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Reference:

Coreynen Wim, Matthyssens Paul, De Rijck Roel, Dew it Ivo.- Internal levers for servitization : how product-oriented manufacturers can upscale product-service systems
International journal of production research - ISSN 0020-7543 - 56:6(2018), p. 2184-2198
Full text (Publisher's DOI): <https://doi.org/10.1080/00207543.2017.1343504>
To cite this reference: <http://hdl.handle.net/10067/1449510151162165141>

Internal levers for servitization: how product-oriented manufacturers can upscale product-service systems

Manufacturing companies that venture into servitization can experience difficulties when upscaling product-service systems (PSS) for further growth. This research study has two main objectives: first, to develop insight into the internal levers to increase firms' servitization capacity, and second, to apply a new methodology to support companies in upscaling PSS. For these purposes, we conduct an exploratory research study of eight manufacturing companies, consisting of both multiple case and participatory action research methods. We find that manufacturers often experience challenges when either designing or rolling out PSS, which varies based on the company's chosen strategy. Additionally, they can be confronted with an organisational logic that hinders PSS upscaling efforts. This research offers guidance to practitioners facing internal barriers for servitization, providing a new method to explore, prioritise and work out concrete PSS-enhancing projects.

Keywords: product-service systems, design for service, manufacturing strategy, servitization, upscaling

1. Introduction

Over the past decade, the topics of servitization and product-service systems (PSS) have gained considerable ground in academic research (Beuren, Gomes Ferreira, and Cauchick Miguel 2013). For instance, the literature on production research (Durugbo 2014; Szwejcowski, Goffin, and Anagnostopoulos 2015), service management (Kindström, Kowalkowski, and Alejandro 2015; Visnjic, Wiengarten, and Neely 2014) and industrial marketing management (Kowalkowski *et al.* 2017; Kowalkowski, Gebauer, and Oliva 2017) offers both insights and guidance. The transition towards PSS is considered '... an innovation strategy, shifting the business focus from designing physical products only, to designing a system of products and services which are jointly capable of fulfilling specific client demands' (Manzini and Vezzoli 2003 p. 851). Manufacturers increasingly consider servitization for a number of different reasons: to remain strategically relevant in times of commoditisation (Matthyssens and Vandenbempt 2008), to offer an alternative to low-cost competitors (Baines *et al.* 2007), to address higher customer expectations and to make better use of constant technological innovation (Vandermerwe and Rada 1988).

Although manufacturers acknowledge the importance of moving into services, many are unable to exploit their full potential. Only a limited number of companies achieve financial success with their service strategy (Baveja, Gilbert, and Ledingham 2004; Eggert *et al.* 2014). Manufacturers, in particular, experience issues reaching sufficient scale in regard to service activities, which is considered as a key requirement when moving into new service additions (Matthyssens and Vandembemt 2008; Visnjic and Van Looy 2013). The reason why manufacturers are unable to turn services into growth is still considered ‘a black box’, but literature does offer some thoughts on the phenomenon. Often times, external reasons are posited, such as customers who simply prefer to purchase products rather than pay for their use or results (Rexfelt and Ornäs 2009) or customers who do not place a high value on services and are therefore unwilling to pay for them (Beuren, Gomes Ferreira, and Cauchick Miguel 2013; Witell and Löfgren 2013). Reasons internal to the company are investigated less, especially when it comes to the process of upscaling PSS within the organisation.

The aim of this research is twofold. First, we intend to shed light on the internal levers available to companies to increase their servitization capacity towards better-integrated PSS. Prior research has often focused on the link between different service strategies and success without considering the organisational capacity needed to implement PSS (Eggert *et al.* 2014; Fang, Palmatier, and Steenkamp 2008). Because the process of PSS upscaling is still an under-researched topic, we opt for an exploratory case study approach (Yin 2011). Second, we aim to develop a new methodology for companies to generate, prioritise and work out concrete projects to enhance PSS. The majority of PSS design tools tend to focus on improving the offering itself (Szwejcowski, Goffin, and Anagnostopoulos 2015) without much attention to the specific context of the company. This research joins the call for new methods that integrate knowledge from multiple organisational science domains (Song *et al.* 2015; Vasantha *et al.* 2012).

Before continuing, we offer a brief overview of this paper. First, we explain the chosen research methodology and describe the different methods of data collection used in this research. Second, we present the research in two main stages, iteratively going back and forth between the consulted literature and our own data. In the first stage, we examine manufacturers from a holistic perspective in order to find what their potential barriers are to upscale PSS. In the second stage, we delve deeper into these barriers and address several managerial suggestions and methods that have been posited in prior literature to help companies overcome them. These insights serve as input to develop our own methodology to

assist companies in PSS upscaling. Third, we discuss the two research stages and evaluate the impact of this approach on the studied cases. Finally, we conclude by summarising the main theoretical contributions of this study, making specific recommendations for practice as well as suggestions for future research.

2. Research methodology

With the twofold aim of this research being to investigate the internal levers necessary to increase companies' servitization capacity and to develop a new method to support companies in upscaling PSS, this study combines multiple case study and participatory action research as its main methodology.

Developing multiple qualitative case studies allows the researchers to build new business theory (Barratt, Choi, and Li 2011; Beverland and Lindgreen 2010). In this study, we produce new knowledge on how companies upscale PSS within their organisations by examining different cases. This way, we ensure sufficient depth for every case while also maintaining enough variety among them. At the start of the research, a specialised consultant (co-author) and panel of experts identified eight companies that have taken concrete steps or have shown clear interest towards in PSS. Table 1 offers an overview of the studied cases, their main products, the type of PSS offered based on Brax and Visintin's (2017) meta-model of servitization, and the size of the company based on number of employees. Following a cross-case analysis (Eisenhardt 1989), we search for patterns in terms of PSS strategies and barriers, and compare cases on how they attempt to upscale PSS over time.

Table 1. Case companies.

We supplement the multiple case study approach by participatory action research (PAR) as an operative research method for both data and theory generation. PAR is a convenient method for bridging theory and practice as it involves both critical reflection and evaluation, making it useful for improving conditions (Koshy, Koshy, and Waterman 2010; Lingard, Albert, and Levinson 2008). It also stimulates practitioners to engage with the research (Meyer 2000). For this study, PAR was used as a step-by-step process to monitor the subjects over a period of 18 months using different data collection methods, allowing feedback to be translated into concrete suggestions for action (Cohen, Manion, and Morrison 2011). The degree of participation among the researchers was kept balanced between being insiders and outsiders,

meaning that, depending on the activity in question, one would steer the discussion while the other mainly observed. For instance, during the company interviews, an academic researcher asked the questions, guiding the conversation through the topics of the research, and the consultant later challenged the companies with insightful and practical frameworks as fuel for further discussion. This form of collaboration between academics and practitioners is useful for encouraging the business applicability of new methodologies (Vasantha *et al.* 2012).

