LEAN LOGISTICS

Anna Wronka

University of Lodz,
Faculty of Management, Department of Logistics, Lodz, Poland

e-mail: akraw@uni.lodz.pl

JPM
JOURNAL OF POSITIVE MANAGEMENT
Vol. 7, No. 2, 2016, pp. 55–63
© Copyright by
Wydawnictwo Naukowe
Uniwersytetu Mikołaja
Kopernika
ISSN 2083-103X

http://dx.doi.org/
10.12775/JPM.2016.012

Abstract

Purpose: The aim of the article is to present the key assumptions of Lean Management, with particular focus on the components of Lean Management System and the assessment matrix of implementation the Lean concept. In addition, Author demonstrates the applicability of Lean paradigms to improve the logistics area, as well as to improve the functioning of supply chains, especially by using methodology which links Six Sigma and Lean ideas as well as Agile approach. This paper except theoretical analysis presents lean logistics application in practice. Short case study is developed on basis of best lean logistics practices of company from B2B market

Methodology: The used research approach was the detailed analysis of logistics international literature and case study based on internal documents and interviews with lean managers from international company.

Findings: Emphasizing the multidimensionality of the concept, Author indicates potential areas of integration Lean with other tools and strategies used in modern businesses management, like Six Sigma or Agile approach. Additionally article presents practical application of Lean in logistics.

Keywords: Lean management, Lean Logistics, Lean Six Sigma, Agile, Supply Chain Management

Paper type: Viewpoint/case study

1. Introduction

The increasing dynamics of changes in the environment, both internal and external, requires the enterprises to proceed with constant improvements of their processes. In search of methods and techniques to optimize actions, the multidimensional concept of lean management, which paradigm is increasingly being used in domestic and foreign economic practice, deserves attention. The idea of eliminating unnecessary waste in order to improve the flow of added value, in particular the one dedicated to the customer, more often determines the quality and efficiency of logistic processes happening in the organization and as a long-term consequence create positive potential of company (Pfohl, 1999).

2. Assumptions of Lean Management

The concept of Lean Management is widely identified with the elimination of loss through "leaning" the organization from any unnecessary activities. However,

in practice this is too narrow of an approach, not generating expected benefits in the form of optimizing the functionality of key areas of the company, related primarily to: quality, time and cost. Efficient and effective implementation of the concept does not only come down to restructuring but requires a long-term and multifaceted transformation on all levels of the organizational structure. Within the scope of the existing so-called Lean Thinking culture, all employees, seen as the biggest potential of the organization, must be aware of the need of multifunctional cooperation and the dual role they play in the Lean management's system. On the one hand, they are in fact obliged to maintain and control processes but on the other they have to continually improve them through a variety of tool and programs. In business practice this often means the necessity to expand the existing structure with Lean functions (Czerska, 2015). Table 1 shows the major components of the Lean system together with essential levels of the organizational structures.

Table 1.
LMS components

Source: own study based on: Charron, R., Harrington, H. J., Voehl, F., Wiggin, H. (2014), *The Lean Management Systems Handbook*, Productivity Press Inc, p. 6.

Level in organizational structure	**Basic tasks**	**Double Lean management**	
		Control activities	**Perfecting actions**
Executive team	Defining the vision and values of Lean	Managing the resources and assets of the organization	Elimination of variation (Mura) and losses (Muda)
Middle level managers	Defining and implementing change initiatives (stimulators)	Risk management	Reducing excessive resources burden(Muri)
Line employees	Improving implemented innovations	Managing processes and operational results	Minimizing unnecessary operations

The use of Lean management axioms requires integration and a holistic management of aspects superior for the enterprise, namely, operating results, broadly understood organizational assets – risk and human resources in particular (Charron et al., 2014). Due to the fact that implementing Lean is neither a simple nor a short-term process, a matrix has been developed for assessing problems and benefits occurring for companies implementing Lean Management. The critical layers for the proper functioning of the concept, as well as the areas of potential difficulties are illustrated in Figure 1.

