The Servitization of Manufacturing: A Methodology for the Development of After-Sales Services

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Abstract. It has been suggested that though many companies realize the importance of providing after-sales services, most do not fully understand the maximum benefit from such offerings. Though several research papers document an approach for the implementation of a service operations strategy, a practical guide for the development of after-sales services is lacking in the current literature. Therefore, in this paper, we apply existing theory and use practical insights in order to propose a nine-step methodology for the development of after-sales services. The methodology links customer value from services to portfolio management theory. Two case studies describe application of the methodology. It can be used by practitioners in order to exploit the untapped potential of providing product-service offerings, with the aim to generate greater profits and a higher level of customer service.

Keywords: After-sales service, Product-Service System (PSS), action research, portfolio management

1 Introduction

A widespread decrease of margins on product sales coupled with changing customer expectations is driving manufacturing companies to find addtitional profit centres, moving beyond the traditional manufacturing realm towards the service domain [1, 2]. This phenomenon, usually termed as servitization of manufacturing, represents the evolution of companies' business models from a "pure-product" orientation towards integrated Product-Service Systems (PSSs), based on the provision of integrated bundles consisting of both physical goods and services [3].

In general, adopting a servitization strategy entails several advantages for a company, in terms of higher profit margins, more stable source of profits and a lower

cash flow vulnerability, providing at the same time a powerful competitive weapon, as summarised by Mathieu [4].

As a consequence, the old dichotomy between product and service has been replaced by a product-service continuum [5], where three categories of PSS can be placed, with an increasing level of servitization [6]: i) Product-oriented, where the business model is still mainly based on product sales with some additional services; ii) Use-oriented, where the traditional product still plays a central role, but it stays in ownership of the provider and is made available in a different form; and iii) Result-oriented, where the client and provider agree on a result, and there is no pre-determined product involved. Among these three categories, product-oriented PSSs, still represent the most common type of services provided by manufacturing companies to ensure the functional capability for the period in which the customer uses the product [7], and constitute the focus of this paper.

Even if it is argued by Cohen *et al.* [8] that we are now in "*the golden age of services*", and that to survive and prosper, "*every company must transform into a service business*", most companies either don't know how or don't care to provide after-sales services, and PSSs in general, effectively and fall into the so called "service paradox" [9]. The latter describes situations in which companies investing heavily in extending their service business increase their service offerings and incur higher costs, without any expected corresponding returns. Indeed, current corporate structures and processes of many manufacturing companies are not designed to efficiently develop and launch services on the market. Among others, difficulties arise because the new services introduced in the portfolio by firms are not clearly defined, and there are no unequivocal descriptions of the service contents, the relevant processes and the necessary resources [10].

To overcome this gap, the first aspect to consider is the creation of a suitable portfolio of service products [8]. By addressing the following research question, we propose a methodology for the development of after-sales services: *Which steps should a producer take in order to develop a competitive after-sales service portfolio*?

In order to address our research question, the paper is structured as follows: firstly, we explain our choice of action research as the selected research methodology; then we give an overview of the relevant existing theory within the field. We then use this theory to propose a methodology for the development of after-sales services before describing the application of parts of the methodology in two companies that are currently developing their portfolio of aftersales services. To end the paper, we summarize the work that has been carried out so far, and identify directions for further work.

2 Research Methodology

The primary research methodology is action research [11]. We made some empirical observations related to the current state-of-the-art of after-sales services, from work carried out in Norwegian companies operating within the maritime and subsea industry. The action research methodology has been chosen due to the practical nature of the problem, and the companies were selected through convenience sampling.

Action research can be defined as a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview [12]. Essentially, it focuses on bringing about change (action) and contributing to knowledge (research). Reason and Bradbury [12] go on to say that action without reflection and understanding is blind, just as theory without action is meaningless.

In this paper we present a methodology for the development of after-sales services, which we have formulated from a short analysis of the portfolio management literature combined with the theory surrounding PSSs and after-sales services. The methodology has been developed concurrently as the action research process unfolded, and represents a true account of the various implementation cycles inherent to the action research methodology [11]. In this process a theory building approach is adopted to identify the relevant steps involved in the development of a manufacturer's after-sales service portfolio.

3 Theoretical Background

In general, portfolio management can be described as a dynamic decision process about investment mix and policy [13], aiming at matching investments to strategic objectives, maximising value, and balancing risk against performance [14].

As argued by Kendall and Rollins [15], portfolio management has six major objectives:

1. Determining a viable investment mix, capable of meeting the goals of the firm;
2. Balancing the portfolio to ensure a mix of investments that balances short term vs. long term, risk vs. reward, research vs. development, etc.;
3. Monitoring the planning and execution of chosen investments;
4. Analysing portfolio performance and ways to improve it;
5. Evaluating new products and services against the current portfolio and comparatively against each other;
6. Providing information and recommendations to decision-makers at all levels.