Figure 1 presents this study's research framework. We combine several lenses to increase our understanding of PSS upscaling, namely 'content' (what are companies' current PSS offerings and intentions for the future), 'process' (how do they upscale PSS) and 'context' (what barriers are present within the organisation that inhibit PSS upscaling). This multiplex of content-process-context perspectives is considered necessary when building new theories about complex and dynamic strategic issues (Matthyssens and Vandembemt 2003; Pettigrew and Change 1988). Case studies and PAR are therefore highly applicable to this topic, since both methods are situation-based and context-specific, and take into account the content of the intended strategy as well as the process of implementation. Also, through systematic combining (Dubois and Gadde 2002), we juxtapose our own collected data with existing theoretical insights on PSS upscaling. In practice, this means we collected and analysed the data together with the literature, iteratively going back and forth between the two (Orton 1997). In line with this approach, the research is split into two main stages. In stage one, we examine companies' internal barriers to successfully upscale PSS while considering their different service strategies or intentions. In stage two, we delve deeper into these barriers and consult prior literature as input to develop a new methodology to help companies prioritise and work out concrete PSS-enhancing projects.

Figure 1. Research framework.

As empirical fieldwork, a variety of data gathering methods were used (Patton 2001), including focus groups, in-depth interviews with companies, consultation with experts, and company workshops, which ensures data triangulation (Eisenhardt 1989). Figure 1 provides a chronological overview of the various actions undertaken throughout the 18-month period. The timing of each action is also given; for example, 'M3' means that focus group 1 took place during the third month of the project. The brackets indicate which research stage each action has mainly contributed to. We will now discuss each data collection method separately.

Three focus groups with the eight selected manufacturing companies were conducted with each session lasting approximately two hours. They took place at about the beginning, middle and end of the project. The focus groups were held for the purpose of introducing the research, providing updates and discussing issues matching the steps of our research, i.e. current PSS offerings, intentions and drivers (focus group 1), barriers in upscaling (focus group 2) and potential organisational levers for enhancing PSS (focus group 3). We chose a moderately structured format for all focus groups (Morgan and Krueger 1997). For the first two focus groups, we also invited service experts, advisors and representatives from two intermediary organisations (for the mechatronics industry and small and medium-sized enterprises) to share their insights. They did not attend the third focus group since the cases' confidential results based on the in-depth company interviews were then discussed. Instead, experts and advisors were consulted at regular intervals to discuss the general findings as well as potential methods for supporting companies regarding PSS.

Two rounds of in-depth interviews were conducted with all participating companies. Each interview took place between the second and third focus group and lasted about two hours. The CEO of the company was interviewed, often joined by a manager in charge of business development, operations, (after-)sales or communications. Before visiting the company, secondary data was gathered on the company by consulting their website, online (press) articles and videos. During the first interview, the company's history, strategy, current products and services, drivers and intentions for PSS were discussed using a semi-structured interview protocol. During the second interview, we focused on the company's barriers for upscaling PSS. One researcher took extensive notes during the interviews and focus groups; these notes were checked and completed by the other researchers shortly thereafter. Most interviews and focus groups were also audio-recorded and transcribed. All companies were given written reports shortly before the third focus group, describing the company's current and desired state in terms of PSS as well as identified barriers to overcome in both the short and long-term.

Finally, two case companies were selected for four three-hour workshops (the selection process is further explained in the findings section of stage two). Together with the company's CEO and three to five key employees, we conducted two workshops emphasising idea generation (workshop 1) as well as prioritisation and definition (workshop 2) of PSS-enhancing projects. This process was inspired by prior work by Jacoby (2012), who organises innovation activities into three domains: 'exploration', 'idea generation' and 'project

definition'. The specialised consultant involved in this research guided the workshop while the first author participated mainly as an observer. Notes and pictures were also taken throughout the workshops.

3. Research stage one: PSS strategies and internal barriers for PSS upscaling

Following a systematic combining approach, we first summarise the literature on PSS upscaling and its relation to company growth. Next, through multiple case research, we aim to find what potentially blocks manufacturers from upscaling new service activities. The findings from this research stage serve as input for the second stage where we move deeper into the identified barriers and develop a method to help companies enhance PSS.

3.1 Literature review

The inability to move into services often leads to a profitability hurdle for manufacturers. Growth through services only seems feasible to the extent that investments in service capability are translated into economies of scale (Kowalkowski *et al.* 2015; Visnjic and Van Looy 2013). At first, when companies offer services on a limited scale, picking '... low-hanging fruit that can be harvested early on' (Visnjic and Van Looy 2013 p. 172), growth coincides with higher profit margins. However, companies often run into trouble when service activities progress to a moderate scale and additional resources need to be allocated to the service organisation (Eggert *et al.* 2014). It is during this stage that margins decline and companies are tempted to deviate from the services path. In the literature, this issue is referred to as 'the service paradox' (Gebauer, Fleisch, and Friedli 2005).

So far, little attention has been paid to the internal barriers preventing companies from upscaling PSS more successfully. Prior research outlines a number general resources and capabilities that firms need to acquire to leverage this transition (Kindström and Kowalkowski 2014; Ulaga and Reinartz 2011), but further insight is still needed on how manufacturers can enhance their servitization capacity while taking their specific intentions into account. For instance, companies may differ in the type of PSS strategy they want to pursue due to the generic pre-existing business logic of their industry (Storbacka 2011). Also, some companies may have a surplus of resources to explore new PSS opportunities while others do not (Fang, Palmatier, and Steenkamp 2008). For instance, the means available to small vs. larger companies to develop new services often differ (Paiola, Gebauer, and Edvardsson 2012).

Recently, there has been a rise in the number of academic papers addressing servitization from a holistic perspective; see for instance prior work by Kindström and Kowalkowski (2014), Song *et al.* (2015), and Rabetino, Kohtamäki, and Gebauer (2016). Moving towards PSS is increasingly being viewed as an organisation-wide challenge, and managers are advised to consider all elements of the firm's business model (Kindström and Kowalkowski 2014). During the empirical fieldwork, we apply a similar holistic perspective to search for what potentially blocks companies from upscaling PSS.

