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Extended Product Business Model development in four manufacturing case studies

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Abstract

Business Models in manufacturing are focused on selling tangible products and are in danger of being copied by competitors from emerging economies. In response, the value share of services is increased to parity with the product and beyond. To realize such an "Extended Product" (EP), manufacturers need to establish a "Manufacturing Service Ecosystem" (MSE) with adequate service providers, requiring radical changes to the business model. This paper describes a methodology that enables manufacturers to integrate EP and MSE into their business models and analyzes the results of its application in four manufacturing case studies from different countries and industrial sectors.

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1. Introduction

A Business Model (BM) describes the rationale of how an organization creates, delivers, and captures value [1]. According to this definition, BMs in the manufacturing industry have focused on the fabrication or assembly of more or less customized products and have generated revenue from their sales. The therefore required machines, materials and qualified personnel cause high fix costs, so supply chain organization and efficiency have a high influence on competitiveness. The levels of standardization, automation and the technological advance have been important indicators for the success of a manufacturing company [2].

However, these traditional manufacturing BMs come under pressure with the global harmonization of technological standards and the reduction of trade barriers. Manufacturers in developed countries are experiencing increasing competition from manufacturers based in developing countries with substantially lower production costs. According to the *"Global Competitiveness Manufacturing Index"* (GMCI) [3], developed countries like the U.S., Germany and Japan are expected to decline in their manufacturing competitiveness during the next five years, while developing nations such as Brazil, India and Russia are on the rise. Though the emerging economies hold an advantage with regard to the low cost of labor and materials, the advantage of developed economies lies in talent-driven innovation and supplier networks.

In order to use the advantage in innovation capability, many researchers have suggested that manufacturing firms in developed economies should expand their role in the value chain by seeking to innovate and design new products and services so they do not have to compete on the basis of cost alone [4]. Because customers increasingly demand that the manufacturer has to support all phases of the product life-cycle, from development over assembly and distribution to operation, especially intangible offerings have been extended over time. In particular, this includes more value added service propositions like training, system integration and consulting. Some firms even offer customized solutions to clients, where manufacturing no longer is the differentiating process. This "servitization" of manufacturing is also referred

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to as hybrid value creation through the provision of Product-Service Systems or Extended Products (EP) [5].

The success of servitization strongly depends on the utilization of the second advantage in developed countries, the ability of the supply base to innovate in products and processes. Manufacturers often lack the competencies needed for the provision of the intangible components of an EP (e.g. services). Therefore, collaborative arrangements with other partners, such as service providers, become more and more important [6]. As service requirements can have implications on the whole product life-cycle, an integrated development of the physical product, services, and the manufacturing processes is needed. Therefore it has been proposed to establish a business ecosystem of manufacturers, service providers and other stakeholders of the EP, a so called Manufacturing Service Ecosystem MSE, out of which Virtual Manufacturing Enterprises (VME) can be created individually for each customer demand [7].

The trends, which are affecting manufacturing enterprises pursuing servitization of their products and new collaborative arrangements, are summarized by Neely et al. [8]. The study shows five fundamental developments: *"(1) the shift from a world of products to a world including solutions, (2) outputs to outcomes, (3) transactions to relationships, (3) suppliers to network partners, and (5) elements to ecosystems."* The authors further assert that manufacturers still need to understand the transformation, especially in terms of the Business Models that enable them to create and capture value through the provision of services.

2. Problem description

Manufacturing Business Models are focused on selling the physical product in traditional market segments through supplier-buyer relationships. The trends in servitization and collaboration require innovation of these BMs [9]. According to Osterwalder & Pigneur [1], a BM can be described with nine building blocks:

- Value Proposition
- Customer Segments
- Channels
- Customer Relationship
- Key Resources
- Key Activities
- Key Relationships
- Cost Structure
- Revenue Streams

A manufacturing enterprise that changes from the fabrication of products to offering Extended Product solutions and transforms its supplier base into an ecosystem of network partners will have to analyze and adapt the elements in all building blocks to create a new and competitive BM.

First of all, the new value proposition of the EP as the solution for a customer problem has to be described. The product as output of the manufacturing process is replaced by a guarantee of the functionality, availability or outcome of the product usage [10].

The provision of EPs enables manufacturers to address new customer segments. For a successful BM, the right customers to be targeted have to be identified. Therefore it is important to identify and address potential customer segments outside the current boundaries of the manufacturing industry. Furthermore, pure physical delivery of the product has to be extended with new channels for service provision. The selling transaction has to be replaced by a permanent relationship to the customer to generate constant streams of value and information.

To create the new value proposition of the EP, additional human, financial, physical and intellectual resources are required. This includes competencies in service development, product-service integration and collaboration. Likewise, key activities have to change from manufacturing to service provision and the creation and management of a suitable Virtual Manufacturing Enterprise for each customer demand. Suppliers as key partners must be complemented by service providers and other stakeholders of the EP. A Manufacturing Service Ecosystem has to be created, in order to be able select the appropriate network partners for the realization of each value proposition.

In contrast to manufacturing BMs that are often cost driven, the EP BMs are value driven. The focus should not primarily lie on reducing the costs for manufacturing the product, but to combine products and services in a way to deliver the largest possible value to the customer. Revenue then will not be generated by a one-time sale of a product, but it should be concentrated on generating a constant revenue stream through service or usage fees.

The main challenge for manufacturing enterprises is to integrate the new and unknown value proposition of an EP and the associated collaborative arrangements into their BM without experience in this field. Building networks with unconventional business partners is difficult and can bring incalculable risks [11]. New information and communication technologies (ICT) have to be utilized for service provision and to develop closer relationships to the customer. New stakeholders in the ecosystem affect the cost structure and require new kinds of revenue models, which are currently not elaborated in manufacturing industries.

Baines et al. [12] reviewed in his study the literature on servitization and concluded in his findings that there is little previous work offering guidelines, tools or techniques that not only can be used by companies to servitize, but also that practitioners can apply to help in service design, organizational design and organizational transformation. This lack of support leaves manufacturers hesitant to change their BM while their competitive advantage is shrinking. Manufacturing enterprises thus need methodological support to identify the opportunities in offering EP and collaborating in MSE. A new practical methodology, which helps manufacturers to adapt their strategy and BM according to a vision of servitization and collaboration, is presented in the next chapter. The methodology has been instantiated in a workshop concept and evaluated in four manufacturing case studies.