTS

A. Current state of productization

Neither of the studied companies had clear productization practices in place. The only descriptions of the companies' commercial offerings were presented on their web pages and only to a limited extent. The descriptions focused mainly on listing the companies' machinery without any description of what they were used for. In other words, the companies were

presenting their service production resources but not what services the customer could buy. The companies, however, marketed themselves as manufacturing service providers to their customers.

The employees' understanding of the companies' offerings varied, and no uniform understanding existed of what the companies offered. Individual employees had their views based on previous experience. Even though the companies presented themselves as manufacturing service providers to their customers, the companies' internal views on productization were goods dominant. The employees' views on what could be ordered were shaped by bills of materials and technical drawings of previous customer orders. Having a goods-dominant productization logic mindset hindered gaining a uniform view of the offerings, as the commercial offerings could not be linked to how they were produced. Technical manufacturing methods were well known but they had not been modeled as services. In addition, service process descriptions for design services were not modeled, even though the larger company had been providing them. Consistent service product data was not available due to the lack of clear productization practices.

B. Integrating the offerings in M&A

A uniform product structure logic was utilized to describe each company's independent offering and to construct an integrated offering (Fig. 1). The logic was relatively easy to establish despite the lack of clear service productization in the companies. As the companies' commercial offerings were not systematically modeled, describing the companies' independent offerings needed to be started by modeling the technical side of the offerings. The main resources that were used to produce the offerings were identified. For the most part, the resources

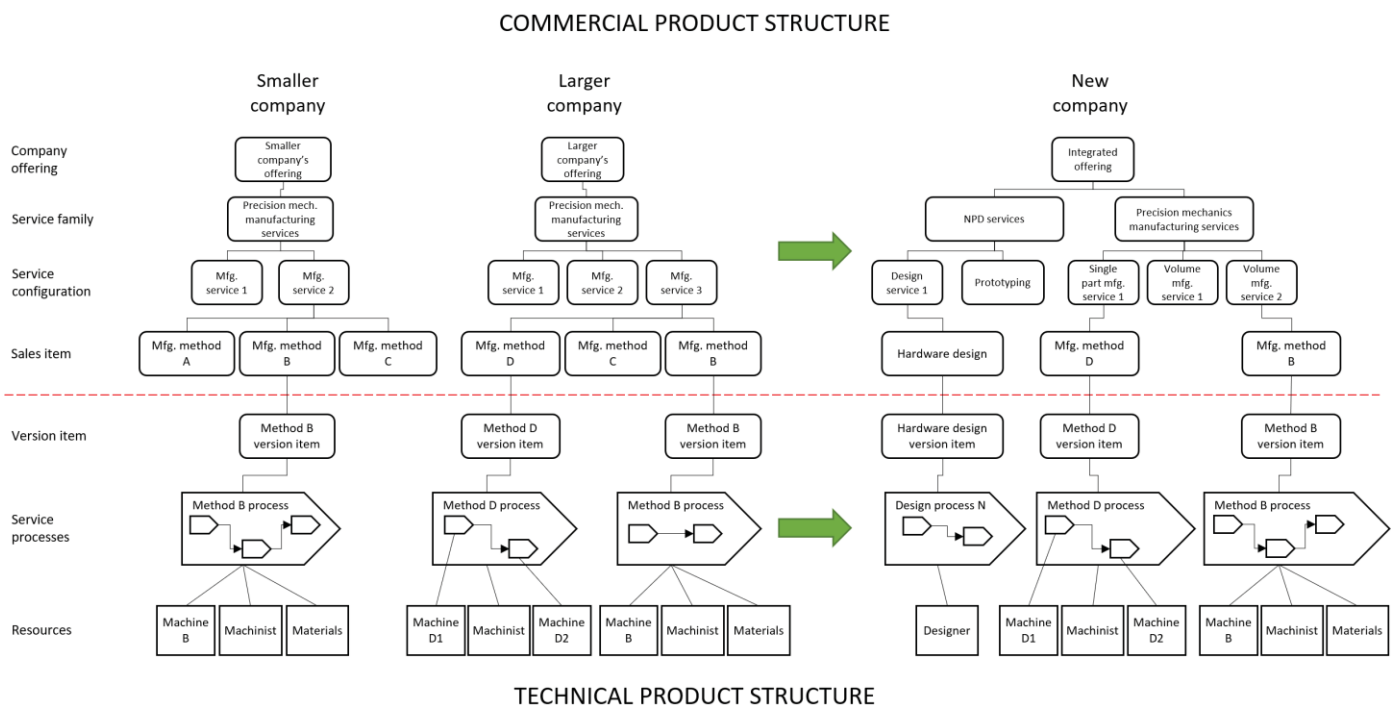


Fig. 1. Integrating the offerings of two companies in M&A

consisted of machinery, machinist time, and materials. The technical service processes consisted mainly of manufacturing methods that were performed by using the resources. In addition to the manufacturing services, design services were modeled using the same logic. This was seen to allow more precise cost calculations as the design costs could be allocated to the products. Further, the technical service processes were possible to be modeled as commercial service items that were used to produce each company's offering. As the general view of the companies' commercial and technical sides of offerings was achieved, the rest of the resources were possible to be linked with the service processes.

