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Roadmap for business models definition in manufacturing companies

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Abstract

With the globalization and the volatility of the markets there is a huge pressure for manufacturing companies to be more innovative and competitive in delivering value to their customers. The evaluation of overall value chain, designed and implemented to supply a specific product or service, should support changes in the existing business model or in the definition of new business models that ensures higher levels of customer satisfaction. The business model is at the core of the competitive response of any company to the market, defining the value proposition, the required activities, resources and partners, and knowledge of customers, costs or profits related with its overall operation. The relevance that integrated product and services is assuming nowadays, allowing manufacturing companies to achieve a longer and more stable relationship with their customers, determines new approaches to product service development and methodologies or tools to support the review and definition of appropriate business models. In this paper we propose a roadmap to support the development of new business models, their implementation and evaluation. For the roadmap a set of tools are proposed to support each stage from business model design to its evaluation. The roadmap validation is made through a case study.

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1. Introduction

The market is continuously challenging companies to improve their competitiveness and to adapt or transform their businesses [1-2]. Business opportunities are globally considered and companies look locally for resources and competencies, and search for partners to establish an efficient and effective customer-centered supply chain [3]. Therefore, companies are strengthening the use the adequate tools and methods that support the delivery of competitive product and services with higher added value, at the right time and price, in a consistent and sustainable way.

To compete in terms of added value, manufacturing companies must be able to design and sustain their business based on a network of complementary capabilities to respond to market opportunities. The ability to design products or services and competitively deliver them into the market requires the definition,

implementation and management of new business models.

Business models are often framed in response to particular competitive circumstances and it outlines how a company generates revenues with reference to the structure of its value chain and its interaction with their supplier, customers and other partners with complementary competencies.

Visible changes in business models over recent years have included a transition from products to services, the reduction of vertical integration in large businesses, an increase in the importance of networks of smaller businesses working in open collaboration to form a value system [4].

In this paper is proposed a *roadmap* to support the definition, implementation and management of business models. The proposed roadmap consists in four phases: *analysis*, *design*, *implementation* and *evaluation*. Each phase is divided into a set of activities and suggests different methods and tools to drive top managers in the new business models definition and management.

This work has been supported by a study case that addresses the implementation of new business models and allows to validate the effectiveness of the proposed Roadmap.

With the research developed we contribute for a better understanding about the relevance of manufacturing companies to adopt innovative business models and we supply an important background for developing application for a full use of business models concept inside the manufacturing organizations.

2. The relevance of Business Models in manufacturing companies

The global and sustainable competitiveness of manufacturing companies has a major importance due to its impact in supporting economic growth and employment creation, through delivery added value products and or services. Therefore, manufacturing companies are each time more challenged to compete in terms of added value to achieve dominance in markets, since purely cost-based competition is not compatible with the goal of maintaining social and sustainability values [4]. The added value is related with company's ability to delivery customer-focused solutions [5], adding for example services or integrating services in their core products. This trend, the servitization of manufacturing, is getting more importance in our global economy and to support this trend, companies need methodologies to drive them in a paradigm shift that is to go from considering independently products and services and start to consider them integrated.

The understanding of Product-Service System (PSS) concept allows companies to shift their business focused in designing and delivering products to deliver a system of products and services [6]. It requires the development of new relationships with stakeholders [6]. The companies become responsible to maintain the product along its life cycle. A whole life-cycle's business model is required and imperative [4]. According to [7], with PSS customers have more customized offers, higher quality and products-services with new functionalities. On the other hand, companies have new market opportunities, gain a new competitive advantage and improve the total value delivered for the customer.

The definition and implementation of new business models will enable the growth of new businesses and allow existing industries to sustain their global competitiveness [4]. Business models need to be evaluated and managed by the manufacturing companies, adapting its characteristics to take advantage of the market conditions. Thus, the evaluation and redesign of business models will allow manufacturing companies to maintain their sustainability, promoting a more long term relation with their customers, innovating

and supplying additional add value related with their products. Through a constant monitoring and evaluation of the business model, industries can be in the forefront of their business market.

The business model concept is being increasingly used across all the fields of research and there are several descriptions to define the business model concept. However there is no consensus about it. We enumerate some definitions: i) "refers to the logic of the firm, the way it operates and how it creates value for its stakeholders" [8]; ii) "defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and convert those payments to profit" [3]; iii) articulates the value proposition, identifies a market segment, defines the structure of the value chain, details how the firm will be paid, describes the position of the firm within the value network and formulates de competitive strategy" [9]; iv) "is the method followed by a company to generate value. Including the combination of products, services, image and distribution" [10] and v) "outlines how a company generates revenues with reference to the structure of its value chain and its interaction with the industry value chain" [11]. In general, we can say that a business models describes some key components that meets the four principal areas of a business: customers, offers, infrastructures and financial feasibility. Furthermore, it pretends to answer a set of questions: [12] what product/service will be offer?, who will pay for it?, how will it generate profits?, how will it be provided and how will it keep the competitive advantage? Thus, a business model starts by creating value for the customer. The financial issue is left out of the business model, once is assumed that the model is financed by the internal corporate resources [13].