In the literature, models for portfolio management are usually built around four general phases: 1) strategic considerations, 2) individual project/investment evaluation, 3) portfolio selection, and 4) stage/gate evaluation [16][17][18][19].

Even if portfolio management is typically associated with financial assets (financial portfolio management - FPM), projects (project portfolio management - PPM) and information technology (IT portfolio management), we believe that its implementation can be very useful also in the PSS domain to develop new product-service offerings. As argued by Hanski et al. [20], a product-service portfolio should be managed in a similar way to a financial portfolio: riskier strategic investments should be balanced with more conservative investments and the mix should be constantly monitored. Consequently, besides product-service characterised by low or medium uncertainty and aiming at maximising economic value, high-uncertainty solutions should be introduced in the portfolio in order to strengthen the company's competitive position.

To this end, companies should look not only at products and services in areas close to their business, but also explore new landscape and create new strategic opportunities [21]. Interdependencies among product-service offerings should also be considered to avoid cannibalisation and the utilisation of the same resources.

Despite the great importance covered by this subject, literature lacks of portfolio management models and methodologies specifically tailored for product-service offerings. Thus, the empirical part of this paper describes a research initiative undertaken to develop a methodology for the development of product-oriented PSS, also referred to as after-sales services.

4 A Methodology for the Development of After-sales Services

Based on portfolio management and the associated four phases identified previously, we suggest that a methodology for the development of after-sales services should begin with a mapping of existing service offerings (Step 1); followed by a SWOT analysis of strengths, weaknesses, opportunities and threats.

Step 3 is a key to the methodology, where the team begin to define value from the point-of-view of the customer (Step 3). This steps starts with a cross-departmental workshop where customer value is defined in three phases: before purchase, during delivery, and in the after-sales phase. Then a small set of representative customers are selected and interviewed in order to check if the defined value propositions match the expectations and perceptions of their current customers. This helps the organisation to evaluate the value propositions of their current product-service offerings [20].

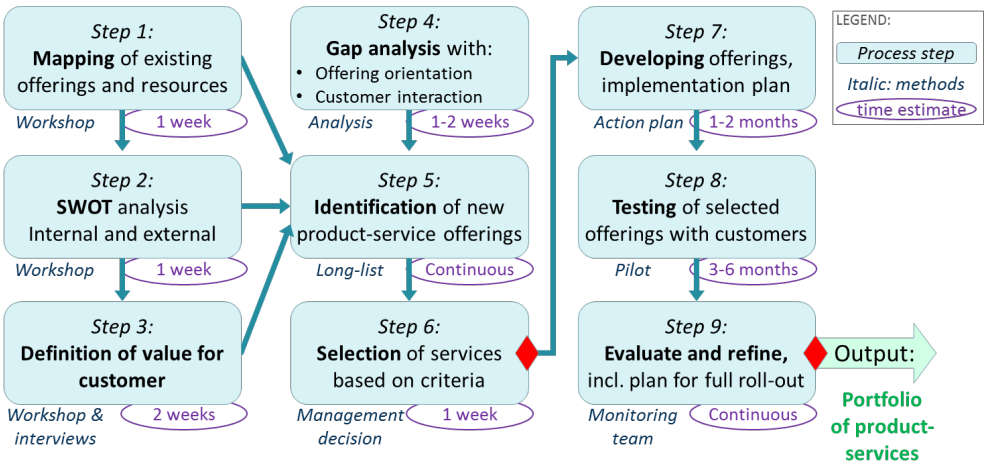

Fig. 1. A methodology for the development of after-sales services

Step 4 involves a gap analysis between internal resources, capabilities and the value for customer. These four steps represent the necessary considerations in terms of

strategy formulation. For example, we suggest that a company must first map the current state of operations before it can possibly identify future directions. Also, by gaining an overview of existing service offerings, the organisation is able to conduct a SWOT analysis in order to identify external opportunities and threats. This subsequently enables the organisation to conduct a thorough gap analysis, taking into consideration the orientation of the offering, its product- or process focus, and the type of interaction with the customer [22].

When combined, the result of Steps 1-4 will allow the organisation to identify any new potential product-service offerings (Step 5). Having identified new offerings, it is then time to select potential opportunities based on the following criteria (Step 6):

- ***Market attractiveness*** (profit potential in a given market)
- ***Feasibility of the offering*** (technical complexity, reliability, availability, maintainability)
- ***Sustainability of the offering (profitability, environmental effects, social effects)***
- ***Internal resource requirements*** *(physical, human and financial resources)*

Having surpassed the decision point, the organisation is encouraged to develop the selected offering/s with an action plan to implement (Step 7). The action plan should involve a test period with selected customers (Step 8), before eventual evaluation and refinement, which will also include a plan for full roll-out (Step 9).