Although there are many resistance factors together with unavoidable costs for adapting to the new sub-strategy (those are primarily costs associated with trainings and improvements of machines, devices or installations), companies are more willing to take on the attempt and try functioning while basing on Lean philosophy. In the "promise" made by J. Womacka and D. Jones which states

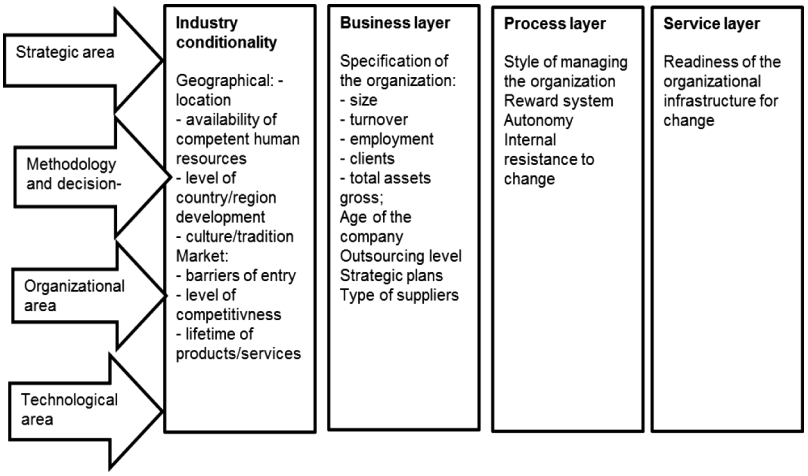

Figure 1. Components for Lean implementation evaluation matrix

Source: own study based on: Pavlovska, O., Kuzmina-Merlino, I. (2014), "Scale Development for Lean Implementation in International Environment", *Journal of Business Management*, No. 8, p. 74.

"Lean gives you the ability to produce more by using less – less human effort, equipment, time and place, while at the same time getting closer to the objective, which is to provide the clients exactly what they want" (Womack et al., 2007), entities recognize a realistic chance to improve their market position. The more so that numerous empirical analysis confirm that when compared to a typical mass production, savings even in terms of production area, stocks and total costs of production are significant as they can reach up to 50% (Hobbs, 2011).

3. Lean in logistics

The concept of Lean Logistics is becoming more and more common in world literature. It is defined in various ways, mainly depending on the scope and context of the study. Most generally, it is a logistic dimension of production, in line with the Lean Management concept (Baudin, 2004). Internal and external logistic processes are designed to support the continuous flow of production materials and completing the delivery to end customers, at the same time maintaining the appropriate time, place, quality and cost. In addition, all logistic processes taking place in the organization must be constantly improved, especially with regards to the elimination of unnecessary waste and activities not generating added value (Baudin, 2004). In practice, there can be nine logistic area pointed out in which the typical losses for Lean can occur. These are: logistics service and customer support, forecasting demand and planning, procurement and purchasing, stock management, deliveries and communication, packaging of materials, transportation, storage and reverse logistics (Sopadang et al., 2014). Applying Lean principles in relation to the listed areas, apart from identification and elimination of losses, leads to many tangible benefits. The most important of

them include: balancing production lines and reducing lead time factor (measured from the order time to the delivery time), reduction of stock levels, elimination of downtime, delays and unwanted variability, as well as a greater availability of products together with flexibility throughout the supply chain. Applying the guidelines of Lean Logistics on a regular basis, helps to prevent any process shortages, mainly basing on a systematic analysis of processes, production control compatible with the pull system, and supporting ongoing operations through a number of tools typical for the Lean concept, such as VSM, Kanban, TPM or 5S. The adaptation of Lean principles to the management of logistics processes are to contribute to the improvement of flows occurring in them. However, keeping balance between the customer's requirements and the organization's capabilities requires proper demand management, both on strategic and operational level, standardizing activities and the time of their implementation and comprehensively qualified, multi-tasking employees who are able to efficiently handle various processes (Overboom et al., 2013).

4. Lean Six Sigma Logistics

When analyzing the scope of using the Lean approach in logistics, in economic practice, complex, hybrid tools for improving widely understood quality are used more and more often. An example of methodology linking objectives of different concepts is Six Sigma Logistics. It's main guidelines claim that the customer has to be provided with a product that meets his requirements in an optimum time and place. Furthermore, if possible, eliminating any irregularities and unwanted variations in the processes carried out with the involvement of all employees together with basing on reliable data obtained from regularly conducted more or less detailed analysis (Zimon, 2013). The implementation of these objectives requires a change in the approach of the company, especially in terms of decision-making processes, which should be based on the terms of Total Logistics Costs and processes of identification and elimination of losses in key logistics areas.