3.2 Research findings

During the initial interviews and focus groups, we discussed the case companies' strategies for PSS. Table 2 offers an overview of the cases' current and intended PSS based on the meta-model of servitization (Brax and Visintin 2017). It also includes a description of the most important drivers that managers mentioned for their servitization efforts.

Table 2. Description of case companies' current PSS offerings and intentions.

Concerning current PSS offerings, we notice a division between companies located near the lower end of the PSS spectrum (*Beta, Delta, Epsilon, Kappa*) and those that have already advanced to higher value-added services (*Alpha, Gamma, Lambda and Mu*) (Brax and Visintin 2017). Also, we find that companies offer services that either support the functioning of the product (*Delta, Epsilon, Kappa, Lambda*) or customer processes (*Alpha, Beta, Gamma, Mu*) (Oliva and Kallenberg 2003; Ulaga and Reinartz 2011). Regarding future intentions, we note a difference between companies that want to move into new types of PSS (*Alpha, Beta, Delta, Epsilon and Mu*) and those that prefer optimising the delivery of current PSS offerings (*Gamma, Kappa, Lambda*).

Although the studied case companies profess clear ambitions for further growth through service addition, they seem to 'get stuck' at a certain point when upscaling PSS. We distil three types of barriers that companies addressed during the interviews and focus groups.

A first group of companies considers servitization as a valuable route for future growth, yet in practice they mainly focus on updating the product or improving internal efficiency. For example, they create solutions starting from the physical product rather than customer needs, their R&D departments emphasise the importance of product and

technological innovation, and service is provided only later as an add-on. Such companies lack integrated PSS design skills and processes. Three noteworthy examples:

- *Beta* says it has limited means to explore new opportunities with clients for security and data analysis services because daily operations are mostly geared towards implementing current projects more efficiently.
- *Epsilon's* previous CEO claims that 'customer intimacy' (Treacy and Wiersema 1993) is their core strength, yet the new CEO admits that providing switchboards efficiently, and at competitive prices (namely 'operational excellence'), has been the company's main focus for years.
- *Kappa* transfers responsibility over repair and maintenance services to dealers abroad. However, the company sells so few of its new line of high-end printers that the dealer is often unable to resolve repair issues, leading to longer resolution times for clients.

A second group of companies mainly struggles with exploiting current service practices, for instance by expanding the market, retraining sales staff, making internal operations more efficient and experimenting with new revenue models such as leasing and performance-based contracts. Also, some companies have started to servitise unintentionally based on a handful of customer requests but without procedures being embedded in the organisation. These companies seek to achieve further growth by either increasing revenue or pushing down costs, thus further 'unlocking' their current PSS potential. Three observed examples:

- *Alpha* offers a wide range of services to support podiatrists. However, the company owners prefer to deal with customers themselves, and employees are not yet familiar with client relations procedures.
- *Gamma* offers total office furniture solutions, yet the sales and interior design departments are often in conflict over who should provide advice to the client and to what extent. Also, current promotion materials solely emphasise the quality of the physical product rather than the total solution being offered, which includes advice, installation and removal of used furniture.
- *Lambda*, a business unit of a large stainless steel pump manufacturer, says it has trouble upscaling new PSS initiatives within the organisation because R&D, production and other business units within the company are not yet used to this new approach.

Finally, a third group of companies lacks an organisational mindset that supports PSS. This issue seems particularly common in larger, product-dominant companies with multiple

business units or departments. Interviews at these companies reveal that it is considered difficult to take the organisation in a new direction since most strategic decisions are made higher-up in the hierarchy. Two observed examples:

- The engineering manager at *Mu*, a large, public multinational company, says that the organisation lacks the mindset and structure to support ideas that are out of the scope of technological innovation. Fundamental changes in the core offering are not supported by management due to fears of the effect they may have on shareholders.
- The after-sales service manager at *Delta*, a global niche player with foreign headquarters, says the focus on satisfying customers by proactively solving their problems is limited among staff members. The after-sales department is even physically separated from the rest of the company.

In sum, derived from the studied cases, three types of barriers prevent companies from upscaling PSS (see Figure 2). First, companies may lack sufficient knowledge or experience to develop fully-integrated PSS, and choose to focus only on improving products and technologies. We call this a PSS ‘design’ barrier. Second, companies may lack a go-to-market strategy to further capture PSS, and offer services either in a reactive manner or only to a handful of customers. We refer to this issue as a PSS ‘rollout’ barrier. We found that both issues exist primarily on the business unit level, whereby managers in charge of certain products emphasise either one or the other barrier. Third, in addition to the previous two barriers, companies may not have the necessary organisational mindset to either develop or implement PSS due to a history of simply providing products or an inherent distrust in the potential of PSS. We refer to this issue as a PSS ‘logic’ barrier, and it is present at the underlying company level. In small companies, these levels mostly overlap, but in larger companies, there can be a distinct difference in logic between different business units and departments.

Figure 2. PSS upscaling barriers.

Although three barriers are highlighted, multiple hindrances may occur simultaneously in practice. For instance, companies may run into problems rolling out PSS either because of a failing PSS design approach or an unsupportive organisational logic. *Alpha*, for example, specifically targeted beginning podiatrists rather than considering older, more traditional podiatrists during the development process. Therefore, the company is now less able to sell its

solution to both customer segments. *Lambda*, on the other hand, has trouble meeting customer requests because, as a business unit in charge of selling steel-pumps to the industrial sector, it does not share the same customer-oriented mindset as the overall company.

During the first steps of the research, companies expressed the need for prioritisation. What barrier should they focus on first to help leverage other barriers in PSS upscaling later? For instance, *Lambda's* business unit manager says it will only be able to further implement procedures when the overall company culture is in favour of delivering PSS. Also, companies that look to reap short-term benefits say they prefer taking small steps by focusing on successfully exploiting current PSS initiatives. As an example, *Epsilon*, a product-dominant company, wants to gradually move into services by offering upgrade services to their current installed-base of electric switchboards. Also *Beta* indicates that, before venturing into new types of services, it wants to focus on streamlining current operations in areas such as personnel planning and stock maintenance to assist current clients more efficiently.

4. Research stage two: a methodology for companies to enhance PSS upscaling

Moving on from case study research into participatory action research as our main methodology, the aim of stage two is to help companies leverage PSS by giving insight into their barriers for servitization, and assist them in prioritising and working out concrete PSS-enhancing projects. In line with the systematic combining approach, we first go deeper into the literature regarding the three barriers identified in stage one. Next, in the research findings section, we describe the development and results of a new methodology, consisting of a diagnostic instrument and set of workshops, to help companies upscale PSS.

