

# NEEDS AND PROBLEMS OF SMES IN THE CONTEXT OF LEAN SIX SIGMA METHODOLOGY. FRENCH AND POLISH PERSPECTIVE

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## Abstract:

The article presents the results of the research conducted in Polish and French SMEs referring to the context of the implementation and application of the concept of Lean Six Sigma. The research was conducted in the form of case studies, observations and individual interviews.

The pilot studies led to the identification of the needs, expectations, concerns and experience of these companies. At the same time possible benefits and the barriers related to the implementation of the Lean Six Sigma methodology in the SMEs were disclosed.

The results of the research considered also the suggestions and expectations of the employees of the surveyed organizations.

The majority of companies using elements of the LSS in both countries had difficulty with the correct use of the of Lean or Six Sigma tools. These results ultimately confirmed the demand for Lean Six Sigma methodology dedicated to SME sector.

**Keywords:** small and medium-sized companies, lean six sigma, research, methodology

## 1. INTRODUCTION

Companies operating in the global market, especially small and medium-sized enterprises (SMEs) that want to increase profits, maintain a stable position on the market, gain competitive advantage and quickly respond to changes in demand are forced to constantly improve high quality of their products and services. To achieve this objective it is necessary to implement and maintain the quality management system and to apply the process approach, client orientation in accordance with Total Quality Management principles - the foundations of Lean and Six Sigma methodologies.

In companies with quality management systems, applying the process approach and customer-oriented, there are very good development conditions of the principle of continuous improvement and the introduction of the concept of Lean and Six Sigma.

The authors present the thesis that in small and medium-sized enterprises of the manufacturing sector there is no need to use all of the Lean Six Sigma tools, as it is in the case of large companies. It is necessary, on the other hand, to apply in these organizations dedicated support for the Lean Six Sigma methodology.

Therefore the primary cognitive objective of the article is to identify problems and needs of small and

medium-sized enterprises of the manufacturing sector in terms of the implementation and application of the Lean Six Sigma methodology.

The research was conducted in France and Poland. An important aspect of the research is therefore a comparative analysis, taking into account Polish and French conditions.

## 2. THE DEFINITION OF LEAN SIX SIGMA

The concepts of Lean Manufacturing and Six Sigma are becoming widely appreciated among large enterprises, thanks to their favorable impact on the productivity, quality and financial results, leading to improved market position.

As a result of the evolution of both methods a hybrid was created of Lean Six Sigma (LSS). The combined application of the principles of Lean and Six Sigma allows to complement each other and thus strengthen the synergy of their effectiveness in improving an organization [1], [4], [6], [19], [20]. The concept of Lean Six Sigma helps, in fact, even better than in the case of each of their elements individually, to reduce waste and improve quality in an organization. The foundations of Lean Six Sigma are:

- achieving customer satisfaction through fast delivery of the products or services of high quality and consistent with their expectations,
- fulfilling customer requirements through process improvement by reducing variation and wastage,
- working in a group to find solutions and to achieve better results,
- decisions based on measurements ([5], [10]).

## 3. LEAN SIX SIGMA – SELECTED POLISH AND FRENCH EXPERIENCES

Lean Six Sigma methodology was adopted successfully in large companies, such as for example Caterpillar, GE, Honeywell, International Truck, ITT Industries, NCR, Northrop Grumman, Lockheed Martin, Raytheon and Rockwell ([6]). However, in general, research and specific solutions for the SME sector are still rare.

In Poland the supporting programmes for SME were, so far, dedicated especially to the implementation of normative management systems based on the criterion of quality. These include programmes such as "Introduction to quality" and "Obtaining the certificate" coordinated by the Polish Agency for Enterprise Development.

The research carried out at the Technical

University of Gdansk [7] and TU of Wroclaw [9] evaluated the usefulness of the methodology of Six Sigma in smaller organizations and the level of implementation of the Six Sigma components.