The best approach to clarify the process is to map the business model, which allows companies to experiment different alternatives. [14] has done it through dividing the business model into nine components: (1) customer segmentation, (2) value propositions, (3) customer relationships, (4) channels, (5) key resources, (6) key partners, (7) key activities, (8) cost structure and (9) revenue streams. See figure 1.

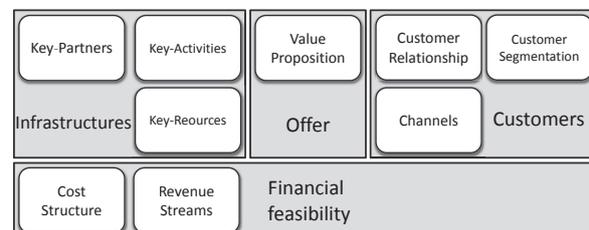


Fig. 1. Business Model components (adapted from [14]).

Each component is now described: (1) customer segmentation defines who will receive the company's value proposition. A deeper study should be done with the aim to understand all the possible customers and its needs. The segmentation process should be done in 4 phases: i) choice of the criteria to be used, such as age, location and earnings; ii) study of each segment features; iii) choice of the most relevant segments; and iv) defining the approach to have with each chosen segment. The entire business model will be designed according to the customer segment it pretends to serve. The customer is the core of our business model directly related with the value proposition [14] [15]. However, in the industrial market it is difficult to identify the best variables [16]; (2) the value proposition is about the product/service delivered to the customer. It is the main reason why the customers choose a certain product/service or not. Some elements can contribute to add value for the product/service itself, such as: innovation, performance, design, price, usability and brand [14]; (3) the type of relationship a company establishes with its customer is decisive. Relationships can range from personal to automate [14]. It can be managed through specific customer management tools; (4) the point that is concerned with the channels describes how the companies communicate with its customers and reaches them. The channels have multiple goals, such as publicizing its products/services, help customers on making a choice, deliver the value and provide post-purchase support. The companies can reach its customers through its own channels or through partners [14]. In the manufacturing industry the support post-purchase is special important once very often it entails a need for maintenance; (5) Key resources refer to the most important assets to make the business model work. The key-resources can be physical, financial, intellectual (patents, proprietary knowledge and copyrights and brands) or human and they can be from the company itself, leased or from partners [14]; (6) key partners contribute to optimize the business model. It is possible to have four types of partnerships: between non competitors, between competitors, buyer-supplier and joint ventures [14]; (7) to have a correct full operation of the business model, some key activities must be performed. Activities can be categorized in two types: production, namely design and deliverable, and problem solving [14]; (8) cost structure regard the most important costs related to the execution of the business model. The main goal is to minimize the costs [14] and (9) revenue streams describe the way the company generate a cash flow from each customer segment. It is possible to generate revenue streams from: asset sale, usage fee, subscription fees, leasing, licensing, brokerage fees and advertising [14]. Mapping is a very useful tool however

is not enough. Is fundamental to take action after the mapping [9].

An innovative business model must be able to satisfy at least one of the following points: a market need; bring new technology, new products or new services to the market; change a market or create a new one [14]. During the conception of a business model is essential to consider some external factors, i.e., political and legal environment, socio-economic trends and technological developments. A monitoring of the business model must be done continuously with the aim to ensure the quality of products/services, as well as the necessary adjustments [15].

A successful business model must be innovative and hard to imitate. Superior products and services, excellent resources and leadership are not enough to produce sustainable profits if the business model is not properly adapted to the competitive environment. It is essential to figure out how to capture value from innovation [3].

However, to define and implement a business model in a properly way it could be easier if we have guidelines. Thus, we suggest the use of a *roadmap* to define a business model for a manufacturing company. The roadmap is considered a very useful tool for deploying a manufacturing company strategy into operations, defining and developing effective relationships with business stakeholders.

3. Roadmap for the development of new business models

The development of an innovative product-service strategy is a clear response to the global market and requires adapting the business models to new challenges and the increase of service content [17]. This strategy is based on the development of solutions for customers, strongly supported by core competencies on systems integration [5] involving the provision of services, rather than just design, development and distribution of high quality products. This implies of course, changes in the planning, conception and implementation of integrated product-service systems [18]. Therefore, we consider a need to have a roadmap to help manufacturing companies changing their approach on business models and support them in the definition, implementation and management of new business models.