4.1 Literature review

As demonstrated in stage one, three general themes emerge from the findings when looking for barriers in servitization: an overemphasis on product innovation, the inability to capture the value of PSS in a successful business model, and a lacking organisational logic that supports the integration of goods and services. We now turn to what the literature says about each barrier in more detail. Attention will also be given to the managerial suggestions and methods proposed to help companies overcome these barriers and, thereby, increase their servitization capacity.

4.1.1 Design

The successful development of PSS depends to a large extent on the front-end of innovation. Many significant benefits can be achieved when companies would only alter their starting points (Beuren, Gomes Ferreira, and Cauchick Miguel 2013; Jacoby 2012). However, product-oriented manufacturers are geared towards innovating products, and they generally lack experience in service innovation. Consequently, companies that venture into services often remain at the ‘service as add-on’ stage, providing services such as phone support, printed materials and user training (Parida *et al.* 2014).

In order to successfully develop integrated PSS, manufacturers need to become familiar with new design approaches (Morelli 2006). Three oft-cited approaches to service innovation in a manufacturing context are the ‘assimilation’, ‘demarcation’ and ‘synthesis’ approach (Carlborg, Kindström, and Kowalkowski 2014; Coombs and Miles 2000). The first approach attempts to assimilate services within the framework of product innovation, such as through the adoption of new technologies (e.g. product upgrades, technical support services). The second emphasises the unique, non-technological characteristics of services, thus separating service from product innovation (e.g. knowledge-sharing, supporting customer processes). The third aims to fuse both into one integrated approach, combining both technological and non-technological forms of innovation (Gallouj and Windrum 2009). Because integrated PSS design methodologies are not well-known among manufacturers, these companies tend to resort to traditional product design methodologies (Beuren, Gomes Ferreira, and Cauchick Miguel 2013).

Manufacturers need to decide the level of resources to invest into a certain approach, as each carries its own implications for growth. For instance, service innovation that is isolated from product innovation may lead to short-term financial gain with the risk of long-term knowledge loss, whereas the synthesis approach can lead to a short-term performance sacrifice in order to fuel long-term benefits (Visnjic, Wiengarten, and Neely 2014).

4.1.2 Rollout

Manufacturers are often unable to translate PSS into successful growth for the company. The issue of deployment, which focuses on the latter phases of servitization such as sales and delivery, is generating increased interest in service innovation research (Carlborg, Kindström, and Kowalkowski 2014). The ability to create attractive business models is a key challenge for manufacturers to make a successful transition towards services (Parida *et al.* 2014; Visnjic

et al. 2016). Companies need to carefully consider the type of service business model they want to deploy. Most companies begin by offering lower value-added services at first, such as maintenance and installation services, and later move to higher service levels, such as R&D support and operational services. When doing so, companies generally do not abandon the first level of services but rather build a new level on top of the first, managing the co-existence of different supplier roles (Kowalkowski *et al.* 2015; Parida *et al.* 2014). This transition seems to be the most common choice for manufacturing firms, since they are able to draw from earlier knowledge gained in offering product-oriented services before gradually moving into more customer-oriented services (Eggert *et al.* 2014; Visnjic, Wiengarten, and Neely 2014).

Unlike methods for PSS design (Vasantha *et al.* 2012), tools to evaluate possible PSS business scenarios are far more limited. One example is by Bezerra Barquet *et al.* (2013), who used the Business Model Canvas (Osterwalder and Pigneur 2010) to assist a machine tool manufacturer in investigating different PSS scenarios. By using the canvas, the company could identify, compare and choose from different types of PSS based on their respective characteristics. Besides remodelling the organisation, manufacturers also need to implement safeguarding mechanisms to meet new performance commitments to customers while maintaining internal profit targets (Ulaga and Reinartz 2011). For this purpose, Settanni *et al.* (2014) introduced a through-life-costing methodology to address the challenges of PSS cost assessment.

4.1.3 *Logic*

On top of the previous two barriers, the company's existing mindset is considered one of the main barriers to PSS (Kindström 2010). Due to the inherent differences between goods and services, product-dominant companies '... fail to integrate the two effectively and do not successfully exploit the financial potential of an extended service business model' (Ryan 2013 p. 1). There are various explanations as to why a company's logic can block PSS. First, from a strategic perspective, product-oriented managers are restrained by several cognitive phenomena, such as a preference towards the tangible features of new products and technologies, a lack of faith in the economic potential of services and a fear of taking on risks that were previously carried by the customer (Gebauer, Fleisch, and Friedli 2005). Second, from an operational perspective, product-minded employees resist moving into services as it may require them to develop new skills geared towards solving customer problems. Some do

not have these skills or are reluctant to apply them (Matthyssens and Vandenbempt 2010; Ulaga and Reinartz 2011). Third, the organisational structure may not be suited to a particular type of service strategy. An example would be the structural differences between an after-sales service provider that supports the mere functioning of products vs. an outsourcing partner that takes over specific customer processes (Eggert *et al.* 2014; Gebauer, Edvardsson, and Bjurko 2010).

In order for manufacturers to servitise successfully, they are advised to move towards a new logic that supports the integration of goods and services (Ryan 2013). This logic consists of both ‘soft’ and ‘hard’ organisational features, such as an organisational culture that embraces PSS as well as structure that supports activities for both PSS development and implementation (Homburg, Fassnacht, and Guenther 2003). A service orientation within the corporate culture, clearly reflected in the values and behaviour of managers and employees, is positively associated with companies’ overall performance (Gebauer, Edvardsson, and Bjurko 2010; Raddats, Burton, and Ashman 2015). For example, when sales channels of different product and service units collaborate, they can more easily clarify common approaches to address customer needs (Gebauer and Kowalkowski 2012). Also, as companies move from services supporting products to services supporting customer processes, decentralising decision-making authority to lower hierarchical levels increases financial growth (Eggert *et al.* 2014). Managers should be aware of these complex interactions and provide sufficient time and resources to change the current organisational logic towards one that supports PSS (Gebauer, Edvardsson, and Bjurko 2010).

4.2 Research findings

Based on the consulted literature, we developed and applied a new methodology to support companies in prioritising issues and working out concrete projects to upscale PSS. The methodology consists of a diagnostic instrument and set of workshops.

