

# TRAPSS METHODOLOGY – A SMART SOLUTION FOR MANUFACTURING SMES

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## ABSTRACT

Manufacturing SMEs are under high pressure coming from the market and from environmental legislation. They need the ability to rapidly and effectively change the business in response to opportunities and threats from the external environment, and to create and shape their own future through innovation. Product-Service System (PSS) is such an innovative concept. When competition on the basis of price, time, quality, flexibility or environment has become insufficient for the success of a company, the adoption of a PSS business model can have a beneficial impact on company competitiveness. However, the shift from product to product-service is a major strategic decision which has large implications on all the aspects of the business model. This paper proposes the TraPSS (Transition along the PSS route) methodology to define the PSS route and to support SMEs on the transition along the PSS route. Results from four SME case studies are discussed.

**KEYWORDS: Product-Service System (PSS), Small-Medium Enterprise (SME), TraPSS**

## 1. INTRODUCTION

In the current economy, manufacturers are under considerable pressure to continuously evolve and adapt to an emerging business environment. Various change drivers [1] are influencing the economy; they can be environment-related (such as the increasing shortage of natural resources and environmental legislation), market-related (e.g. change in customer behaviour and demand, market saturation, globalisation and decreasing demand due to economic crisis) or technology-related (such as emerging technologies or the unprecedented development of information and communication technologies).

An innovative business concept, which permits a manufacturing SME to take advantage of the opportunities offered by the external environment or to react to its threats, is the PSS. It is a system of products, services, supporting networks and infrastructure that has the potential to generate economic benefits, while simultaneously reducing the adverse environmental impact of manufacturing [2], [3].

SMEs are reluctant to engage in environment-related activities mainly because they consider them costly and time-consuming. Strategic decisions in SMEs are mainly driven by financial and economic reasons; the environment is not a priority. Our research team believes that PSS can be a solution through new environmentally friendly offerings as a potential source of competitive advantage and a new source of added value [3], [4], [5].

A decision support methodology called TraPSS (Transition along the PSS Route) [6] has been developed to assess a manufacturing company’s position on the route from product to service and to support the change along the PSS route using the knowledge and experience of the company. Initially, the methodology was tested and validated in a large multinational company.

The research presented in this paper is conducted with the aim of evaluating the suitability of the TraPSS methodology for SMEs and identifying any need for simplification and extra

features. The methodology will help to identify new business ideas based on product-service. It will support the decision-making regarding the SME's transition (or not) from one position to another on the PSS route.

The research is being carried out as part of FutureSME project ([www.futuresme.eu](http://www.futuresme.eu)) funded by the European Union under the Seventh Framework Programme (FP7). The primary aim of the project is to develop a set of tools and methodologies for manufacturing SMEs in Europe, which will enable them to adapt to the changing economic environment and will lead them towards a sustainable business model. The research has been organised in three steps:

1. Literature review, survey of SMEs and focus groups to identify SMEs' challenges and needs, in particular those related to the environment
2. Adaptation of the existing TraPSS methodology to SMEs' needs and test of the TraPSS methodology in manufacturing SMEs
3. Refinement and validation of the methodology.

The first step has been completed and the research team is currently working on the testing of the methodology. TraPSS has already been tested in four Irish manufacturing SMEs and it will be further tested in other European companies within the FutureSME project.

This paper is the second in a series of papers that will present this research. The first one covers the SMEs' challenges and needs as identified in the first step of our research [7]; this one will focus on the testing of the TraPSS methodology within SMEs and the results. The paper begins with a brief overview of the PSS and the potential of PSS as a competitive strategy in a Triple Bottom Line (TBL) context [8]. The TraPSS methodology is presented in Section 3 as a solution for manufacturing SMEs that want to succeed in a challenging environment. Findings from the tests carried so far are presented in Section 4. The paper concludes with some final remarks and recommendations for further work.

## **2. BACKGROUND TO PSS**

PSS has been defined in many ways: from an environmental perspective, considering PSS as a way to enhance sustainability [9], from a business perspective [10] or both [11], [12], [13], [14]. Many times in the literature, there is confusion between two concepts: Product-Service (PS) and Product-Service System (PSS). The PS is a particular type of value proposition – “a mix of tangible products and intangible services” [11], “an extended product”, where the service “uses the core product as a support to deliver a function” [15] – whilst the PSS is a “functional business model” [11], [12] which consists of the PS, a revenue model and a technological architecture.

