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MASTER THESIS

Challenges in Lean implementation
Successful transformation towards Lean enterprise

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Abstract

The paper is based on a systematic literature review that examines how the implementation of Lean could bring value to the organization processes and contribute for achieving an operational excellence. Different organizational factors which have importance in the implementation process, are thoroughly examined. Key success factors that enhance the implementation process are identified - human resource practices, management style, organizational strategic vision, organizational culture, external partnerships. The research outlines the challenges that companies experience when they change their business model towards implementing a new to the company management system – Lean concept. For better understanding of the term the paper suggests definitions from the authors acknowledged in the field.

Part of the research considers some critical points that impede the implementation of Lean. The conclusions are drawn upon considering lean as a complete business system, which change the way organization thinks in striving for a competitive advantage.

Keywords: lean implementation, lean enterprise, Lean, challenges, process improvement
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Introduction

*Change* is the word that best characterizes the nature of modern societies and determines the challenges that managers face. In the reality of rapid technologic progress, global communication and intensified competition, old methods can no longer reach the same results nor can they respond to the fast changing situation. The success of companies and managers depends on their ability to react, operate and adapt to change (Kotter 2007).

Some authors argue that the capability to adjust to the new conditions quickly is a competitive advantage. Time cannot be wasted if one wants to be successful. (Spur et al. 1996 as cited in (Mertins, Jochem 2001)) Management of change needs to be at the table of the everyday plan for a leader. The successful structuring of change processes requires powerful methods and tools.

Staying competitive requires looking for new ways of reducing costs and increase the quality of the company’s products. Lean thinking was considered to be one potential approach for improving organizational performance. Authors suggest that this complex highly integrated system is the reason for Japan’s manufacturing effectiveness (Womack et.al.1990, Liker 1998)

When the flexibility seems to be an important issue in today’s highly competitive environment Lean integrated as a complete system in the organization can ensure company’s adaptation. Developed as a production system eliminating wastes in the Toyota’s plants in the 1960’s, Lean is evolving into a management approach that improves all the processes at each level of an organization.

The main objective of this study is exploring the process of implementation of Lean throughout all the levels of the organization as a whole business system approach analyzing to which extent organizational factors can enhance or impede this process. The thorough review of the literature aims to bring out the challenges that companies are facing in the process of implementing Lean approach as well as some to determine limitations and barriers of the model. The study main goal is to develop a theoretical framework that suggest a different more detailed perspective of the Lean approach to the managers who consider implementing it as a possible direction towards achieving sustainable performance for their companies.

The beginning of the research clarifies the concept of Lean based on the work of significant researchers for the field. Discussion of the definitions of Lean given by various
authors will provide a better understanding of Lean as a management model and will identify the key characteristics and aspects of the term.

The next section observes how the implementation of Lean could bring value to the organization processes and contribute for achieving an operational excellence. On the other hand it is questioned why applying Lean principles does not always bring the expected profit and how this could be overcome. It outlines the challenges that companies experience when they need to change their business model towards implementing a new to the company management system. Different organizational factors such as human resource practices, management style, organizational strategic vision, organizational culture, external partnerships, which have importance in the implementation process, are thoroughly examined.

The analysis are supported with evidences from several companies that have successfully implemented Lean and examine how they managed the organizational change throughout the improvement process.

Another part of the research considers some limitations and barriers of the management tool.

The conclusion includes discussions over consideration of Lean as a complete integrated system for achieving a sustainable business excellence in the organizational performance.
**Methodology**

The research is written as a theoretical thesis and it is based on a systematic literature review.

The literature source - Web of knowledge was identified as providing the access to the leading citation databases covering thousands of journals worldwide, as well as conference proceedings. The databases gave research results from variety of publications such as: International Journal of Operations & Production Management; Proceedings of Institution of Mechanical Engineers; Journal of international management; International Journal of Production Economics; Journal of Manufacturing Technology Management; Journal of Operations Management.

Some books were also found helpful as a starting point in the research process. The research was inspired by the insights for Lean implementation process at Toyota plants, the book “The Toyota way” written by Jeffrey Liker (2004).

From this review it could be identified a set of key findings, where the literature was either consistent or contradictory. The review of the literature published on the topic could help establishing a better understanding of Lean implementation processes and the challenges that the companies face. A starting point was identifying the definitions and key characteristics of Lean concept given by authors who are prominent in the field of continuous process improvement. Next step was identifying hindering and supporting factors in the Lean implementation process. The criticism regarding this model was also discussed.

In the initial search, over twenty thousands of papers associated with the topic of Lean appeared in the result list. It was then necessary to narrow down the scope of the search by using a set of keywords which were based on the main research question. According to different combination of key words this step reduced the result list to 158 papers for “lean implementation”, 147 papers for the search combining “lean implementation and lean management”, 81 for “lean concept” and 31 papers for “lean and challenges”; The search was further restricted by considering papers published after the year 2000 and the ones that had been cited more than five times and appearing in the results lists from different keywords searches. Several articles were chosen using a snowball technique. While scanning the selected papers identified through the databases, some relevant articles
appeared from the reference lists that would further explain terms and give clearance over researched topics. All in all, 22 articles were selected for review.

The paper is structured as follows. (Maybe sth for the relevance of the topic researched) The research method is described first and the results of the literature search are summed up. Then it is shown the analysis of the literature and the key findings and issues. Finally, the results of this analysis are summarized, put into perspective and conclusions are drawn.
Literature review:

Part I. Conceptual framework for study Lean:

1. The roots of Lean concept – TPS, manufacturing practices

1.1. Background information

Henry Ford first develops a manufacturing concept of continuous moving assembly line – the first approach for mass production. The Ford model of a worker performance in simpler and repetitive tasks has been replaced by job rotation and teamwork, which mainly improve employee morality but also yield substantial benefits in terms of higher quality and employee suggestions for improvements in the process.

This model changes the way managers view the production as the emphasis becomes the specialization of job tasks performed by unskilled workers. The spread of mass production—high product volumes, lower cost per unit, job standardization was supported by the scientific management school and its founder Frederick Taylor. The model’s efficacy was not questioned by the managers till Taiichi Ohno of the Toyota group in Japan noted some flaws in the model. Mass production required high levels of inventories for needed materials, large amount of capital and space, low quality of the products, over-standardization of the products and in that way the organizations become highly inflexible to customer demand and resistant to any changes. Lean production was defined by contrasting it with two existing production systems approaches, i.e. craft production and mass production. In craft production, skilled workers use relatively simple but very flexible tools to produce one of a kind products to meet precise customer requirements. In mass production, highly skilled specialists design products to be made in high volumes by relatively unskilled operators using expensive and inflexible machines.