The purpose of the diagnostic instrument is to offer companies insight into their PSS upscaling barriers. The instrument consists of three parts and was used during the second round of in-depth interviews (see Figure 3). First, to understand how the case companies design PSS, we posed several questions derived from the three service innovation approaches described by Coombs and Miles (2000). These included: what is the company’s approach to designing PSS? What type of features does the company consider important in innovation? How are customers involved in the development process? And how does the company

translate customer feedback into their operations? Second, to learn how companies roll out PSS, inspiration was taken from the Business Model Canvas (Osterwalder and Pigneur 2010) and Goods vs. Service-Dominant Rating Table (Ryan 2013). For instance, we asked whether the company's value proposition puts emphasis on selling tangible products or providing solutions, and whether customer interactions are mainly considered transactional or relational. A further inquiry involved asking if service is delivered on an ad-hoc basis or a clear process-oriented basis. Third, to understand companies' logic towards PSS, we made use of prior work on service orientation and corporate culture (Gebauer, Edvardsson, and Bjurko 2010) complemented with questions from the Competing Values Framework (Cameron and Quinn 2011). For instance, do managers and employees recognise service as a lasting and profitable strategy, and are rewards given for service-oriented behaviour? Is emphasis put on taking risks, achieving targets or simply following rules and procedures? And does management take on a supporting, coordinating or result-oriented leadership role? Finally, on organisational structure, we asked whether the service organisation is separated from other units and departments, or integrated.

Figure 3. Diagnostic instrument overview.

The diagnostic instrument allowed the researchers to evaluate the eight companies on relevant features of each of the three highlighted barriers, and pinpoint potential weaknesses in bridging the gap between their current and desired PSS position. We provided a summary to each studied company with a prioritisation of issues that they should consider as potential levers to increase their servitization capacity. The summaries were provided to the participating managers as written reports, along with a description of the key findings from the interviews. We describe the outcome of three cases, and illustrate their suggested priorities in Figure 4:

- *Alpha's* priorities are to first focus on 'rollout', followed by 'design'. The company has already taken tremendous steps in providing solutions to podiatrists, ranging from installing foot scanners to offering manufacturing services as well as advice on office set-up and training. The company is currently also creating a new web application for podiatrists to design insoles themselves. However, customer relations are managed by the company's owners, with procedures less known by the staff. Also, repair services for scanner malfunctions are still offered to customers without charge, and the

company seems reluctant to move into service contracts. Finally, in terms of design, there are still possibilities to improve overall customer experience, such as in terms of packaging and branding.

- *Beta's* priorities are to focus on 'design', followed by 'rollout'. Today, the company focuses primarily on the sales, installation and repair of security camera systems, yet the CEO/owner has several ideas on different types of services they could offer. For instance, one customer recently asked the CEO to help them increase production efficiency through camera footage analysis, but the company has not yet researched whether such ideas have potential in the market or for profitability. Once new PSS concepts have been defined, they will also need to work out new procedures for sales and delivery.
- *Epsilon's* priorities are to first focus on 'logic', followed by 'design'. This goods-dominant company is heavily focused on increasing efficiency in production. Although the importance of moving towards PSS is recognised (the CEO even mentioned some ideas on upgrade and maintenance services), current operations are geared towards technological and process optimisation. To enhance PSS, the company should allow the means and incentives for employees to explore new PSS concepts. Once these means are made available, the company can undertake several actions to design better-integrated PSS. An example would be to pro-actively engage with customers regarding their requirements.

Figure 4. Examples of case companies' priorities.

As a final method in our empirical fieldwork, we conducted two workshops at *Alpha* and *Beta* to help them further prioritise and work out concrete PSS-enhancing projects. These cases were chosen for two reasons. First, they differ in terms of their experience and intended goals for PSS (see Table 2), and deal with different types of barriers (see Figure 4). Second, they are both small companies with about 10 to 15 employees and managed by their owners. With the similar size of the companies as well as the owners' motivation to participate in this project, the opportunity for having an impact in terms of PSS upscaling was considered higher at these companies than at the larger companies involved in this research.

During the workshops, the CEO together with three to five key employees (e.g. from sales, installation, administration) were taken through several interactive discussions using

flipcharts, post-it notes and dot stickers. In the first workshop, participants discussed current sector trends and changes in customer needs to come up with distinct ideas for both PSS rollout and design projects. For instance, *Alpha* considered opening a pop-store and improving efficiency by focusing on several logistical issues to upscale current operations. The participants also discussed new types of training for podiatrists on biomechanical analyses. *Beta* considered logistical issues in the areas of supply management and improved communication between installers as well, and further explored the concept of extending into data analysis services. In the second workshop, these ideas were discussed further per their potential in the market as well as return for the company, while considering the company's barriers derived from the results of the diagnostic instrument. For instance, based on the outcome of the diagnostic instrument, *Alpha* put emphasis on rollout projects that further upscale current PSS offerings. *Beta*, who ought to focus on design, gave priority to developing new services. By involving key employees who previously had not been included in such a workshop, the companies could evaluate their ideas from both strategic as well as different operational perspectives within the firm. We also guided the participants with more suggestions, for instance on how to increase customer involvement during the design process, attach sufficient financial and staffing resources to their projects and by referring to other PSS methodologies (Morelli 2006). By the end of the second workshop, participants had generated, prioritised and defined concrete PSS-enhancing projects including several practical issues such as timing, goals and project roles (e.g. project leaders and sponsors).

5. Discussion

This research paper has the objective of developing insight into the internal levers that are necessary to increase a company's servitization capacity, and applying a new methodology to support companies in upscaling PSS. For these purposes, we merged three perspectives on PSS upscaling, i.e. 'content' (current and intended PSS), 'process' (upscaling) and 'context' (barriers that inhibit PSS upscaling), and used systematic combining to move through two distinct research stages, which we further discuss here.

In stage one, we distilled potential barriers for PSS upscaling by examining companies' current PSS offerings and strategies. The eight studied companies all illustrate varying levels of experience as well as intentions for PSS. In general, we found that companies near the lower end of the PSS spectrum seem to desire moving into new types of PSS (*Beta*, *Delta Epsilon*), and companies at the higher end want to optimise their delivery of

current PSS (*Gamma, Lambda*). However, the relation between companies' current and intended PSS is more complex since some cases at the lower end tend to prefer optimising the delivery of current offerings (*Kappa*), while some cases at the higher end still want to progress to newer types of PSS (*Alpha, Mu*). We described three internal barriers that companies experience when upscaling PSS: a 'design', 'rollout' and 'logic' barrier. Companies that want to move into new types of PSS are primarily concerned with the first barrier, while companies that seek to optimise the delivery of current PSS offerings tend to emphasise the second. In addition, it is noted that an organisational culture that is not in favour of servitization hinders manufacturers in both PSS development and implementation activities. Regarding this third barrier, we observed a distinction between the smaller and larger companies involved. Small companies seem to have a more cohesive organisational mindset, with employees emphasising the importance of similar values. For example, during the first workshop and without prior discussion, *Alpha's* employees all underlined the same values that they feel characterise their company. Among the larger companies, we heard many more concerns about the lack of a shared organisational culture, which employees say they experience directly through difficult cooperation with other business units or departments. Also, the small companies studied seem to be strongly driven by the CEO/owners whose vision has a big impact on the company's overall strategy. In the larger companies, we observed that PSS is usually driven by one or several internal leaders who find themselves needing to convince others of the benefits of servitization.