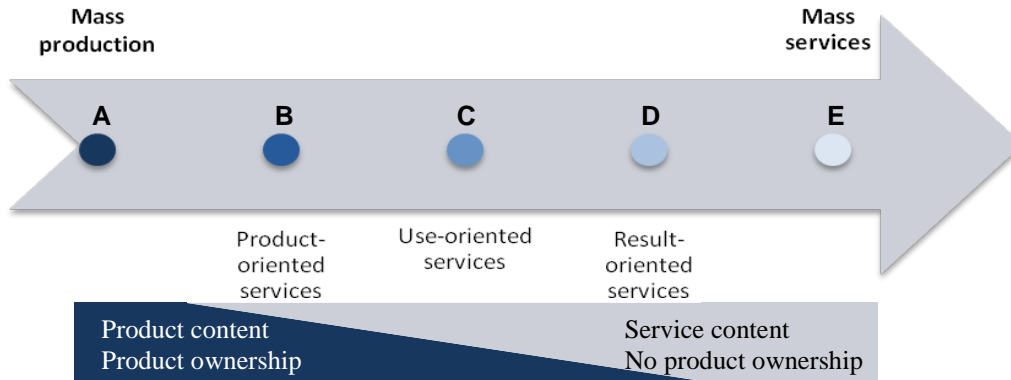
In the authors' view, a PSS is a specific business concept that focuses primarily on customers' demands and is meant to provide customers with all the benefits (functionality, utility, self-esteem, low environmental impact) of the product without ownership of the product. In this work, the PSS is seen as a business model that supports 'servitisation' of products – the movement towards services – and sustainability. The definition adopted by the authors is the one given by Mont: *'a system of products, services, supporting networks and infrastructure that is designed to be competitive, satisfy customer needs and have a lower environmental impact than traditional business models'* [13].

### **2.1 The PSS Route**

Literature reveals various classifications of PSSs. The classification adopted in this paper is one agreed by many authors [9], [11], [16], [17], [18]: 1. *product-oriented services* (such as planning, financing, installation or maintenance, consultancy); 2. *use-oriented services* (e.g.

product-sharing, renting, leasing, pooling); 3. *Result-oriented services* (e.g. delivery of cold air instead of a refrigeration unit, delivery of warmth instead of a heating device).

This classification of PSSs is adopted in the paper because it is comprehensive and represents very clearly the transition from product to services and the transfer of product property. The gradual “servitisation” of products [19], [20], [21] is illustrated in Figure 1.

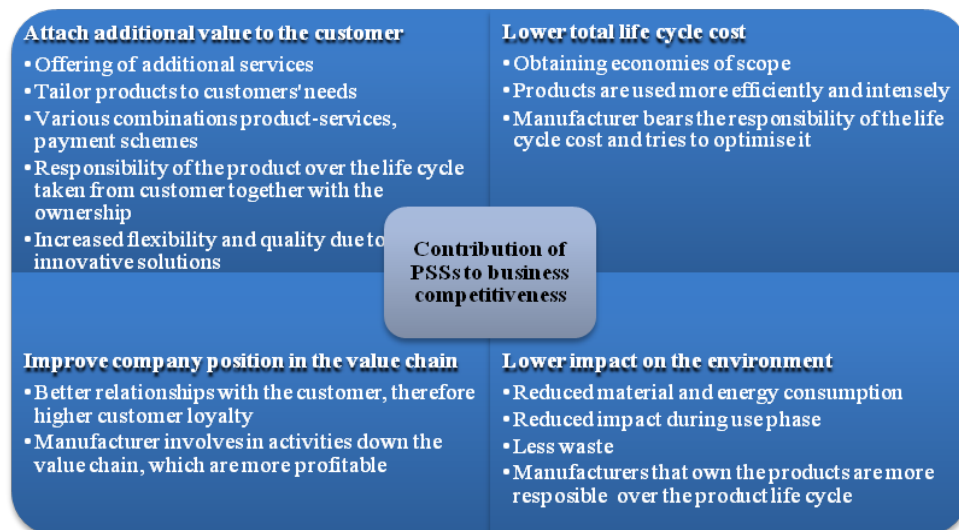


**Figure 1 The PSS route**

Although the diagram suggests a continuum, a company that wants to go from mass product to mass service – move towards servitisation – does not have to go through all the intermediary stages. For example, a company which sells cars can decide to go directly for a PSS based on leasing cars.

## 2.2 Potential Impacts of PSS on Manufacturing Companies

PSS is an innovation that contributes to increasing business competitiveness [6] because of the reasons presented in Figure 2.



**Figure 2 Contribution of PSSs to business competitiveness [22]**

Although it is believed that the PSS can be a source of competitive advantage and it can contribute to reducing the adverse impact on environment of manufacturing processes and products, many companies are not receptive to PSS for various reasons related to the internal

environment of the organisation (such as no available competencies compatible with the PSS concept, unwillingness, inertia, fear of innovation, short-termism in decision-making) or the external environment (e.g. unavailability of the PSS concept, consumers not ready for PSS) [6].