Ohno developed a new concept called Toyota Production System (TPS). TPS underpins many innovations including the elimination of waste—muda, quality at the source—jidoka, continuous improvement—kaizen. The concepts of lean production are not necessarily restricted to materials supply and inventory alone. It is aimed to improve processes and to make them more efficient and to reduce defects. Indeed, they can, and should, penetrate all value adding activities of an enterprise.

1.2. Lean definition
Womack and Jones in “Machine that changed the world” argue that the adoption of lean approach will “change almost everything in every industry- choices for consumers, the nature of work, and fortune of industry by combining the advantages of craft and mass production”. The Lean approach consists of various practices, which aim to improve efficiency, quality and responsiveness to customers. Todd(2000) defines lean production as “initiative, whose goal is to reduce the waste in human effort, inventory, time to market, and manufacturing space to become highly responsive to customer demand while producing world class quality products in the most efficient and economical manner”.

Lean has evolved as a concept over time. The research of (Hines, Holwe & Rich 2004) create awareness in the managers vision of evolving towards lean thinking and developing an understanding about the theoretical underpinning of organization learning. The authors based their work on the framework suggested by McGrill and Slocum (1993) for the relationship of value and cost and reaching the cost-value equilibrium.

The interest in continuous improvement led on to the notion of a Learning Organization. The culture of continuous learning is the great benefit for a lean company that opens a new opportunities for future improvements and in this way achieving sustainability in a long-run.

In order to show the development of the lean concept from the initial purpose of its first usage mainly as a manufacturing technique till today’s aim to enhance organizational learning, the four stages of the evolution of lean approach will be discussed in details.

The four types of organizational learning are classified by McGrill and Slocum’s (1993) as cited in (Hines, Holwe & Rich 2004). The stages of evolution of lean thinking are related to the stages in development of organizational leaning. Organizational learning is defined as the “process of improving action through better knowledge and understanding “by Fiol and Lyles, 1985, p.803 as cited in (Hines, Holwe & Rich 2004)

The first type of organization is called ”knowing organization” and it responds to the first stage of lean approach – cells and assembly lines. It is characterized by first lean awareness, when the belief that there is one best way of doing things is established. This first stage is often comparable with the scientific management approach by Max Weber (1964) and Frederick Taylor (1911). This stage covers the first decade of lean formation between 1980 -1990. The contingency is highly prescriptive application of tools and methods. The initial source of lean thinking at that period of time is the automotive industry.
Second type of organizations is “understanding organization”, which are driven by communicating and clarifying the core values and management practices that aim to reinforce the company’s culture. The companies in this period of mid 1990ties are convinced that they are doing lean and apply the best practice approach, but this is happening only on the shop floor yet.

In the end of the decade till 1999 starts the repositioning of lean thinking. It is claimed that it can be applied in wider range of industrial settings (Womack and Jones, 1996). That is the beginning of the awareness for finding individual firm’s solutions and their improvements throughout the value chain. The type of organization in this stage is called “thinking organization”. Typical is the implementation of value stream mapping and the 5 lean principles developed from Toyota. Even though some of the practices and tools are questioned, the lean organization at this stage ignores some other key processes as new product development, new business opportunities, which prevent the organization of achieving sustainability with constant improvement.

The new century involves a greater degree of contingency that taking into account factors like size, industrial sector, technology employed. The focus is changed towards creating customer value. This model is “learning organization”, involving the opportunity of developing the knowledge about employees, suppliers, customers, even competitors. Each change is viewed as an ability of the system to learn and improve.

Authors of this paper tried to review the lean thinking process and its evolution over time. Four key stages in its development were identified and outlined. The knowledge is spreading beyond its origins from Toyota production system. Many critics try to attack lean, but what they seemed to neglect is the fact that Lean has been developing and still continues to develop as a whole management system. Many contradictions arose due to the fact that there is missing a clearance in lean definition and what is actually lean, what is part of it and what not.

Lean manufacturing is developed by Taiichi Ohno at Toyota Motor Company in the 1950’s as “an innovation technique based on the minds and hands philosophy of the craftsmen era, merging it with work standardization and assembly line of the Fordism system, and adding the glue of teamwork, for good measure” Edwards (1996) as cited in (Motwani 2003).

Lean manufacturing involves changing and improving processes, so the knowledge of variation is critical to the knowledge of leanness. It also requires “re-engineering of the whole process, which makes the system more stable with less variation on account of
common causes” (Deming 1986). The basic principle of Lean is responsiveness to change and waste minimization.

Having the examples of Toyota, Lego, and many other companies in the construction and aerospace industry, Lean model has helped significantly in achieving performance improvements by increasing efficiencies in terms of cost, quality and time.

Womack and Jones (1990) are the first authors who bring out the benefits and improvement performance capabilities of the model after a thorough study at Toyota production plant. The main point is that companies can become vastly more flexible and responsive to customer needs applying the five principles of Lean.

In Womack's view, the contribution of the book “The Machine that changed the world” (1990) is to present Toyota production system (TPS) as the operations element of Toyota's total management system and to link this to the production process, the supplier management process, the customer management process, and the management practices and policy focusing process for the whole enterprise. According to (Womack, Jones 2003) lean thinking can be summarized as correctly specify and enhance value, identify the value stream, make the product flow, let the customer pull value and pursuing perfection.

1.3. Lean principles

To become Lean requires a specific way of thinking, philosophy and management system which for Toyota is following “4P” model of the Toyota way. Liker (2004) describes in his book “The Toyota Way” fourteen principles which present the foundation of getting Lean at Toyota Production System (TPS). The author divides these principles into four categories all starting with the letter ”P” – Philosophy, Process, People and partners and Problem Solving. This becomes known as so called “4 P” model of Toyota (Liker 2004 p.6)

The five principles of lean implementation that was specified by (Womack, Jones 1996) are accepted with key importance to successful implementation. Applying these five steps needs to happen on every organizational level and requires complete transformation of the current business system. A real challenge is to know how to start.

First step is defining precisely the customers’ value. It is important that the value flow would be ensured across the organizations as well as through the departments of each company. If the value is not specified correctly, this could result in wrong product or service with a great waste for the organization.
Second is identifying the entire value stream and eliminate waste. The three critical activities at this stage are product definition, information management and physical transformation.

Plant layout is something of need to change at first place, because that way the work could be organized better and the visibility allows for managers to detect the mistakes and problems occurring, so that to be fixed. The new reorganization is needed mainly because of introducing the new technology, organizing the work flow, introducing of the work boards.