In the framework of simplifying the designing process and implementing logistics strategy based on the principles of Lean and Six Sigma, T. Goldsby and R. Martichenko have proposed Logistics Bridge Model. It assumes establishing, Maintenance and improvement of partnerships with suppliers and customers of the company, especially in the face of pressure from the competition and owners to reduce costs and increase market share. The model is to stimulate critical thinking skills in the organization, which according to the authors, us the basis for the improvement of logistics processes. The following should be considered as critical to the success of Lean Six Sigma Logistics: flow logistics, capabilities of logistics processes and the so called logistics discipline. Within the flow logistics the model takes into account the assets, information and finance. Whereas in the

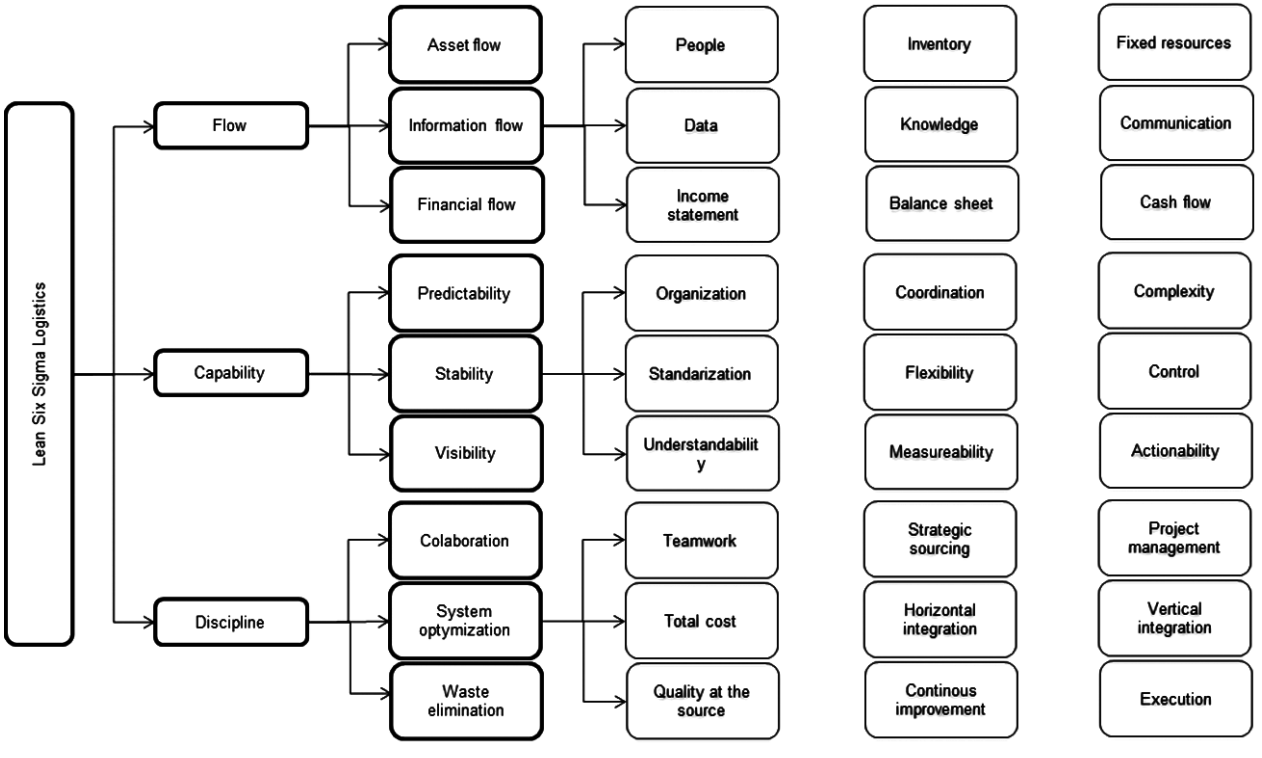

Figure 2. Logistics Bridge Model

Source: Goldsby, T., Martichenko, R. (2005), *Lean Six Sigma Logistics. Strategic Development to Operational Success,* J. Ross Publishing, Pine Island Rd., p. 270.

area of process capability, analyzing their predictability, stability and transparency. In the area of discipline the model takes into account cooperation, optimization of the system and elimination of losses (Goldsby and Martchienko, 2005). The components of Logistics Bridge Model are shown in Figure 2.