In France to a greater extent than in Poland, the cooperation is implemented of the industry sector with universities and networks of small and medium-sized enterprises in the field of Lean and Six Sigma. The good examples of such cooperation are "L'Aube de l'Excellence Industrielle" that was created in the cooperation with Université de Technologie de Troyes or "Lean Manufacturing 10-52" [12]. Another initiative of the French Government supporting the University's ECAM, Ecole Centrale de Lyon, École des Mines de Saint-Étienne and Arts et Métiers ParisTech Cluny was the program called "Qualité & Performance 2010" [13].

The similar projects of the large scale realized in France were "Production au Plus Juste" (PPJ) and "Améliorer La Performance" (ALP) carried out in the region of Rhône-Alpes [3], [18] with the participation of Regional Agency for Development and Innovation in the Rhône-Alpes region and organizations promoting the development of the SME sector: Thésame and Ceforalp. Both the PPJ and of the ALP were group concept implementation projects, aimed at facilitating the transformation of SMEs of manufacturing sector in region Rhône-Alpes. Result of both programmes have confirmed the usefulness of the concept of Lean and Six Sigma in SMEs of various branches. On the other hand the results of the programs indicated also the difficulties encountered during the transformation. Basic, typical obstacle for SMEs is the lack of sufficient financial resources, necessary for hiring external consultants, training or reorganization. A major obstacle is also insufficient maturity of the SME sector - too weak involvement of the top management, the lack of a long-term vision of the development or inadequate supporting the process of changes [2], [15], [18]. Particularly upsetting is the fact that, despite the high level of satisfaction with the results of the changes made during the project, participating companies within three years of the completion of the program returned to the application of the old methods of production. This indicates a significant barrier to the development of the SME sector, which is the inability to plan and support sustainable improvements.

The concept of PPJ and the Alps programmes is commendable after the introduction of some corrective actions. It allows to effectively increase the potential of knowledge related to modern management methodology, including the application of the principles of Lean Management. For this reason, small and medium-sized enterprises should build local networks to exchange of experiences and share the information on good practices to be used in improving the various categories of processes.

Of particular importance may be building such relationships within links of SMEs cooperating with each other in accordance with the principles of Lean and

Six Sigma. To build this type of partnership one should use the local contacts with the relevant institutions specialized in intellectual capital management systems development methodology - universities, research institutes, centers of excellence, etc. [16].

#### **4. STUDY ON THE NEEDS AND PROBLEMS OF SMES IN THE CONTEXT OF THE LSS APPLICATIONS**

In order to carry out the research concerning the implementation and the application of the concept of Lean Six Sigma in SME sector, authors conducted case studies, observations, interviews and pilot studies in the Polish and French small and medium-sized businesses. Pilot studies allowed authors to identify the needs, expectations, concerns and experience of these companies. At the same time, possible benefits of the Lean Six Sigma methodology implementation in the SMEs and the barriers to that implementation and application were identified. Research results generally confirmed the demand for Lean Six Sigma in SMEs.

Authors selected 60 small and medium-sized enterprises in Poland and France. Out of the group, 23 companies agreed to attend, of which 18 were selected as organizations suitable for comparative analysis. Finally, the pilot study was conducted in 18 companies of SME sector, including 9 Polish and 9 French organizations. Participation of micro, small and medium-sized organizations, was almost identical in that group. Similarly, uniformly (33%) tangible and intangible services organizations were selected. The researched companies represented various industries: automotive, financial advisory, trade, transportation, food, clothing, plastics processing, recreational, decorative. In terms of their "quality maturity", 22% had implemented the quality management system and 33% used tools of Lean or Six Sigma.

The pilot study indicated that the Lean Six Sigma methodology can be applied and effective in small and medium-sized manufacturing enterprises in the Poland and France. Comparing the Polish and French conditions, authors concluded that there were similar expectations in terms of the needs, barriers and benefits achieved from the implementation of the elements of LSS.