Making steps flow requires innovative thinking. Managers believe that flow can be achieved only through continuous incremental improvements. But the lean transformation is possible to happen only if lean thinkers turn to radical improvements that would build a complete new business system.

Next step is letting the end customer to pull the product he wants into the system when he needs it. In this case the high cost for inventory will be reduced.

Pursue perfection is the final step of the implementation process.

It is very important that all the steps are performing together, so that the influence of each of them is strong enough to enhance the outcomes of the others.

Lean production is seen also as consisting of eight principles (Ahlstrom, Karlsson 2000): elimination of waste, zero defects, pull scheduling, multifunctional teams, delayering, team leaders, vertical information systems and continuous improvement.

In lean system the emphasis is basically on reducing waste of all types. The emphasis on elimination of waste as well as continuous improvement is combined with a strategic focus of the company over the quality ensuring that the reduction of defects will always be at first place. To accomplish this goal employees are trained into using different methods of hypothetical testing of how to identify problems and search the appropriate solutions for them. They look for sources of variation and wastes, develop ways to eliminate them.

Another lean belief (Mefford 2009) is that the process can be improved always some more further on no matter the fact the how good is it and the approach and the management actually should encourage the workers to think in this direction of searching always continuously better ways of doing things.

A great majority of economic activities-construction and housing, transportation, the food supply system, manufacturing, and personal services - are affected only over a long period, if at all. New technologies and investments in human capital may generate growth
over the long term, but lean thinking has demonstrated the power to produce green shoots of growth all across this landscape within a few years. Lean thinking works well when applied in a comprehensive way (Womack, Jones 1996). The problem is a sabotage of managers with the knowledge and energy to make the leap, taking heroic measures to define value correctly, to identify the value stream, and to make value flow more and more perfectly at the pull of the customer.

2. Shifting the focus from lean production (associated with cost reduction and eliminating waste) to lean thinking (creating value)

Womack and Jones (1990) argue that Lean can be applied not only in manufacturing context, but also in every other organizational level. The value of the system is without a question for the manufacturing companies having the example of Toyota. Lean was always associated with reduction of cost, eliminating waste, just-in-time (JIT) delivery (The term ‘lean’ is also regarded ‘as the previous name of just-in-time manufacturing (Holweg 2007)) A study suggests how the adoption of Lean is beneficial for knowledge-based activities such as design, new product introduction, engineering and product development (Baines et al. 2006 p.1539). It claims that today the popular emphasis is on customer value, on the “value” in a broader context of different useful activities and how to maximize this value. James-Moore (as cited in Baines et al. 2006) also argues that engineers need to move from the production focus where the primary focus is waste reduction to such of identifying and enhancing value.

Chappell (2002) defines lean thinking as applicable to all aspects of a business and positively impacts not just production operations, but the whole range of business processes including product development, design and sales.

Womack et al. (1996) define lean thinking as a “multidimensional approach of doing business with the primary focus on waste reduction”. The eight wastes include: mistakes, rectification, overproduction, unnecessary production steps, unnecessary movement or transport of employees, unnecessary movement or transport of goods, people waiting downstream, goods or services that do not meet customer needs. Liker, 2004 adds to the list the unused employee creativity as a major type of waste. As most important for the successful implementation the author emphasizes that all the employees within the
organization must accept and understand the goals of lean thinking adoption and to be engaged in it.

The authors develop a conceptual framework for lean thinking based on the work of Liker (2004), (Shah, Ward 2003) and Shingo prize guidelines (2005). The framework put together all the enablers of lean thinking and relationships between them for a successful lean implementation. It includes the practices, principles and processes needed for adoption of lean thinking within the whole organization. Lean thinking is “operationalized as an integrated management approach”, that has an impact over the whole organization including its stakeholders – suppliers and other business partners, customers, etc.

Figure 1. Conceptual framework for studying lean thinking

The terms of lean are defined by the Womack and Jones, 2004 as following. When the organization implement the lean practices only at the inside structures, then it is lean

1 (Czabke, Hansen & Doolen 2008 p.78)
organization. When the lean thinking is applied at all value-adding activities within the organization as well as between the organization and its contractors, the authors suggest the term: “Lean enterprise”. As it is shown on the figure the house keep together all the necessary parts of the lean enterprise. Each of these elements is important to be present, so that full benefits could be received for the company adopter. The base of the structure consists of the enablers of successful lean implementation. 

First of them is lean philosophy, which mainly refers to the appropriate leadership style and commitment of all management levels till the top management. The focus is on perfection in meeting customer requirements and continuous improvement, learning and waste reduction. The second layer is human resource management (HRM), employee empowerment and involvement in lean implantation as the key success factor as the focus is on “teamwork”. Sharing the value of lean principles, the employees are those who make things happen. Next are illustrated the supporting activities that shows the need of the company to improve its core processes with the main focus on “waste reduction”. Within the organization manufacturing “best practices” are just-in-time (JIT), total productive maintenance (TPM), and total quality management (TQM), which contribute for waste reduction. On the other side are the areas that are non-manufacturing supporting functions that should be influenced and improved by the implementation by the already mentioned practices. This so called “core operations” include marketing, new product development (NPD), partnering with suppliers and customers. The ceiling of the lean house is lean culture that supports the roof – lean goals and results. Lean culture comes with the problem solving in the process of learning going on the path of continuous improvement. Culture is both a result and enabler for sustainable and successful lean operations (Liker, 2004). It has the function of a role model, which guides the employees through the organizational change towards the values of lean thinking. On the top is the achievements reached by implementing Lean – all the goals and results of lean thinking for high performance. The results are related to best quality, lowest cost, shortest lead time, high employee moral, safety working issues, top business results. These results give the company competitive advantage (Womack et. al. 1990)

3. The term Lean enterprise
Womack and Jones (1994) are focusing on the external networks of the company as the strategic vision of the lean production. This vision is conceptualized by these authors in the term “lean enterprise” instead of “lean production”. Applying lean techniques throughout the whole value chain would create a continuous value stream by value adding activities. What the authors (Womack, Jones 1994) suggest is joining the value-creating activities which can be realized through a new organizational model: the lean enterprise. “Lean enterprise is a group of individuals, functions and legally separated but operationally synchronized companies. The notion of the value stream defines the lean enterprise.