In the second stage, we introduced a diagnostic instrument to help companies prioritise issues as levers to increase their servitization capacity. We also experimented with a new workshop format to generate, prioritise and work out concrete projects to enhance PSS. We found that this methodology has the potential to upscale PSS in three respects. First, the diagnostic instrument stimulates companies to reflect on their capacity for servitization before venturing into concrete PSS-enhancing projects. Second, companies become more familiar with the difference between 'exploring' vs. 'exploiting' service business opportunities (March 1991). Prior research indicates that companies put emphasis on either one or the other (Fischer *et al.* 2010), yet the capacity to strike a balance between both activities is considered positively related to firm growth (He and Wong 2004; O'Reilly III and Tushman 2008). This methodology encourages companies to distinguish PSS development (or 'design') from deployment (or 'rollout') projects, emphasising how they may differ both in terms of investments and benefits. Third, by involving employees from different functional

perspectives, companies can more easily address the various bottlenecks for specific PSS-enhancing projects, and gradually create a shared organisational logic in favour of servitization.

Overall, we found that the impact of our suggestions and actions differed for each case. Companies with prior experience in PSS were more engaged to actively participate in the project, whereas companies with less experience considered the process more an inspirational exercise to share knowledge with the involved researchers and other companies. We also engaged more easily with companies whose CEO was actively involved throughout the entire project. At the other companies, shared insights needed to trickle down to relevant stakeholders inside the organisation before further action could be taken, if at all. In sum, we found that the highest impact was achieved at companies with prior experience in PSS and whose CEO was actively involved in PSS upscaling.

6. Conclusions, recommendations for practice and future research

In this section, we summarise the theoretical contributions of this study, paying specific attention to its relevance for practitioners. Finally, we discuss the limits of our work and offer recommendations for future research.

This study explores the internal dynamics of what blocks companies from successfully upscaling PSS, taking a holistic approach to unravel the internal barriers encountered by firms that are in the process of servitization. Depending on their strategy for PSS, we find that companies experience barriers that are generally related to either ‘design’ or ‘rollout’. In addition, an organisational ‘logic’ in support of servitization is noted as the necessary basis to successfully upscale PSS. Without such a mindset, the company is unlikely to make progress in either PSS development or deployment. For instance, in terms of PSS design, product-dominant companies mainly value tangible forms of innovation, and in terms of PSS rollout, they lack both the culture and structure to implement new service business models. They are therefore unable to move from services as mere add-ons to better-integrated PSS.

This study also introduces a new methodology to help companies increase their servitization capacity, thereby offering substantial practical relevance for managers and advisors. First, we raise awareness among practitioners that the barriers encountered in servitization are heavily dependent on the amount of prior experience in PSS as well as companies’ preferred PSS strategy. Second, we offer a diagnostic instrument that is based on several frameworks from the literature to address potential gaps between companies’ current

and intended PSS position. Practitioners can use and further extend this instrument to help companies prioritise their levers for servitization. Third, we describe a workshop format for companies to explore, prioritise and work out distinct PSS-enhancing projects. We have also integrated the concepts of ‘exploration’ and ‘exploitation’ into the methodology to help companies distinguish projects that explore new service business development ideas, whose benefits may only become apparent in the long term, from those projects that improve current offerings. Finally, by consulting with the CEO and involving employees from different functional perspectives, companies can develop an organisational mindset in favour of PSS that is more consistent throughout the organisation in question.

One of the limits of this research is that the studied companies are slightly similar to one another in the type of PSS offered. Based on the meta-model of servitization (Brax and Visintin 2017), our cases’ current PSS offerings are oriented mostly towards ‘installed and supported products’, with some extensions into ‘complementary services’, ‘operating services’ and ‘product-oriented solutions’. Future research is warranted in further investigating the topics proposed in this paper at companies that offer ‘managed service solutions’ and ‘total solutions’. It would be a valuable point of inquiry to determine whether more advanced servitised companies suffer from the same barriers related to PSS upscaling as those found in this research paper or whether they experience other types of hurdles. A similar argument also applies to the comparison of companies from industries with different business logics. Most of the cases involved in this research paper have an installed-base of products, such as machinery, equipment and furniture, to which varying levels of services can be attached, including installation, maintenance and leasing services. It may be worthwhile to compare companies from industries with other business logics such as input-to-process providers that provide integrated components that are ‘lost’ within the customer’s end-product (Storbacka *et al.* 2013).

Second, as with any form of exploratory research, we should be careful in generalising these results. For the purposes of this study, a combination of multiple case and participatory action research was chosen. Based on these methods, we are not able to make grounded claims on whether prioritising and investing sufficient means to address different PSS upscaling-related barriers may lead to actual performance growth in practice. However, the consulted literature that analysed the link between different service innovation strategies and performance does strongly point towards some of the suggestions made in this paper (Baveja, Gilbert, and Ledingham 2004; Visnjic and Van Looy 2013; Visnjic, Wiengarten, and Neely

2014). We therefore call for additional quantitative research to further analyse the relationship between different PSS strategies, barriers and performance. A potentially interesting area of further research is to investigate whether companies dealing with a ‘design’ barrier would benefit mostly from emphasising exploration activities and those dealing with a ‘rollout’ barrier from exploitation, or vice versa. It may also be of value to compare them with companies that put an emphasis on both types of activities. Finally, using a more experimental research design, future research could compare whether companies that have applied different PSS methods such as the ones proposed in this paper are indeed more successful over the course of time than companies that have not.

Acknowledgements

This work was supported by Flanders Innovation & Entrepreneurship as part of a Technology Transfer (TETRA) project carried out by Antwerp Management School.

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Table 1. Case companies.

Table 2. Description of case companies' current PSS offerings and intentions.