Moreover, the urgent need to increase productivity in companies may cause more frequent implementation of Lean and Six Sigma tools. The important difference between the two countries were the expectations related to the implementation of elements of the LSS. French SMEs counted on the subsidies for cooperation development within the network of enterprises, as well as they applied similar methods of process management as large companies – their customers. The majority of smaller companies in both countries had difficulty with the correct application of the tools of Lean or Six Sigma.

A study revealed that micro-enterprises and service companies have significantly lower motivation of

continuous improvement and the lack of a clear need for radical organizational changes.

Further analysis confirmed the thesis that in spite of the growing interest in the modern management methods, SMEs faced numerous constraints and obstacles in the implementation of Lean Six Sigma methods. This conclusion can be formulated with concern to smaller firms in Poland and in France. These results are in accordance with the opinion of the other researchers [17], indicating that, in addition to insufficient financial resources to launch improvement projects, unavailability of qualified specialists in the field of continuous improvement are the main causes of the problem. Due to their small size, good internal communication and simplified decision-making processes in comparison with big companies there is no need in SMEs to use all the tools available in the repository of Lean Six Sigma [8], [14], [21].

Research results in Polish and French companies indicated that the vast majority of the tools of Lean Manufacturing can be efficiently applied in SMEs, while a large group of tools used in the framework of the concept of Six Sigma seems to be too complicated and therefore is usually rejected. This concerns in particular the tools to collect and organize large amount of information and tools that require advanced knowledge of statistical methods of data analysis.

The final decision about the choice and number of Lean Six Sigma tools to implement, a company should take individually, on the basis of their real needs and opportunities [14]. There are important differences in the demand for tools depending on the size and maturity of an organization. Companies employing more than 100 employees are free to use the all tools of Lean and selected Six Sigma tools for reorganizing their processes, flows and stocks management and product quality control. In the case of small companies the scope of application of Lean Six Sigma tools is narrowed down to selected, "point" improvements in key processes.

International experience in the application of Lean Six Sigma shows growth of interest in Lean and Six Sigma methods, which is associated with the organizational progress represented by large corporations. In the developed European countries, the United States, not to mention Japan, smaller organizations quite commonly use one of the key tools of SPC and Six Sigma-control charts to ensure high quality of products by active control of processes. Most other well-known statistical tools used to identify and solve problems is still considered too complicated, too time consuming and requiring specialized qualifications.

Small and medium-sized companies have, in fact, a tendency to selective, non-systematic application of the tools of Lean and Six Sigma. Corrective actions are not usually backed up by rigorous analysis of the problem. Areas of improvements are generally selected basing on the intuition and experience of selected employees. The lack of systematic approach and complexity in terms of defining the problem and identifying the methodological process efficiency improvement projects significantly

reduces effectiveness of the management systems in the group of SME.

In order to sustain beneficial changes in small and medium-sized enterprises application of EFQM Excellence Model may be useful. Its use in the SME sector is recommend by Kitzmann [11] and Zymonik [22]. Authors intend to verify and validate the modified criteria of the model with the respect of Lean Six Sigma implementation in SMEs.

## 5. CONCLUSIONS

The combined use of two complementary methodologies-Lean Manufacturing and Six Sigma-better yet interact with the complex considerations that determine the effects of the company: productivity, speed of delivery and quality ensuring external and internal customer satisfaction. The effectiveness of this approach has been confirmed in practice by proving that it brings good results in different company size, branches of industry and types of activity. It has to be noted, however, that there is a lack of recognized methodology of Lean Six Sigma implementation taking into account the specificities of various SMEs.

The research described in that paper confirmed growing interest of SME sector in components of the concept of LSS both in Poland and in France. It was noted, however, that due to specificity, smaller organizations in both countries need similar tailored solutions to their problems and limitations.

The extended review of literature, development in operational management in industry and presented results of pilot studies confirmed the methodological gap concerning Lean Six Sigma for small and medium-sized enterprises at the international level. Due to the lack of appropriate methodologies, there is a need to create a Lean Six Sigma deployment model adapted to the specificities of the SMEs of the manufacturing sector, based on the criterion of a minimum number of simple, effective and efficient tools.

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