To ensure this flow though the organization needs to stand behind the new organizational model called “lean enterprise”. Karlsson and Åhlström (1996) define “lean enterprise” as a firm that uses best practices in all functional areas and see it consisting of four different parts: lean development, lean procurement, lean manufacturing and lean distribution. (Panizzolo 1998 p.227)

Not all the managers today can be successful in lean implementation in condition of failing to see the place of the company in the value stream. Another point is that linking lean activities is difficult in that situation and so it is the full benefits to reap. Evidence for the struggling of managers to combine the individual lean techniques into a coherent system gives the authors Womack and Jones (1996), whose study shows 50 companies advanced in implementing lean or beginners from a variety of industries. “Getting lean” is a path of development that every manager professes to follow. All of them perfect the techniques and tools, but when it comes to putting them altogether managers had stumbled.

The authors argue that in time when the company couldn’t even manage to apply the lean production in all of its processes; it could not become a lean enterprise.

The most difficult task appears to be understanding of the conflicting needs of individuals, functions and companies up and down the value stream.

Lean thinking goes beyond the firm, looking at the whole: the entire set of activities in creating and producing a particular product, from concept through detailed design to actual availability, from initial sale through production scheduling to delivery, from raw materials to out of side in the hands of the customers. The organizational mechanism for that state Womack et al. (2003) called “lean enterprise” – including all concerned parties to create a channel for the entire value stream eliminating muda.

The first starting point for Lean thinking is value, which can be defined only by the customer. So Lean is about creating more value for the customers by eliminating what is
considered to be wasteful in the company’s activities. The next stage is reaching a continuous flow with the customers’ pull of orders.

The most important in the final goal - striving for excellence is the transparency throughout the value chain, where all the participants in the implementation can learn and improve their skills in creating value.

The western companies connect Lean mostly with the implementation of the best practices and tools. On the other hand Japanese are focusing on philosophy and culture. Whatever the perspective is – the elimination of waste remains the main focus of Lean.

Achieving a high performance and improvements in the organization with implementation of Lean is proved to be very difficult. (Womack, Jones 2003) Not one could expect to realize a high performance results by simply implementing a few tools and techniques. Lean is a philosophy more than a tool and requires significant changes in the way of thinking. It is continuously improving the way the company is operated. The problem is how to transform an organization into a “Lean Enterprise”.

The book “Machine that changed the world” by Womack and Jones (1990) popularize for the first time the new manufacturing technique – Lean. Conducting the research in Toyota plants the authors open a discussion not only about production, but also about Lean enterprise and applying Lean principles in other areas of the organization. Another side of the system got uncovered as innovative tool of the company for its adaptation to the fast changing customer demands. Increasing productivity, improving quality and operational excellence became the concept for success. But how this concept develops and what are challenges that companies face today when implementing Lean.

Started back with Taylorism the quality gains the attention of the world as an instrument of achieving competitive advantage. The principles of standardization and specified working tasks accepted in Ford Motor companies, contributed for a great success and better performance in mass customization conditions. But what is actually achieved from the traditional plants gives us only a small part of what implementing Lean model could lead us to.

Lean implementation is seen as a process of adoption. The term implementation process is taken for a meaning of “progression of events” (Ahlstrom, Karlsson 2000). The implementation as a process of adoption involves the necessity of innovation and adaptation of the organization, not just following a certain sequence of steps from a preliminary designed plan. The research tries to explore to which extent the
implementation process includes certain improvement initiatives and which are the success factors which would enhance the implementation process.

**Part II. Lean implementation:**

1. **Success factors in implementing Lean**

A longitudinal case study (Crute et al. 2003) of two plants in the aerospace industry considers five factors significant for a lean implementation.

1. **Change strategy targeted and holistic:**
   It is argued that lean philosophy and techniques require adoption of the entire system in a holistic manner rather than applying techniques in a piecemeal fashion. Womack and Jones (1996) suggest that managers have drowned in techniques as they tried to implement isolated parts of lean system without understanding the whole. On the other hand this more tentative or piecemeal approach is being adopted mainly as a result of resistance from the employees to the new ideas. The more focused training gives evidence for a better understanding among personnel of the key principles of waste elimination and flow of value.

2. **Effects of company culture:**
   Changes of mindset gives people an aim in their working life and have the potential to change attitudes, so that the employees begin to think differently and are more willing to contribute to company’s improvement initiatives. Stronger management control makes the organization structure bureaucratic, which makes difficult the change from the existing ways of doing things.

3. **Product focus:**
   Lean changes need to be focused on the specific product value stream, so that the control over resources to be dependent mainly on the improvement team.

4. **Senior management commitment:**
   Consistency in management commitment is emphasized as important element in effective implementation of changes in organizations (Kotter 2007)

5. **Timing for performance improvements:**
It is also considered as a significant factor for organizational change. The companies need to be prepared for the lean transformation, but at the same time manage change requires fast reaction with the implementation activities even taking a risk and later deal with consequences. (Crute et al. 2003)

A research (Pius Achanga et al. 2006) based on a literature review and data collection from semi-structured personal interviews with managers and personnel at 3 large manufacturing companies and 10 SME’s all implementing Lean identifies four key factors for lean implementation. The factors are only at inter-organizational level:

1. **Finance**
The financial capabilities of the companies are one of the critical factors for successful implementation of Lean. Financial resources are needed for employee training programs, external consultants, etc. Sometimes even production of firms may be interrupted as a result of the employees training in the new techniques. The managers would rather refuse unnecessary loss of resources especially if they do not anticipate immediate returns. (Pius Achanga et al. 2006 p.467)

2. **Leadership**
The study indicates that it is highly desirable to have a certain degree of communication skills throughout the company, long-term focus of management and strategic team while implementation of a new initiative.

3. **Organizational culture**
Organizational culture is an essential element in lean implementation process and high-performing companies are those with a culture of sustainable and proactive improvement efforts.

4. **Skill and expertise**
Staying competitive requires the use of intellectual capital and ability to innovate and differentiate. Most companies experience difficulties after employing people with low skills levels, who do not foster the ideology of skill enhancement.

A multiple case study by (Czabke, Hansen & Doolen 2008) reports results of four case studies of secondary wood manufacturer from Germany and United States. The results outline 3 main factors with great importance for the successful Lean implementation. These are:

1. Communicating the vision of the new initiative at every organizational level
2. Necessary change in the organizational culture
3. Consequently following the new practices and principles. Most successful change efforts begin when some individuals or some groups start to look hard at a company’s competitive situation, market position, technological trends, and financial performance (Kotter 2007). The vision clarifies the direction in which an organization needs to move. In more successful transformation efforts, executives use all existing communication channels to broadcast the vision.

Kettinger and Grover (1995) as cited in (Motwani 2003) points out that any significant process change requires the following success factors:

1. Strategic initiative of top managers acting as leaders in defining and communicating the vision of change

The process change begins with a strategic initiative. The support from the senior management is needed for the strategic change.