5. Lean and Agile integration

The Agile approach complements Lean, emphasizing firstly the flexibility of the supply chain, adapted to constant and rapid changes in the market and the progressive level of customization, more and more innovative orders. Although the dogmas of Lean and Agile are oriented on different purposes (Table 2 shows the characteristics of Lean and Agile supply chains), in practice, their coexistence (Leagality or League (Goldsby et al., 2006)) is possible and increasingly used, like through the Order Decoupling Point and the so-called strategic stock (Rudnicki, 2015). Implementation of both Lean and Agile aims to reduce the rate of lead time (in the case of Lean, due to eliminating loss, whereas for Agile, through immediate response to quantity and quality divers expectations of customers) cost reduction, providing optimal before and after sale services and the integration of key links of the chain. It should be noted, that choosing the right strategy for managing supply chain (Lean, Agile or a hybrid of those two) is conditioned by a number of variables among which the most important are the specifics of the product (standard or customized), the demand type (stable or unpredictable), way of order realization (based on long-term forecasting and product strategy called Make to Stock or relating to current orders and in accordance with the so-called Make to order principle), and increasingly the ability to absorb risk and customer sensitivity (Goldsby et al., 2006; Faisal et al., 2006).

Differentiator	Lean chain	Agile chain
Primary aim	Implementation of the forecasted demand in the most efficient and effective way	Ensuring rapid response to changes in demand in order to reduce interruptions in the supply, pricing and aging of goods
Market success factor	Quality, total delivery time, availability	Quality, cost, total delivery time
Competitive advantage	Cost	Availability
Order execution strategy	Shortening the execution time for the order without incurring additional costs	Investing in methods, reducing cycle of order execution
Determinants for choosing suppliers	Price and quality	Speed, flexibility quality

Differentiator	Lean chain	Agile chain
Storage strategy	Shortening the rotation cycle and stock levels	Allocation of intermediates and final products reserve buffer
Product design strategy	Designing products with taking into account the costs and productivity increase	Modular design in order to delay the phase of product differentiation
Production strategy	Maintaining a high level of production capacity	Maintaining excessive production capacity buffer

Table 2. Characteristics of the Lean and Agile supply chains

Own study based on: Konecka, S. (2010), "Lean and Agile Supply Chain Management Concepts in the Aspect of Risk Management", *Electronic Scientific Journal of Logistics*, Vol. 6 No. 4, p. 25.

Although Lean and Agile differentiate in their basic assumptions, more and more entities see the benefits of their integration, in particular in the design, production and logistics (Mukhopadhyay, 2015).

6. Practical use of lean in logistics

Practical implementation of Lean principles in the area of broadly understood logistics runs multidimensional. This is due to the fact that the scope of implementation and the selection of tools is in a large way dependent on the specifics of the organization, industry in which it operates and also the awareness of the senior management and staff attitudes. Analyzed, in the context of this article, entity is a strategic branch of an international group, representing the energy and transport sector. The object of the characterized unit is the production of steam and gas turbines, distributed both for the domestic and world market. Due to the fact that it is largely automated single-unit or low-series production, example use of Lean Management concerns mainly the internal logistics area and in a relatively narrow sense. In order to illustrate the theoretical analysis, the focus was on sample uses, guidelines of Lean approach to improve logistics processes.

Execution of project orders, particularly in the field of wind turbines, determines the organization of the warehouses. Although the company operates in line with the Just in Time production and optimizes the Work In Progress indicator, minimum losses in stock that ensure continuity and fluency of production are needed. As a part of the process to improve storing components, necessary for executing orders, Visual management guidelines were used. In the form described this includes the use of color markings assigned to specific orders. The solution is compatible with visualizing work on the production floor and in the packaging department, which results in minimizing the likelihood of confusion, as well as having a positive effect on the works of operators who reduce the selection time of necessary elements thus increase efficiency and effectiveness of ongoing tasks. In practice, the color codification is apart from light signaling, controlled by Warehouse Management System, most commonly used way for visual controlling

of internal logistics processes, especially in the scope of design and improvement the so-called supermarket, which is a tool to optimize process flows within the company.

Apart from the visual identification system, the company uses Lean guidelines also in the area of internal supplies. Managing according with the shop floor management concept is focused on improving processes that generate the greatest value from the point for the customer's needs and expectations. In the described subject, those are undoubtedly the production processes that determine the distribution of machines on the shop floor, meaning the so-called layout. Because of the specificity of the manufactured products, the setting of the machines is not standard and assumes the existence of movable workspaces. Work organization is in fact dependent on the complexity of the executed order. However, it is always consistent with the dogmas of Lean. Such approach helps to optimize the capacity of the operations, ensuring safe flow of material, people and information together with the work ergonomics. Machine operators have storage carts near their workplaces, which are to support the "no boxes on the floor" principle. All positions are organized accordingly with the "shadow box" principle and also in the context of applied visualization, components on the carts are segregated by colors, depending on their status, for example: green is the finished product, yellow and blue are for elements in need of machining whereas red ones are rejects. Additionally, in order to ensure continuity of the processes, a division to a safety zone is being used (so-called safety buffer), which is an effective tool for signaling the numerical states of components and is vital information for the "milkman" riding twice a day. It should be emphasized that the carts designated to support delivery routes are operated in accordance with the needs of operators on specific parts. The use of the milkman loop (so-called milk run), even though requiring coordination and skillful planning of the supply paths and departure time through unloading components and loading of finished parts in one cycle, contributes significantly to the reduction of internal transport costs and minimizes downtime of production by adequate and timely delivery of components.