Case	Main products	PSS type	Company size
Alpha	Foot scanners and functional insoles	Operating services	Small
Beta	Security systems	Installed and supported products	Small
Gamma	Office furniture	Product-oriented solutions	Medium
Delta	Hydrogen generators	Installed and supported products	Medium
Epsilon	Electric switchboards	Products with limited support	Medium
Kappa	Vinyl cutters, printer cutters and contour cutting plotters	Products with limited support	Medium
Lambda	Stainless steel pumps	Product-oriented solutions	Business unit within a large-sized company
Mu	Air compressors	Product-oriented solutions	Business unit within a large-sized company

Table 1. Case companies.

Case	Current PSS	PSS intentions	Mentioned driver(s)
Alpha	Installation of scanners and after-sales support (<i>installed and supported products</i>); manufacturing insoles for podiatrists (<i>operating services</i>)	Development of a web application for podiatrists to design insoles themselves (<i>managed service solutions</i>)	- Increased customer demands in terms of advice, training and outsourcing of manufacturing activity - Opportunities in technological innovation
Beta	Installation of security systems and after-sales support (<i>installed and supported products</i>)	Data analysis services based on analysis of camera footage (<i>complementary services</i>)	- Threat from cheaper security systems manufactured in Asia
Gamma	Personalised advice on office set-up; installation and repair of office furniture (<i>product-oriented solutions</i>)	Efficiency gains in sales and delivery by implementing a new IT system	- Increased customer expectations in terms of overall customer service before and after-sales
Delta	Installation, maintenance and repair of hydrogen generators (<i>installed and supported products</i>)	Performance-based contracts (<i>system leasing</i>)	- Relieving customers from the initial high investment cost (capex)
Epsilon	Supply and installation of electric switchboards with limited after-sales service (<i>products with limited support</i>)	Maintenance, thermographic research and upgrade services (<i>installed and supported products</i>)	- Limited margins on the production and sales of electric switchboards
Kappa	Supply of cutter and plotter equipment through a network of dealers (<i>products with limited support</i>)	Increase support for dealers to provide better after-sales services to the end-customer	- Increased customer expectations (who often contact the manufacturer directly)

Lambda	Installation of customised stainless steel pumps; advice on optimal use of the product (e.g. detergent use) (<i>product-oriented solutions</i>)	Efficiency gains through increased collaboration between sales, R&D, production departments and others business units	<ul style="list-style-type: none"> - Competitors offer similar products - Opportunities in remote monitoring to proactively offer maintenance and repair services
Mu	Supply and rental of (customised) air-compressors (<i>product-oriented solutions/systems leasing</i>)	Energy-household services (<i>managed service solutions</i>)	<ul style="list-style-type: none"> - Customers are increasingly interested in outsourcing non-key activities

Table 2. Description of case companies' current PSS offerings and intentions.

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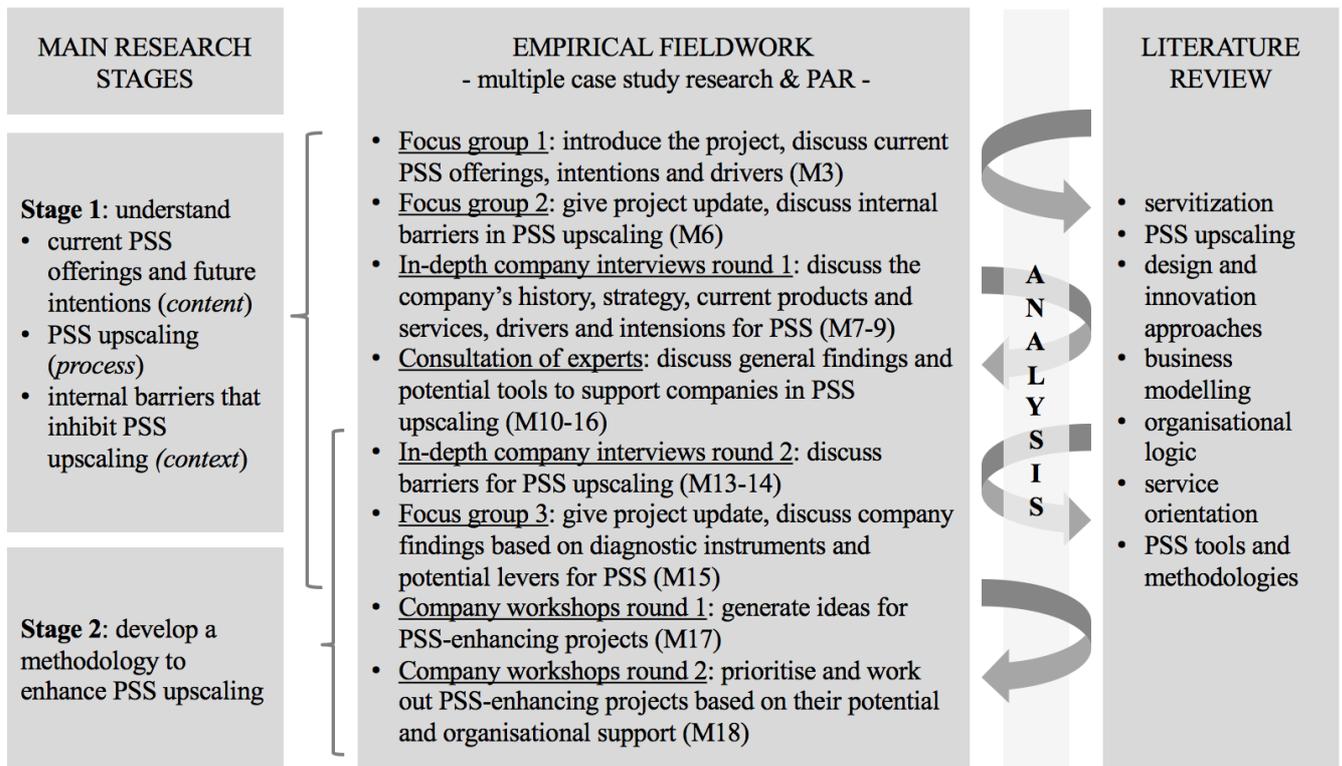


Figure 1. Research framework.