2. Willingness to learn

The goal of learning is to provide positive impact outcomes as a result of effective adaptation to environmental changes and improved efficiency in the process of learning. Adaptation includes appropriate actions in response to technological changes and learning from other organizations achieved the best practices in the industry.

3. Culture readiness

Organizational culture facilitates the integration of individual learning by influencing the organizations’ ability to learn, share information and make decisions.

4. Balanced network relationships

Under most circumstances cooperative, interpersonal and group behavior is resulting in superior performance. Open communication promote common culture and innovative behavior within the organization.

5. Knowledge sharing

6. Prescribed process management and change management practices

Corporate transformation requires dissatisfaction with the current state of the organization, a vision for the future and well-managed change process. The management needs to be fully committed to lean implementation and to view the problems they face as opportunities and turn every challenge into a learning experience. Applying best practices should be everyone’s responsibility.
If managers apply these concepts collectively they can reap the full benefit of lean techniques and significantly improve their products’ competitive edge. (Motwani 2003)

The following four essential components for successful implementation are identified, which if thoroughly embedded into one continuous system can create value for creating a lean culture. (Mefford 2009)

- belief in the new program, that it will work – convincing into the success of the lean concept
- commitment for implementing it from managers
- involvement of the whole organization – employees, resources
- patience and long term view for the results

What is needed most is that managers should essentially change their philosophy of management. The role of the manager as boss needs to be replaced by allowing the responsibility in the lower levels of the organization.

Organizational change is never easy and at in first place the philosophies need to be changed, roles should be different and responsibilities divided and accepted as such. The process requires truly commitment from the top management, they should be convinced that this is the right path for organizational development and as leaders they should continually urging and share the values of commitment to everybody in the organization.

Organizational culture should be created and shared values of the goals spread throughout the firm.

Patience for the final results is needed because often the prediction for the superior performance miss take into consideration the exact time horizon of the implementation process. Quarterly financial results cannot be pursued in this situation. The large upfront costs and delayed benefits can be a fact within an implementation of sustainable improvement program. Also it takes time for the employees to achieve best results in a short term when they need to perform new acquired improvement skills.

One of the finding that the authors achieved is that strong leadership of a chief engineer would be the key to successful product development process. That claim is being supported by many engineers in the field. McNeel (2004) supports the view that if the entire organization undergo a Lean transformation only then the impact of the Lean system could be significant. The underlying key to maximize the success of Lean is actually to adopt the culture across all areas of the business. (Baines et al. 2006 p.1545)
The following table summarizes the factors which are most important for the Lean implementation according to the authors of the research papers. According to the summary of researched papers in Table1 the most significant factors for Lean implementation are:

- Management commitment in the implementation process and communicating the vision of the improvement program
- Necessary changes in the organizational culture
- Employees involvement
- Network relationships
- Holistic strategy for integrating the system
- Willingness to learn

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<tr>
<th>Success factors</th>
<th>management commitment</th>
<th>organization culture change</th>
<th>willingness to learn skills and expertise</th>
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Table 1. Success factors in Lean implementation

These factors are further elaborated into separate parts.

- **Management**

The perspective of lean thinking as an integrated overall management approach is vague at the managerial level. The managers perceived Lean as a manufacturing tool for enhancing the shop floor operations. The other company shares the positive effect of implementing Lean at all areas of the organization, and emphasizes the benefits of it not only in the manufacturing, but also in the marketing department. The forth company brings forward as the main reason for implementing lean thinking – the competitive advantage that the company would gain with it ahead of its rivals.

For many managers is surprisingly difficult to implement a lean system (Holweg 2007). The explanation for this paradox is that lean and quality approaches require a fundamentally different philosophy of management than the traditional mass production approach.

To transform into lean organization, a company needs three types of leaders according to Womack and Jones (1996):

1. someone who is committed to the business in a long run and can be the anchor who will provide stability and continuity – an experienced worker with longer history in the company
2. someone with deep knowledge about lean techniques – lean specialist
3. someone who can be the champion/leader and fight against the organizational barriers arose as a result of the dramatic change in the organizational operations

A study (Czabke, Hansen & Doolen 2008) reports the results of four cases of lean implementations in companies considered “lean leaders” from US and Germany secondary wood products industry. Multiple case study design approach was performed in order to be identified the challenges of implementation process as well as the subsequent successes of it. The key challenge faced by the companies in lean implementation appeared to be the communication of the vision and values of lean thinking to all employees. The main objectives of the research are focused on gaining a better understanding of the challenges and benefits in implementing Lean thinking for the wood products companies by
identifying the pitfalls faced by the companies, the key resources supporting the implementation and the benefits to the organizations.

The managers at the studied companies reached the common answer that the implementation of lean thinking follows after experiencing a crisis, such as loss of market share, decreasing profitability and growing competition. Managers at two of the companies reported that there was still a disconnection between manufacturing operation and corporate headquarters in what lean thinking meant.

Most of the managers interviewed have taken lean courses before its implementation, and as most beneficial to them turns out to be: benchmarking other organizations. They find extremely helpful the observation of particular technique implementation in another plant. One of the studied companies hired a consultant for helping throughout the implementation process. Other manager points out as a main benefit the communication between management and the employees where all of them can set their expectations, and the feedback afterwards is highly valued.

- Employees

Seeing employees as capable and valuable for the organization is required if the managers want them actively participating in the improvement program. They will only contribute to the organizational goals if they believe that these goals are aligned with their own individual interests. Individual characteristics of the employees also play an important role for the successful job enrichment. If some people have unfulfilled needs for self-expression and personal achievement they would be motivated to participate in employee involvement programs. Other people on the other hand may respond better to other stimuli and continuous improvement might lead them to feelings of insecurity and low tolerance to changes in their working habits because they would prefer a stable environment. Personal differences can have a large impact over the attitude and behavior of people towards improvement activities.

Lean production is a broad concept that gives implications for many other aspects of organizational operations as it is work design characteristics. Womack et al. (1990) argues that emphasis of LP practices over the employee participation in problem solving and improvement results in greater job enlargement, cross training, and challenge. The proposed framework explores how the lean production practices, together with organizational and environmental contingencies affect work design characteristics that
influence employee and organizational outcomes. The impact over work design characteristics focus the study on autonomy, task identity and skill variety, and employee outcomes.

The standardization is one of the mechanisms in Lean production and often it leads to reduction of the employee freedom for suggestions and their autonomy to participate in the improvement of work processes. The reason for this is that they become dependent on the specifications for the work flow time sequencing following the predetermined working steps. This is a typical mistake that most managers make in the precise definition of tasks. So the better solution is towards “minimal critical specifications” allowing the employees for their personal contribution, which increase their motivation and participation.