Describing each company's current offering by applying commercial and technical structure provided a way to identify complementing and overlapping services and resources. On the commercial side, the interviewees identified opportunities for completely new services by combining existing complementary services. In addition, some overlapping services were identified. They were either eliminated or integrated into the service offering. On the technical side, as the service processes were identified, they were possible to be linked with their corresponding resources. Similar resources could be compared to increase the capacity of service production or to reallocate them to the production of other services. In addition, the interviewees were wondering whether there would be potential for service delivery efficiency improvement if the service processes of similar services were compared in the light of productivity for choosing the more efficient one.

As a result of describing the independent offerings commercially and technically through the uniform product structure layers, the integrated offering was possible to be constructed systematically, including a clear division into service families and individual services. Originally, the commercial offering of the smaller company was mainly focused on prototype, single part, and small series manufacturing, while the commercial offering of the larger company was mainly focused on volume production. In the

new, integrated offering, the smaller company's services and resources were mainly focused on new product development (NPD) services, such as prototyping, complemented by the larger company's design services and resources. The smaller company's services and resources were also allocated for providing fast-delivery high-precision single parts and small series manufacturing. The services and resources of the larger company were mainly allocated to high-volume production.

The use of uniform product structure logic appeared to be an enabler for product data systemization. Additionally, it appeared that the applied logic could support achieving product analysis capabilities, also after the M&A situation. The new, integrated offering allowed the resulting larger company to meet a variety of customer needs and reduce overlapping in the offering. The new offering involved services from rapid prototyping and fast delivery of single parts and small series to high-volume original equipment manufacturing (OEM).

V. DISCUSSION

Focus on productization logic and product structure appears to have potential benefits while integrating companies' offerings and systematizing data assets during M&A. Modeling the offerings of two companies by focusing on both the commercial and technical structure may help to find synergies from the marketing & sales and the delivery viewpoints and remove redundancy and overlapping when combining the offerings. The logic can further serve as a vehicle to integrate the business processes and IT systems of two companies through the support of systematized data.

The combined productization logic could provide a uniform structure for product data that business processes create, use, and store in various IT systems. Specifically, the product master data is a key in the context. The uniform productization logic supports consistency in data as the consistency in product structure forms the backbone for data (Fig. 2). Consistency in product data, however, can be challenging to achieve without consistency in products. After all, product

Modeling the offerings through a uniform product structure logic in M&A

Post-M&A product data systemization

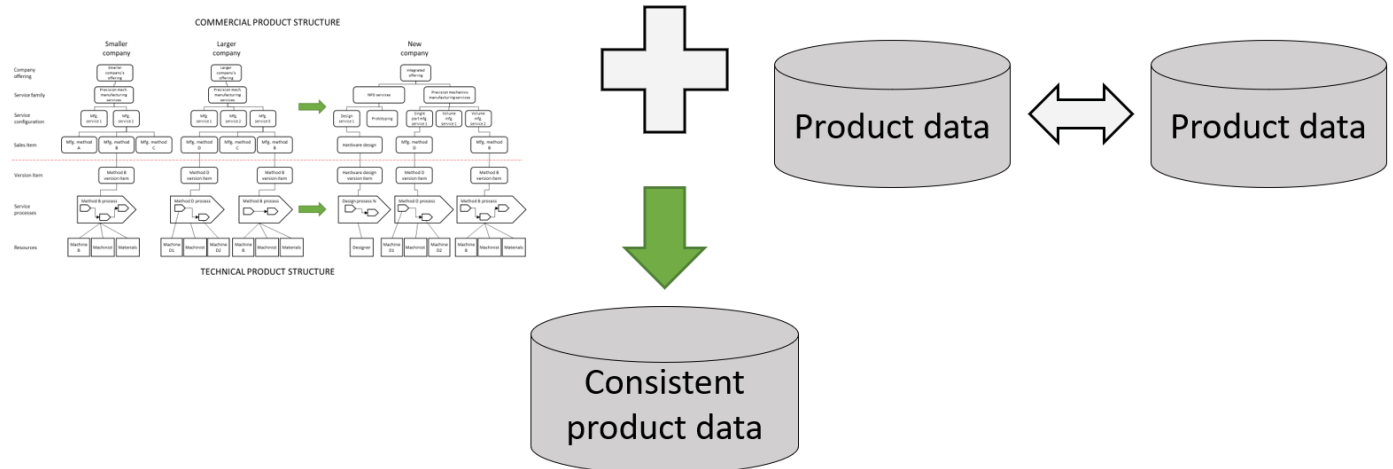


Fig. 2. Use of a uniform product structure logic to support post-M&A product data systemization for consistent product data

structure can play a vital role in supporting the systematization of product-related data assets during M&A. It can provide a consistent, organized framework that simplifies data integration, enhances data quality, and improves data management and access.