Several authors propose different phases for business models' life cycle. For instance, [19] propose: (1) Development/R&D, (2) Implementation/Roll-out and (3) Commercialization. Although no satisfactory roadmaps for business models design were found in the literature. Therefore, in this article, we propose a new approach for a business model roadmap. The roadmap presents a sequence of phases and activities that support the conception of new business models, its implementation

plan and management. This is an iterative process consisting in several loops. A good roadmap should be simple, logical and intuitive – comprehensive and easy to implement. The proposed roadmap consists in four phases: analysis, design, implementation and evaluation. Each phase is divided into a set of activities (see figure 2).

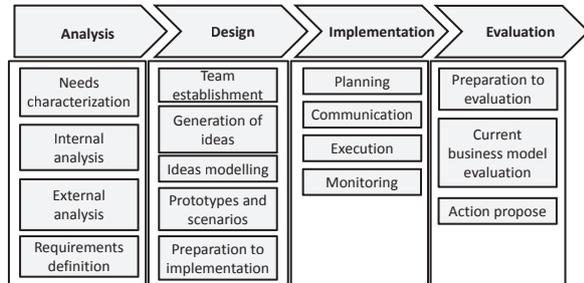


Fig. 2. The proposed Business Model Roadmap with each phase divided into a set of activities.

3.1. Analysis Phase

The *Analysis* phase focus on the characterization of a company internal and external environment. A good understanding of the contextual environment contributes to the development of a competitive and efficient strategy. On the internal viewpoint the aim is to look for the main weaknesses and strengths. On the external viewpoint the goal is to look for opportunities and threats. We divided this phase into four activities: needs characterization, internal analysis, external analysis and requirements definition. The scope of the needs characterization activity is to formalize the need for a new business model that goes through the market and competition characterization as well as a study of the existent business models. In the external analysis activity we look for understand the contextual environment and characterize the opportunists and threats that surround our market environment. To do this we suggest the use of a set of tools such as Porter’s analysis, Benchmarking and a political, economic, social and technological analysis (see figure 3).



Fig. 3. External analysis activity. Description of the input, the involved team, the main activities and the outputs.

In the internal analysis the aim is to analyze the strengths and the weaknesses of the company and look for minimizing organizational and technological potential problems. Finally, in the requirements definition the main goal is to realize what we need to do the business model and what are its aims and goals. See figure 3.

3.2. Design Phase

The *Design* phase consists essentially in the creation/development of new business models. This is a creative and innovative phase. An open minded approach is mandatory. The design phase is divided into six activities: team establishment, generation of ideas, ideas modeling, prototypes and scenarios and preparation to implementation. In the team establishment activity the aim is to define the team members profile and choice the members. The team should be multidisciplinary. The commitments must be defined as well. In ideas generation the scope is to do some brainstorming and come up together with a set of ideas to the business model. This activity is followed by the modeling and selection of the better proposals that will converge in a business model prototype.

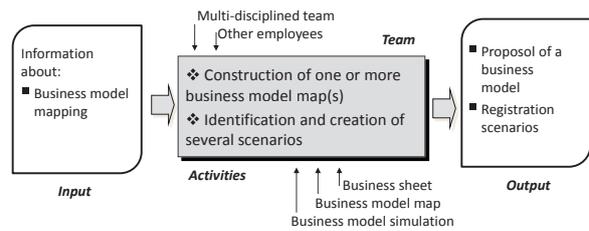


Fig. 4. Prototypes and scenarios activity. Description of the input, the involved team, the main activities and the outputs.

Finally, we have to prepare it for the implementation.

3.3. Implementation Phase

The *Implementation* phase includes operational activities such as definition of working plans and schedules. This phase is divided into four activities: planning, communication, execution and monitoring. The planning activity consists essential in the elaboration of a business plan, an activities plan and the identification of milestones. Then, the business model, the business plan and the plan of activities must be presented and explain to all partners. This is fundamental to involve all the team. After the communication we are now ready to execute the business model. A constant follow up must be done and the constraints should be reported. This continuous monitoring will enable to go back in the roadmap and correct something or stop the work if required.

3.4. Evaluation Phase

The aim of the *evaluation* phase is to compare the results that were obtained with the expected performance and draw conclusions with the intention to make changes in the current business model. This phase is divided into three activities: preparation to evaluation, current business model evaluation and action propose. The preparation to evaluation consists in defining the key performance indicators and performs a survey to evaluate the stakeholders' satisfaction. The evaluation of the business model properly consists in a critical reflection of the contextual environment using, for instance, the SWOT analysis (see figure 5). The last activity is the action proposal. The output of the previous activity must be evaluated and changes must be proposed, communicated and applied.