The flexibility in Lean concerning the human resources is characterized by job rotation, but what the authors conclude here is that actually this could put “boundaries” and lead to low task identity and meaningfulness of the work performed.

On the other hand the “multifunctionality” allows greater mobility of the workers doing various tasks, improving their skills and experience.

Important principle is “support congruence”, which enhance team activities involving all the employees in improvement activities. The accent here is over the individual performance assessment based on innovative contribution, learning ability and involvement.

“Feedback” is defined as the extent to which individuals executing a task receive information on the effectiveness of their efforts. That would give the information to the employees as a response to any deviations from the targeted performance.

“Incompletion” – the idea for continuous improvement – Kaizen and how important is that the employees are encouraged to propose their suggestion for improvement activities aim to eliminate waste.

There is a contradiction in the literature concerning the impact of Lean practices over work design.

The authors (Mehta, Shah 2004) also argue about the effect that Lean production principles have over the employees. All defend the opinion that most important for the companies is to provide high quality of work life – work content, relations, conditions of employment, working environment. One side is taken by those who point on the negative effects of lean production such as workflow formalization and standardization, and working under high level of stress to complete the task on time. Others claim for a positive impact of lean
production which enables employees to work more efficiently and to feel committed to the organization and a part of the working team.

The removal of buffers and continuous flow enables tight coordination between the employees to achieve their final goal. Lean environment is characterized by detailed standardization of work processes. Parker and Wall (1998) define 5 “core job characteristics”: skill variety, task identity, task significance, autonomy, feedback. Parker and Wall (1998) propose that work design should be focused also on a contingent perspective of how organizational factors affect the choice of job design. Both positive and negative consequences of Lean production implementation on employees’ outcomes are reported in the literature.

Womack calls this anxiety a “creative tension”, because the job rotation and sharing responsibility helps workers to solve quality problems at their source. Over these bases other authors report that implementation of the lean practices even increase employees satisfaction. If we look at the today’s competitive environment in condition of a crisis, the stress is high as a result of the fight to keep your own working place. And if the employees are given enough freedom to show their commitment and contribution to the working process, this would enhance the visibility of employee’s performance.

The authors propose a conceptual framework indicating the polarities between work design characteristics and employee outcomes. The conclusions are that higher autonomy, task identity and task significance will have a positive impact over employee commitment, satisfaction and motivation. Feedback affects directly positively the employee motivation. Higher autonomy and skill variety can have a negative impact over job-related strain.

The evaluation of lean production (LP) against socio-technical systems (STS) indicates that lean production would be successful only in situations where task are stable, repetitive and uncomplicated.

The major attention in the comparison between the two systems is paid on work content. In Western countries personal growth needs are leading and important cultural objective is the emphasis on autonomy, and the need for a challenging job.

In socio-technical systems (STS) people are seen as a resources to be developed and the manufacturing structure is divided into separate units with their own autonomy. The system is organized with the purpose to balance the organizational goals with the personal needs for fulfillment. In this context self-managed teams are promoted as a way for increasing productivity and personal satisfaction of the work. Niepce and Molleman 1996
report that the workers responsibility is shared and all the people work closely together, supporting each other.

Self-management is view as a substitute to leadership. The role of the managers and supervisor is already transferred to the role of facilitators and coaches.

Strong emphasis is left also on the boundaries and the autonomy of different teams so that they could in that way identify themselves.

In Lean production systems (LP) teams have a crucial role for the lean environment implemented within a company acknowledging the human being in the labor process. The group boundaries are less clearly defined and the system is more open. The employees are expected to carry out many narrow tasks and to be rotated between teams and departments.

Hofstede’s (1980) model of key cultural dimensions is utilized to explore the “cultural fit” between team design and manufacturing practice. Hofstede’s dimension of power distance is particularly relevant in exploring people’s willingness to engage in self-managing behavior. Power distance is defined as “the extent to which a society accepts the fact that power in institutions and organizations is distributed unequally” (p. 349).

Employees from large power distance cultures (for example, Japan, China) expect managers to lead.

In countries with small power distance models of management the subordinates are those taking the initiative. People in large power distance countries prefer decision making to be centralized, whereas people in small power distance countries prefer decision making to be decentralized.

Management systems that grant employees more autonomy and responsibility as it is the case with self-managed work teams may not be suitable for employees from large power distance cultures. Uncertainty avoidance (“the extent to which a society feels threatened by uncertainty and ambiguous situations”) also relates to formalization, and cultures with strong uncertainty avoidance have a need for formal rules and specialization.

The typical for Japan collectivist view rather than competition, tend to put aside personal interest in defense to the group welfare. People in individualistic cultures as United Kingdom, US, Germany tend to promote their own welfare over the interests of their groups.
LP and STS have differences both in terms of philosophy and practical application, which explains the difficulties that some companies experience in implementations of the working teams.

An important step towards lean enterprise requires a better understanding of the needs of employees and functional units (Womack, Jones 1994).

Needs of individuals and the localizing of employees at the right job position seem to be a major obstacle in creating a lean enterprise. Motivation and creating a working environment that allows them to develop their abilities is the key for achieving the best condition for implementing lean. To expand and use the knowledge of the employees they need to be organized into functions. In the learning organization functions are where the knowledge is collected, systematized and deployed. Making organization lean requires focusing of processes with a high degree of cross-functional cooperation. The relocation of the functions into processes is seen as an obstacle by many managers. To overcome the conflict between processes and function executives assign the employees from one function to multifunctional teams. Other managers overcome the problem in completely the opposite way as narrowing down the task and organize the activities of the minor functions.

Other point is that narrowing down the scope of the responsibility makes calculation of costs and benefits much easier for the organization, which makes visible the results of its improvement efforts.

These needs resulted from three industrial traditions – the German, the American and the Japanese. All of these are trying to satisfy one of the needs – function, individual, or the company.

The German tradition is focusing mainly on deep technological knowledge organized in clearly defined function roles within the organization. The career paths for the employees are clarified up on the functional ladder. The companies defend their positions in a value chain by amassing knowledge within their technical functions. The consequence of this tradition is good positions for a global competition by offering customized products with superior performance. The weakness is the lack of acceptance for cross-functional cooperation.