### 2.3 Examples of PSS Success Stories for SMEs

This section presents only a couple from the multitude of cases of SMEs that have successfully adopted a PSS business model.

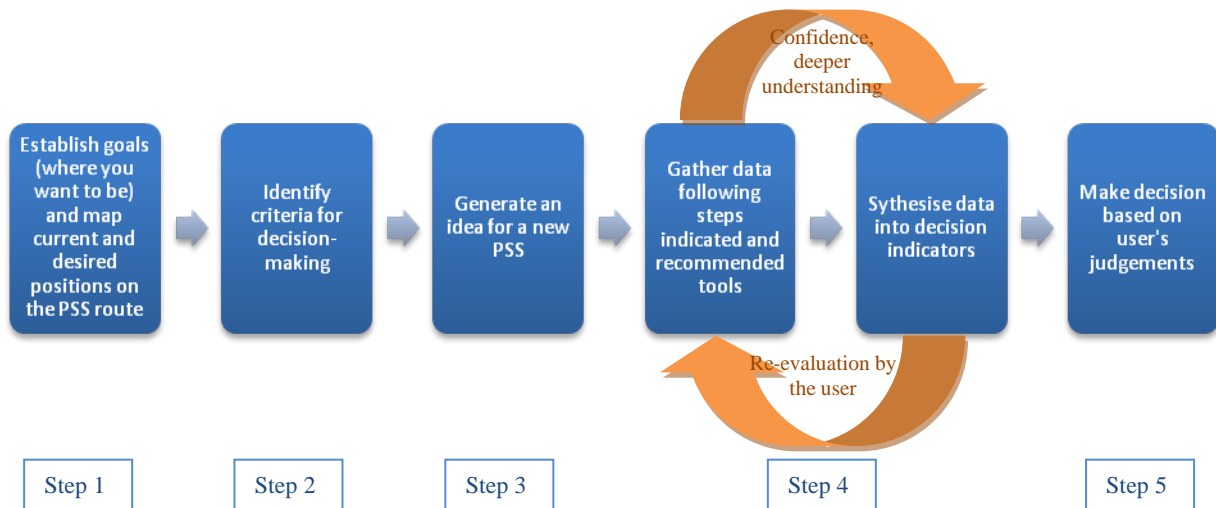
**Odin – organic vegetables subscription system** (<http://odinwinkel.nl/>). Odin Netherlands supply organic fruit and vegetables directly from farmers to customers. The consumer receives the products by paying a fixed subscription fee. The orders are delivered from an organic store in the neighbourhood. The system has economic advantages (for Odin: 15% additional growth due to new customers, revenue growth of 50%; for growers: they are offered fixed prices for certain products, which assures financial security) and environmental benefits: reduced transport costs as most products are grown regionally, packaging waste is minimised, no artificial fertilisers as the products are organic.

**AutoShare Toronto** (<http://www.autoshare.com/>). AutoShare offers mobility services. Customers pay a small subscription fee and then are charged for the hours they use the car (it can start from 1 hour). Cars are stationed near members' homes, train stations, bus stations and are accessible 24 hours. The main benefit for AutoShare comes from opening a new market. Customers who travel less than 12,000 km per year have the advantage of buying mobility cheaper than purchasing a car and without the associated issues of owning a car. The system has also benefits for the environment: reduced emissions, less parking and traffic congestion as a result of the reduction of car use (lower number of cars is needed).

## 3. THE TRAPSS METHODOLOGY

The methodology proposed in this paper – named TraPSS (Transition along the PSS Route) – offers a framework of activities and tools that support decision-making of managers on whether or not it is worth moving to the next level on the route from product to service. It includes an extensive analysis of the impacts of the transition on all the elements of the business model, from offering to environmental performance of the company. The methodology can be summarised in a diagram as in Figure 3. It follows five main steps which permit companies to:

- Assess their position on the route from product to service
- Identify the criteria for decision-making regarding the transition from one type of PSS to another
- Find a suitable PSS idea according to the company's strengths and the opportunities offered by the external environment
- Assess the impact of the transition on all elements of the PSS business model using a toolkit which allows managers to visualise and analyse their business model in relation to the external environment and point out the aspects that have to be changed and how to do it in order to fit best to the requirements and expectations of the external environment
- Make the actual decision.



**Figure 3 The TraPSS methodology**

The TraPSS methodology currently can be used in manual form. The methodology is *systematic*, it follows clear steps, each of them recommending certain activities supported by appropriate tools. It is *comprehensive*, analysing all the aspects of the business model.

All the three aspects of *sustainability* are comprised in the methodology. The importance of the environmental and the social performance of the company, together with the economic performance are emphasised.