5 Practical insights

Our methodology has been developed through systematic combination of existing theory with practical insights gained from two companies in Trondheim, Norway as part of an action research project that is still currently live. The project started in 2011, and is due to finish in 2014. Therefore, the findings reported in this paper represent the work carried out so far in the project, where we have only reached Step 4 of the methodology. It is the intention to refine the model and report its development as further work.

5.1 Case 1: Oil and gas

Case company 1 is a leading technology provider to the oil and gas industry. At its site in Norway, it produces corrosion and erosion equipment for oil and gas pipelines, with applications for both top-side and subsea installations. The company has 72 employees and an annual turnover of approx. 20 Mill Euro.

Step 1 Mapping: The company conducted an assessment of their current service offerings and found that they are currently offering 6 main types of after sales services (see table 1). After-market activities are supported by a team of 5, in addition to a software team and a larger group of skilled on-site service engineers. *Step 2* highlighted the lack of time and tradition for development of new after sales services.

The company spent much effort on *Step 3* to identify what represents *value* for their customer. They classified their value offerings in 3 phases: the purchase situation (order winners vs. qualifiers), at time of delivery and in the after-sales phase.

The Gap analysis in step 4 revealed that most services (# 1, 2, 3, 4) are delivered to ensure product availability and functionality, and few (# 5, 6) aim at supporting customer's activities. Moreover, only service # 3 is based on a long-term relationship with the customer.

A list of ideas of new product-service offerings have been updated along each step in the process, and the company is now planning to go deeper in dialogue with a set of representative customers to check if their view on value propositions is in line with what customers really want. Their next step is to select a pilot service offering for further development and testing.

Type of service	Case 1: Oil and gas	Case 2: Ocean
Installation and implementation	1. Upgrade of installations 2. Service for new installations	1. Rebuilding and reparation
Maintenance and support services	3. Fixed service agreements 4. Spare part offerings	2. Service agreements 3. Spare parts offerings 4. Technical support
Consulting services	5. Training of local agents and operators	5. Training and courses for end users
Systems and solutions	6. Data analysis and presentation	6. Retrieve data, analyse and present

Table 1. Current after-sales services offered by case companies

5.2 Case 2: Ocean

Case company 2 is a high technology company specialising in delivering environmental monitoring, ocean observing and forecasting systems. Based in Norway, the company develops, manufactures and supplies measuring, measurement buoys, instruments, monitoring stations all across the world supported by mathematical models and presentation software. The company has 30 employees and an annual turnover of approx. 13 Mill Euro.

Step 1 Mapping: The company conducted an assessment of their current service offerings and found that they are currently offering 6 main types of after sales services (see table 1). After-market activities are supported by a team of 4, in addition to experienced on-site service engineers. *Step 2 SWOT:* identified a current weakness in the lack of systematic follow-up of customers after time of purchase.

The company also spent much effort on *Step 3* to identify what represents *value* for their customer. They benefited from making thorough customer segmentation, and selected the National Marine Institutes as a case for further study. Credibility, customer dialogue, market presence and financial arrangements were identified as important order winners.

The Gap analysis in step 3 revealed that most services (# 1, 2, 3, 4) are delivered to ensure product availability and functionality, and few (# 5, 6) aim at supporting customer's activities. Moreover, only service # 2 is based on a long-term relationship with the customer. Multiple ideas have occurred at each step in the methodology, resulting in a list of 17 potential product-service offerings. They are now subject for revision and selection of a pilot for further development.

6 Discussion and Conclusion

By systematically combining existing theory on after-sales services and portfolio management with practical insights form an action research project, we have developed a nine-step methodology for the development of after-sales services (Figure 1). We suggest that this makes a valid contribution within the field of product-service systems and the growing arena of servitization.

In this "*golden age of services*", the findings expressed in this paper suggest that such a methodology shows signs of promise in the development of customer-focused, value-adding after-sales services. Companies need to continuously ask whether expansion into new service arenas will take them outside the logical scope of their capabilities and organizational culture [21]. Therefore, our methodology maintains a focus on a company's current practices and competences, in order to evaluate whether the development of new competence is required before greater service offerings can be provided. For example, the mapping of existing offerings, SWOT analysis and Gap analysis that are conducted in steps one to three of our methodology help to identify the scope of the organizations current setup, and then the definition of customer value in step four allows the company to identify the directions in which its service offerings should be progressing. The testing of new service offerings in step eight also allows the service provider to make reflections as to whether or not the new offering will be a success, or whether refinements are needed.

In terms of the limitations of this research and possible further work, we suggest that the remainder of the methodology be tested and refined in the two case companies currently involved in the development process, before further case studies can be carried out in order to test the applicability and generalizability of our methodology.

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