The American tradition put the individual in the center of the society and leave them create its own needs. The main advantage is that the suppliers are willing to coordinate their activities with the actors within the same functional area which ensures the continuous
flow from one operation to another. This shows the functional orientation of this approach similar to the German one. On the other hand each company in the value chain acting for itself, and keep a certain distance from the rest of its partners throughout the value chain. The Japanese tradition emphasizes the needs of the company at the first place through building the specific organizational culture. From one side this enables the company to follow the needs of the entire value stream. On the other it creates a competitive environment for all the members in the value chain. The weakness of this tradition is the lack of technical functions in most Japanese companies as a result of less time dedicated for learning. On the other hand the main advantage is that the employees are working only in cross-functional teams and developing products or improving processes and at the same time applying all the knowledge that they already have. Many Japanese companies prospered by commercializing and incrementally improving products and processes.

Teamwork is another term with a great importance for the efforts of every individual, as what is important that typically each employee goes through job rotation which pursues the aim of gaining knowledge for the whole process and on the other hand receiving the feeling of affiliation to the work. Managers serve as mentors and coaches in these efforts which are considered as job responsibilities of every employee.

Self managed teams are viewed as a form of organizational structure which aims to reach organizational effectiveness (Rafferty, Tapsell 2001). The introduction of the self-managed work teams is beneficial for the lean organization regarding the greater level of team productivity, improved quality, improved customer satisfaction, greater safety. First focus team working receives in the studies by Womack and Jones (1990). The interest of Western companies to Japanese management systems has been an area to learn from on the point of business executives and management researchers.

Self-managed work teams are a growing form of organizational structure aimed at improving organizational effectiveness. Researchers have found substantial benefits from the introduction of self-managed work teams in the workplace, for example, a greater level of team productivity, improved quality, improved customer satisfaction, and greater safety (Cohen & Ledford 1994).

Womack and Jones (1990) in their book “Machine that changed the world” assigned teams a crucial role in the success of lean implementation.

Self-managed work teams are defined as groups of employees that have specific set of responsibilities. (Wellins et al. 1990) A work team is a group of individuals working
independently to solve problems and to accomplish tasks. (Manz&Sims 1993) A real challenge for the organization is actually to implement these self managed teams and to involve all the employees in that process. The effectiveness of the self managed team is core for the organizational structure. This depends also on the team members’ willingness to engage in self managing behavior and their willingness to share that responsibility with other team members.

This study of (Rafferty, Tapsell 2001) explores how the national culture influences the implementation of the self managed work team in the organizational context.

Through the years it was thought that the Japanese competitiveness is a result of the unique national discipline and employment relationships derived from the Japanese society. This conclusions basically drew the fact that Japanese organizations has specific management practices which are non transferable to foreign environments because their cultural advantages could not be maintained. This view is supported by the organizational theory and sociology through the arguments that the organizations are inseparable and embedded with their societal environments (Hofstede 1980). The transferred management systems would be depreciated by the culture of the new environment. (Rafferty, Tapsell 2001) The main aspect of this view is focused on the worker process control that is difficult transferable into the Western companies reality because of the different forms of industrial relations. Apart from that many US and European companies implementing different techniques as teams, quality circles, job classifications, project management and so on. Even though the practices are effective for achieving better results, the overall success doesn’t reach the expected levels of performance. This makes the Japanese model general for Japanese agents and turns it to a cultural phenomenon as a barrier to indigenous importation. (Rafferty, Tapsell 2001) On the other hand industry, technology or particular institutional factors are playing also a crucial role in determining organizational structure and processes.

The increasing competitive advantage of Toyota increases the challenge for the Western companies. The firms try to implement the approach in their context.

A connection between organization size and the level of implementation was identified throughout the different areas of the organization. The smaller study sites in each of the countries –US and Germany implemented Lean thinking as a total business strategy resulting in improvements in all areas of organization operation (Czabke, Hansen & Doolen 2008). Whereas the two large study sites implemented lean with a primary focus
within the manufacturing operations did not gain the benefits of the system in other areas of the operation.

Regarding the comparison between the two observed countries, there are some differences. The results from the research suggest that German sites were much more prepared for implementing Lean thinking and easier accustomed it to the specific needs of the companies.

Most important reported outcomes from the managers’ interviews were the presence of some factors that would enhance lean implementation to be easier accepted through the employees. These are less skilled employees, which gives the opportunity of easy learning the new organizational system, ability to engage in teamwork, as well as willingness to adopt lean practices.

The main implication of the study suggests that lean implementation could bring success to companies in the secondary wood products industry. The identified types of assistance during the implementation process are lean courses and trainings, lean literature, benchmarking. Employees are determined as the most important resource for successful lean implementation. The biggest challenge for all the companies remains the adequate communication.

Many employees report a culture shock when their organization started to implement lean processes, practices and principles (Czabke, Hansen & Doolen 2008). Employees are worried for losing their jobs, but when they gain enough knowledge for the new system they start experiencing its benefits and have positive feelings, as their work become easier and improving of the work conditions is obvious. So also the increased profitability makes them feel secure for their jobs.

The success of changes is determined by the employees, the organization, and the selected approach (Tünschel and Jochem 1998).

The source for the activation of hidden resources is the creativity and innovative capability of employees (Mertins, Jochem 2001). Employees are often aware of the departmental egoism and extravagant coordination efforts. It is a difficult task but the only way to gain the employees support for the improvement program would be the synchronization of the new practices with the corporate targets, to align it with the benefits for the customers and to increase the stakeholder value. To turn the employees towards participation a new way of thinking is needed. Barriers that reduce the speed of processes of change drastically have to be overcome, and motivation has to be built up.
A main focus in the implementation process in the observed sites is employee involvement as one of the key enablers for successful lean thinking. Employees are the most important asset. Managers realize the importance of that factor and agreed that training is a crucial factor in their success. Teamwork and empowerment of the employees are identified as important by all the managers. (Czabke, Hansen & Doolen 2008) In the case by Czabke et al. (2008) the employees are tightly involved in the design of lean practices resulting at the implementation process combining a mixed approach of top-down and bottom-up techniques. In lean production theory the manager is more of a coach who works with the staff, train them to improve their processes. Employees are the experts because they carry out the tasks every day and understand them at a depth managers cannot. They are viewed as assets because of their contributions to process improvement, quality, and customer service instead of costs as in traditional production theory.

The success of the necessary changes depends on the innovative ability of the company. Only if the existing processes are transparent and comprehensible for all participants can profits that today are given away be activated without falling back into `trench warfare’ or needs for justification. To achieve this, all employees must be actively incorporated into the process: led by the corporate targets and oriented towards the requirements of market, product and company. method and tool support is harmonized, will you be able to overcome the existing departmental sealing-oà tendencies, and co-ordinate and integrate the different linguistic `worlds’ and corporate views (Vernadat 1999).