An important feature of the TraPSS methodology is the involvement of the user's knowledge and experience. It is highlighted in Figure 3 by the re-evaluation loop which offers confidence and better understanding to the decision-maker.

TraPSS uses a multitude of tools specific for each area of analysis and intended for use by the company's specialists in each area; therefore it is intended for group decision-makers.

#### 4. FINDINGS FROM THE SME CASE STUDIES

In this section the applicability of the TraPSS methodology to SMEs is discussed. So far the PSS concept and the TraPSS methodology were introduced to four SMEs in Ireland, the only criteria for SMEs selection being location in Ireland. The next step is testing the methodology within other Irish manufacturing SMEs, and then some European SMEs.

Face-to-face interviews and quick tests were carried out with owners or first level management representatives of the SMEs for better understanding of the applicability, usefulness and effectiveness of the methodology.

The four companies act in various areas: 1. concrete machinery, 2. composite wood products, 3. injection moulding, 4. hydraulics, lubricants, seals, filters, rubber products, speed ramps. The results of the four case studies analysis are summarised in Table 1 overleaf.

**Table 1. Findings from the SME case studies**

<b>Feature assessed</b>	<b>Comments</b>
The PSS concept	The SMEs interviewed were not familiar with the concept. However, after presenting the company profiles and explaining the PSS concept, some of the SMEs realised that they were actually acting in the PSS area as they are offering product-services (3 respondents).
Assessing the company position on the PSS route	Showing the SMEs the PSS route and explaining the PSS categories had sometimes an unexpected result: two SMEs realised that they are not manufacturing companies or product providers as they classified themselves, but service providers. The PSS route was found important for companies to see where they are and where they would like to be.
Criteria for decision-making	All the interviewees found the criteria for decision-making chosen by the researchers as covering all the angles that the business should be looked at.
Finding a new business idea	Two of the respondents found very interesting the process of identifying a new business idea. While conducting the exercise, they actually considered a new business idea and quickly assessed it during the exercise. More and in-depth analyses were necessary though, based on real data.
The PSS business model	The PSS business model was appreciated as very comprehensive, covering all aspects of the business. The importance of the business environment analysis and the competitive environment analysis were particularly appreciated, as well as the new aspects of the offering (service design, partnership and infrastructure). The introduction of the sustainability angle, especially the environment, which most of the time is overlooked, was appreciated only by two companies, which are already involved in environment-related activities. The other two didn't consider the environmental or social aspect important for their business.
Tools	The tools recommended at each step in the methodology (such as Life Cycle Assessment or Life Cycle Costing) were found appropriate for tasks at hand but not very easy to use, especially when a large amount of data was necessary for a proper analysis.
Sustainability	Including all the aspects of sustainability in the methodology (looking at the whole picture rather than one single area) was considered a very good thing by two of the companies. The other two companies are considering only the economic and financial aspects in their decisions. As much as they would love to help the environment, they consider themselves too small to afford to think of something else but surviving, especially in the current economic situation. If a side effect of the transition to a PSS is good environmental or social performance, than the company would use that in marketing the product/service. But decisions would not be driven by environmental or social performance.

## 5. CONCLUSIONS

This paper intended to show the suitability (or not) of the TraPSS methodology for SMEs and the possibility to meet their needs. It is difficult to draw final conclusions based only on four

case studies. However, a few points agreed by the four potential users could be identified and they will be summarised in the following paragraphs.

The main characteristics of the methodology that were appreciated by the SMEs are:

- The logical flow, following steps
- The comprehensiveness of the methodology; it covers everything the company is interested in, shows all aspects of the business model
- Structuring the decision-maker's thoughts
- Finding a new business idea
- Scanning the business environment, offering a future vision
- The possibility of identifying partners
- The possibility of cutting some costs related to the environment (e.g. energy cost).

However, the decision-makers interviewed expressed the downsides of the TraPSS methodology from an SME perspective:

- Hard to apply to sub-contractors, which are typical for the Irish economy (2 respondents)
- Needs thorough analysis which is time- and resource-consuming and needs a large amount of data not easily available (all SMEs interviewed)
- Too much emphasis on environmental (2 respondents) and social aspect (3 respondents), which is not the main focus of most SMEs
- More suitable for large SMEs (1 respondent) for the reasons above-mentioned.

Therefore, these first exercises showed an interest of SMEs in PSS as a possibility of finding new business ideas which is crucial in the current economic environment. However, the proposed methodology needs to be simplified to become more user-friendly.

More case studies will be conducted within Irish and other European SMEs in order to generalise these conclusions. Further work is necessary to find possibilities of simplifying the methodology whilst maintaining the level of accuracy necessary in the decision-making process.

## 6. ACKNOWLEDGEMENTS

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