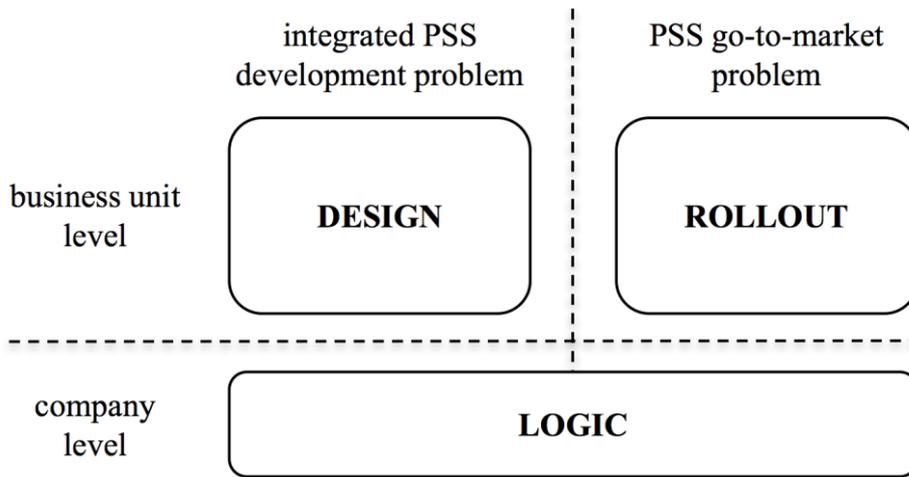


Figure 2. PSS upscaling barriers.

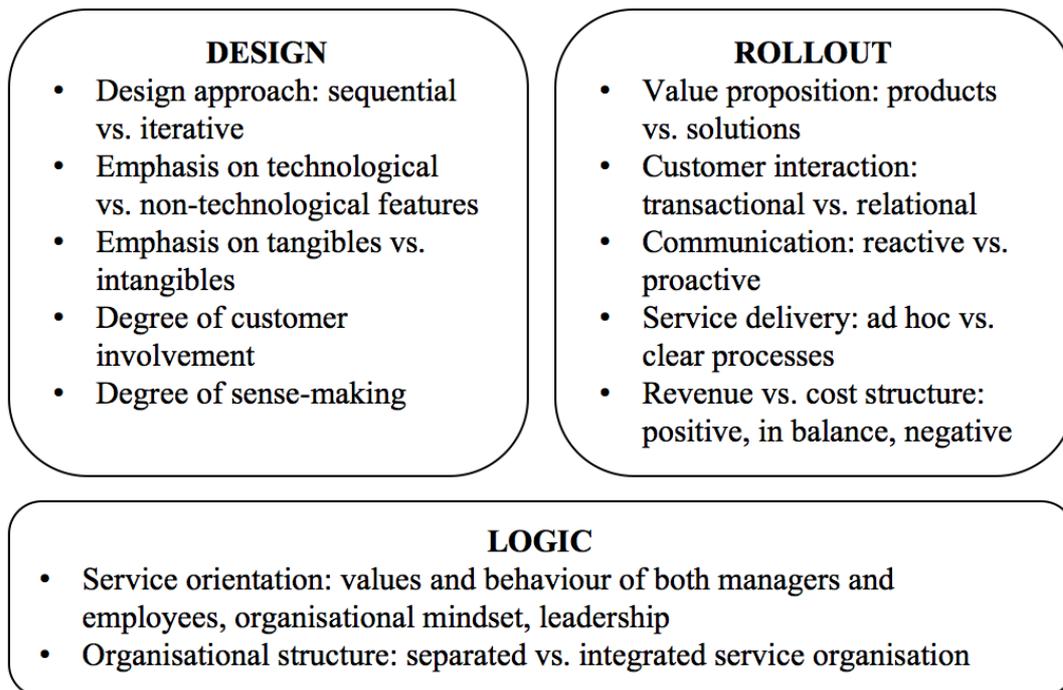


Figure 3. Diagnostic instrument overview.

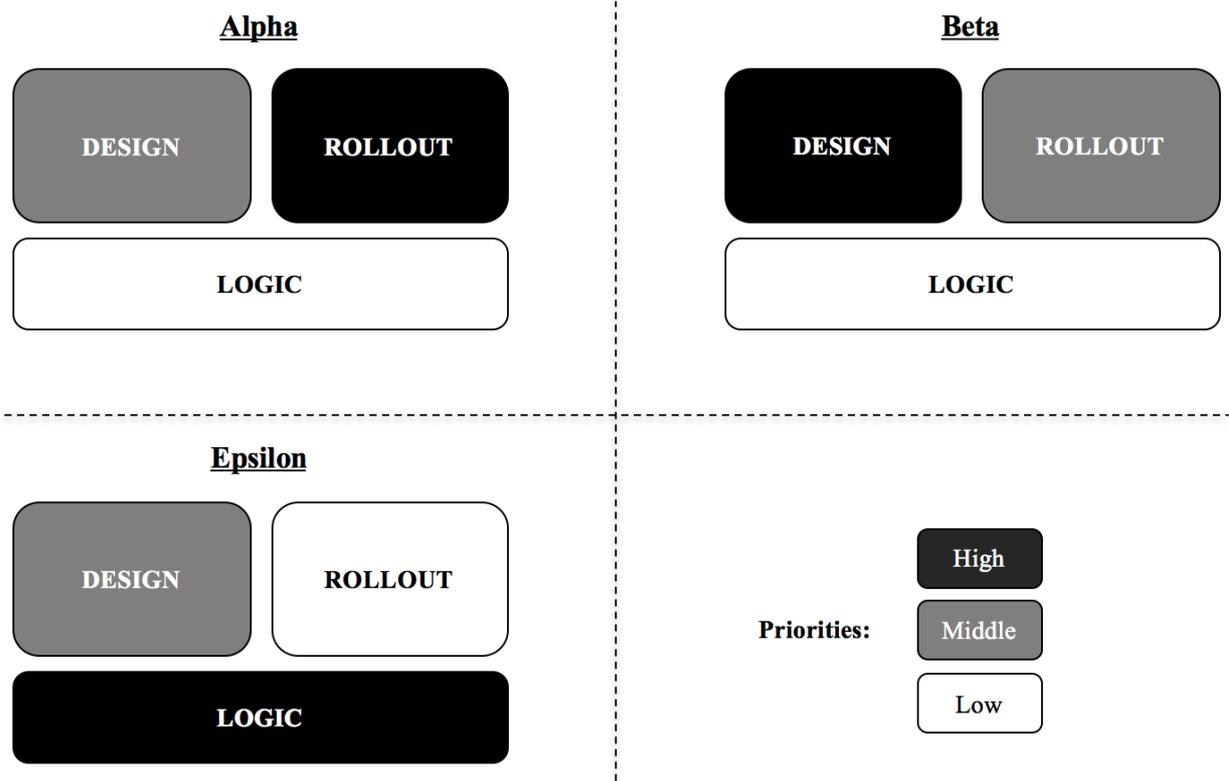


Figure 4. Examples of case companies' priorities.