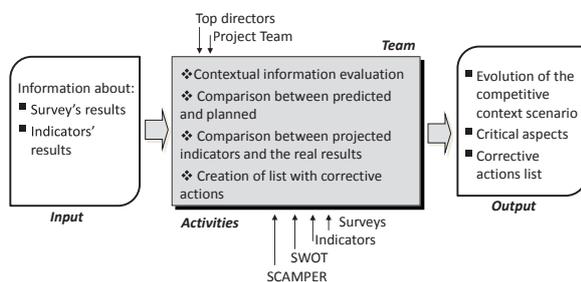


Fig. 5. – Current business model evaluation activity. Description of the input, the involved team, the main activities and the outputs.

4. Case Study

With the aim to demonstrate the viability of the proposed roadmap, we describe an industrial case. The data collected was qualitative and based on interviews regarding the implementation of new business models in the indicated manufacturing company.

The company is a Portuguese manufacturing company that design, manufacture and deliver technological advanced products. The main field of its work is in the cork transformation and optimization of the efficiency and effectiveness of production processes and finishing stoppers. They have been delivery their equipment all over the world. The case study reports a contact from a potential customer from East Europe. The client asked for a standard machine tool. The equipment had to be designed for this specific customer due to changes or updates in software and control systems, with the aim to allow remote maintenance. The needs for maintenance oblige them to consider partnerships in the region of this customer.

The start for the analysis was a request from a potential client. It was necessary to specify the customer needs and the technical requirements, look into the customer region potentialities and look into resources and technical and cultural issues (e.g. power energy

supply specifications; language). From this analysis they came to the value proposition. The idea was to supply the equipment and a set of technical and maintenance support allowing the self-learning. Value proposition was related with the idea to add services to products.

The concept of how they will deliver the value proposition and earn profits was thought but not registered/formalized. However, they recognize the need to do it. Prepare implementation was crucial to the definition of contacts to be established, to assure logistics and bureaucracies (e.g. confidentiality contracts).

The implementation is supported in a business plan which looks into each customer segment, it has an expectation about volume of sales and level of customers' satisfaction.

The evaluation was only supported in customer inquiries, informal talks and data collected from sectorial unions/associations. What is proposed in the roadmap is the evaluation to be performed for each business model component.

4.1. Case study outcomes

This case study shows the relevance to have software tools which allows companies to follow each phase and activities defined in the roadmap driving the different actors in the definition of resource, in the identification of who should be the partners, what should be the requirements and how the company progress with its business model. The benefits of having such kind of software tools can comes also from the introduced ability to visualize graphically each stage of business model definition or from the use of wizards to support the definition of alternative scenarios and the generation of new ideas. In general, tool, by itself, can be particularly useful to structure and drive meetings, involving different people with different competencies in the analysis and design of business model. Also, the possibility to record data and to print reports or different types of outputs (e.g. diagrams, graphical visualization, and cost structure) is considered a value added for the analysis and decision-making process executed in different phases of product-service life-cycle.

A software tool prototype is now being developed in order to test the concepts presented in the roadmap (see fig. 6). The software tool prototype is being structured with a menu bar where four options are displayed corresponding to the roadmap's phases. The software it will be web based and will allow information to be register, to be saved and to be used in further stages of business model lifecycle.

Análise (a)	Design (b)	Implementação (c)	Avaliação (d)
Modelo de negócio (e)			
Modelo de negócio n°: <input type="text"/> (f)			
Parcerias-Chave (g)			
Atividades-Chave (h)			
Proposta de valor (i)			
Relações com os os clientes (j)			
Canais (k)			
Segmentos de clientes (l)			
Fluxos de rendimento (m)			
Recursos-Chave (n)			

Fig. 6. – Software tool prototype interface (Legend: a) Analysis, b) Design, c) Implementation and d) Evaluation. In the principal display is presented the components of the business model: e) business model, f) business model number, g) key-partners, h) key-activities, i) value proposition, j) customer relationship, k) channels, l) customer segmentation, m) revenue stream, n) key-resources).

The formalization introduced with the existence of a software tool to build business models will help in the definition of cost structure for product/service business model. Part of the data defined and saved will allow representing different scenarios and prototypes, quantifying and qualifying each alternative and perform cost *versus* benefit analysis.

5. Conclusions

Manufacturing companies have not only to be innovative in their product or service but also in the business model they use to support customers in a effective and efficient use of their products.

Business model definition or its design it is a holistic approach to establish a value chain for design, manufacturing and delivery product-service, identifying suppliers, partners and segmenting customers. The ability to evaluate effectively the existing business model will bring benefits in managing product and service design and improve its requirements throughout its life-cycle. Business models definition, its evaluation and its redesign must be dynamic and executed involving key persons in the organization.

The existence of a roadmap with all its phases, activities, methods and tools, will allow a clear understanding about its extension in the organization and support the design and develop of software tools to automate the analysis and decision making processes that exist in business models definition.

The development of software for business model definition can be considered for integration with other management systems (e.g. ERP) allowing to link different departments and formalize processes, special in the design and evaluation phase.

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