7. Conclusion

Efficient and effective transfer of Lean Management principles to broadly understood Logistics is not limited to the use of numerous tools in order to reduce unnecessary activities, referred to as waste. Applying Lean in the area of logistics is also a series of steps to improve and facilitate processes within the supply chain and also the ability to operate in different, often unstable conditions for managing the organization. A change in thinking and attitude of employees, as well as commitment form the management, are the factors that determine the level of benefits resulting from the implementation of the concept's guidelines. The results of the research conducted in the United States clearly indicates, that only

self-learning organizations, able to identify threats and solve their problems in the shortest time possible, are able to obtain tangible benefits from Lean (Pieklik, 2011), especially in the area of logistics, both internal and external.

References

Baudin, M. (2004), *Lean Logistics: The Nuts and Bolts of Delivering Materials and Goods*, Productivity Press, New York.

Charron, R., Harrington, H. J., Voehl, F., Wiggin, H. (2014), *The Lean Management Systems Handbook*, Productivity Press Inc, New York.

Czerska, J. (2015), "Ewolucja struktury organizacyjnej w ramach transformacji Lean", available at: http://www.leanmanufacturing.pl (accessed 10 April 2016).

Faisal, M. N., Banwet, D. K., Shankar, R. S. (2006), "Mapping Supply Chains on Risk and Customer Sensitivity Dimensions", *Industrial Management & Data Systems*, Vol. 106 No. 6, pp. 878–895.

Goldsby, J. T., Friffis, S. E, Roath, A. S. (2006), "Modeling Lean, Agile and Leagile Supply Chain Strategies", *Journal of Business Logistics*, Vol. 27 No. 1, pp. 57–80. DOI: I: http://dx.doi.org/10.1002/j.2158–1592.2006.tb00241.x

Goldsby, T., Martichenko, R. (2005), *Lean Six Sigma Logistics. Strategic Development to Operational Success,* J. Ross Publishing, Pine Island Rd.

Hobbs, D. B. (2011), *Applied Lean Business Transformation: A Complete Project Management Approach*, J. Ross Publishing, Pine Island Rd.

Konecka, S. (2010), "Lean and Agile Supply Chain Management Concepts in the Aspect of Risk Management", *Electronic Scientific Journal of Logistics*, Vol. 6 Issue 4 No 3, pp. 23–31.

Mukhopadhyay, S. K. (2015), *Production, Planning and Control. Text and Cases*, PHI Learning Private Limited, Indie.

Overboom, V., Small, J., Naus, F., de Hann, J. (2013), "Applying Lean Principles to Achieve Continuous Flow in 3PLs Outbound Process", *Journal of Economics & Management*, Vol. 11, pp. 66–79.

Pavlovska, O., Kuzmina-Merlino, I. (2014), "Scale Development for Lean Implementation in International Environment", *Journal of Business Management,* Vol. 8, pp. 31–45.

Pieklik, J. (2011), "Zagrożenia Lean Manufacturing", available at: http://www.log24.pl (accessed 30 April 2016).

Pfohl, H. (1999), "Trendy i strategie w logistyce europejskiej", [w]: Materiały konferencji Logistyka „*Rynek – dystrybucja – zapasy*", Ośrodek Doradztwa i Treningu Kierowniczego, Warszawa.

Rudnicki, J. (2011), "Przedsiębiorstwo Agile", available at: http://www.log24.pl (accessed 30 April 2016).

Sopadang, A., Wichaisri, S., Sekhari, A. (2014), "The Conceptual Framework of Lean Sustainable Logistics", in: Materiały z konferencji, „*International Conference on Transportation and Logistics*" (ICLT 2014), Malaysia; 08/2014.

Womack, J., Jones, D., Ross, D. (2007), *Maszyna, która zmieniła świat*, ProdPress, Wrocław.

Zimon, D. (2013), "Logistyka a koncepcje i systemy zarządzania jakością", *Logistyka,* No. 5/2013, pp. 221–224.