By leveraging a clear product structure, companies may more effectively merge, manage, and utilize their combined product data, ultimately contributing to a successful integration and post-merger success. Similarly, business process alignment is necessary during M&A to achieve operational efficiency, consistency, and integration. Also, systematizing IT systems is just as critical as organizing product-related data assets. IT systems support a company's operations, and everything from daily business processes to strategic initiatives. It is the productized offering that is tangible to approach first when aligning the whole formed by business processes, IT systems, products, and data when working towards reaching post-merger success. Utilizing productization and product structure logic to achieve consistent product data may support simplifying the information landscape and allow effective addressing of the other necessary elements of the whole. Nevertheless, productization efforts may prove to be challenging in the case of complex product portfolios if the required resources are significant. In these cases, developing the understanding of the original offerings could take a lot of time. However, the productization could be less time-consuming if some kind of software tool would support it effectively. The use of artificial intelligence might be beneficial in this scenario.

Finding: *Productization can act as a tool for modeling combined product offerings in M&A, and can potentially support product data systemization, and it may provide synergies in the marketing & sales, the delivery, and the overall integration.*

The study provides a novel contribution to the current literature on productization, for example [12]-[14][22][24], by highlighting the importance of companies' understanding of their offerings in case of mergers and acquisitions. The use of a product structure that acknowledges the commercial and technical dimensions of an offering, for example [7,10,14,16], is extended to model the integration of two independent offerings in mergers and acquisitions.

Insights are provided for managers of firms under M&A situations, on how a uniform product structure can support the systematic description of the companies' offerings and support their combination. A consistent product structure supports the consistency of data. Managers must understand that product data consistency can be challenging to achieve without a uniform product structure logic. The lack of consistent product data may, for instance, hinder the ability of product analysis. Having a structure that considers the commercial and technical views of the offering and the link between them can provide clarity on what the companies are selling and delivering. Systematic modeling of the offerings may further ease the linking of the offerings to the needed resources to support operational effectiveness and efficiency. Managers might want to consider the potential benefits of applying the commercial and technical productization logic in M&A situations as it

could be an enabler for information system integrations, business process management and product portfolio management. All of these can be demanding to organize effectively if a clear view of the new offering is lacking in the company.

VI. CONCLUSION

This study investigated productization through the commercial and technical product structures in an M&A situation. The aim was to create a uniform understanding of the two companies' offerings to form the basis for the systemization of product data, identify complementarities and overlaps between the companies' services and resources, and systematically construct the new, integrated offering.

The findings indicate that a consistent product structure logic that acknowledges the commercial and technical sides of an offering can be used to gain a uniform understanding of the offerings of two companies in M&A. Having a clear view of the companies' commercial and technical sides of offerings and linking the offerings to the corresponding resources may allow finding complementary and overlapping services and resources. Opportunities for new services may also be identified. Similar resources can be integrated for larger production volumes or eliminated. Having a uniform, structured way to model the independent offerings of two companies enables the systematic creation of the integrated offering. The structured, integrated offering may support the overall integration of the two companies. The consistent product structure logic seems to form the foundations for product data systemization in M&A. Thus, it may aid the integration of business processes and IT systems. The formed product analysis capabilities may also serve the post-merger needs.

The results are limited by the presented logic being applied to a small number of companies in one M&A instance. However, the basic idea is validated. The studied companies were small-sized machine shops that identified themselves as manufacturing service providers, which also limits the area of application experience. The offerings were modeled as services in this study. Different types of products, including physical products and software, might provide different results. Particularly software type of products might have different types of factors affecting the structural consideration. Also, the size of the studied companies may affect the results or their utilization. The amount of manual work needed to model an offering may increase significantly if the size or complexity of the offering increases, potentially necessitating tool support. It is also unknown whether the benefits of modeling the offerings exceed the costs. More evidence of utilizing a uniform commercial and technical product structure logic in an M&A situation is needed. This study presents the basic product structure logic applied in one M&A instance, and it can support future research. In the future, one could supplement the findings of this study from many different perspectives.

Future studies could investigate the utilization of commercial and technical product structures for the good of successful M&A in the case of different types of products and

companies. Especially, applying the commercial and technical product structure logic to productize software products in an M&A situation could be an interesting research direction due to their specialty. In addition, it could be valuable to investigate product portfolio management after M&A in cases where this kind of systematic productization logic has been used and compare the results with M&A situations that do not take advantage of the potential of the logic. However, it might prove to be difficult to carry out comparative studies of this kind. Utilization of the logic as an enabler for integrating business processes and IT systems in M&A context could also be studied further.

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