Network relationships

Companies operations involve suppliers upstream and customers downstream. Long-term relationships with the suppliers are put into lights not only because of reducing the lead times, but also building of strategically closer and technologically reliable connections. As cited in (Panizzolo 1998), Fuller et al.(1993) were the first ones to draw attention onto the fact that logistics is an extension of lean production process and the emphasis should be over the market and customers rather than the company itself.

The most difficult task appears to be understanding of the conflicting needs of individuals, functions and companies up and down the value stream.
Applying some of the lean techniques on manufacturing level can bring a lot of advantages to the single company, but even succeeding in getting lean it cannot sustain in long term while the rest of the members in the value stream are still struggling with responding to the needs of the other companies. (Womack, Jones 1994)

The improvements in transportation and communication led to a situation where the local competition and markets operate in the context of global standards. This open infrastructure allows manufacturers to respond to this challenge by working closer with their suppliers and customers through building extended enterprises across the whole value chain. Such extended enterprises present great challenges in terms of redesigning business processes to create a competitive advantage from the linkages they include.

The extended enterprise represents a new way of doing business, and requires that we redesign and reengineer appropriate business processes, to provide for local customers while meeting global standards. (Jagdev, Browne 1998)

The supply chain issue is an important element for sustaining competitive advantage with lean production initiatives. As an example Japanese supply chain is based on small number of suppliers, which are devoted to the company and the processes are in coordination to the partner company. Real benefit can be attained only with the sincere commitment from each of the partners. Boykin (1997) as cited in (Jagdev, Browne 1998) identifies nine essential keys to strategic relations:

1. Shared specific focus on satisfying their common end customer.
2. Alignment of vision.
3. A fundamental level of cooperation and performance to commitment (trust).
4. Effective and open communication.
5. Decisions are made by maximizing the use of the competencies and knowledge within the supply chain.
6. All stakeholders are committed to generate long-term mutual benefits.
7. A common view of how success is measured.
8. All members are committed to continuous improvement and breakthrough advancements.
9. Whatever competitive pressures exist in the environment are allowed to exist in the extended enterprise.
Sharing of information among partners of a supply chain will not only reduce the operation costs of each of the partners, but the efficiency of this ‘trust’ based business transaction will give rise to a sense of ‘customer satisfaction’ along the value chain.

The study by Ahlstrom (2000) reports for the importance of delayering the organization at the early stages of processes improvement, to create a platform for further improvements. Organizations cannot simply add lean approach to their existing practices and to expect that it will immediately bring positive results. Changes to different organizational functions are necessary. When responsibility is pushed down to the lowest level of the organization, the number of hierarchical levels in the organization is reduced and the organizational structure is fattened.

Delayering seems to require the management support and resources at the early stages of the adoption process. From the start of the lean adoption, the hierarchical organization needs to be decentralized and responsibilities spread through the operators in making the right decisions throughout their work. Turbulence within the company is created once the supervisors are removed and their responsibilities need to be transferred to the multifunctional teams. Management support is recommended for the transfer of responsibilities. The multifunctional team experiences a real challenge when it is delegated work with a great responsibility. The production manager and the top management emphasized the need for gradual empowering and proper training of the teams.

Delayering at the early stages of lean implementation appears to be highly important. It improves the communication and coordination between management and the multifunctional teams. It makes the transfer of responsibilities to the multifunctional teams much easier. On the other hand delayering is required for the smooth adoption of the other principles of Lean. It enables the lower levels of the organization to specialize in decision making at the early stages where the relevant information for the direct customer demand could be processed through process improvements.

The research by (Repenning, Sterman 2001) suggests that the inability of most organizations to gain the full benefits of the implementation of an innovation is less connected with the particular technique that is being selected. The roots of the problem lie at the way this improvement program has been introduced to the company and how the process reflects the whole system. The real problem in implementation is the way the tool interacts with the physical, economic, social and psychological structures of the
organization. It is a systemic problem created by the interaction between improvement program, the employees, equipment, and management.

2. Challenges in Lean transformation and applying Lean thinking across the enterprise

The framework that the authors (Repenning, Sterman 2001) developed brings out the challenges associated with implementing improvement programs and provides some practical suggestions that would increase the chances for future success in such efforts. The first factor is: time spends on working and capability, which are the “physics” of process improvement. Often it turns out that even if time is added for improvements, it takes time for the problem in the process to be identified, then the causes of it to be discovered and eliminated, then solutions introduced. Unfortunately it happens that even after such efforts they not necessarily immediately leads to improving process capability. Other question is that even improving capability will not last forever, if for example this is applied to technical equipment that is amortization and getting obsolete or where the products are changing often.

This seems to be connected with the management decision regarding reaching the desired goal. This could be performed in 2 ways – work harder or work smarter. In work harder during working time situation the management pushes the workers to work harder so to meet the target, or just add more working hours, which in most cases leads to great pressure and high levels of stress. The alternative is to increase the capability of the process and that way to improve performance. In working smarter situation management gives the employees the possibility to experiment with new ideas and find a solution for performing the work better. The authors (Repenning, Sterman 2001) though do not accept as totally positive the second approach and criticize it as a substantial delay between dedicating the time for improvements and the actual improvement happening – the benefits of invested time and other resources comes much later in the implementation process. This is also connected to the complexity of the improvement. Unfortunately that results to mostly applying of the technique “work harder”, because the main targets should be reached and often the management and employees never find time for improvements. Focusing on the hitting the final target is always leading as it is mainly characterize with less time for non-work related activities as improvement for example.
The study (Repenning, Sterman 2001) determines this managerial behaviour of achieving the short term goals as so called „reinvestment loop“- a temporary emphasise on one option at the expense of the other could become permanent. It operates towards increasing of work pressure and minimal levels of process capability. In the opposite situation it could be a positive feedback that would reinforce the behaviour that dominates. If an organization put enough efforts in improving its process capability, its performance will rise. The same authors develop a model that shows the dynamics of the system response to work harder versus work smarter and helps to explain why the companies fall into capability trap-the interaction between balancing shortcuts loop and reinvestment loop. In the situation of working harder, cutting the investments for process improvements erodes process capability and decreases the performance in a long term. Because of the pressure to meet the high target from the beginning the performance is higher than in general, which delude the work towards less investment in improvements. Later on the capability declines to extend that the actual performance declines as well.

When working smarter, as a result of decreasing the time spent working and increasing the time for improvements the actual performance is falling down. In a log run though the capability is increasing apparently. As a result the work is less and the performance is higher due to the increased process capability.

A capability trap could prevent a product development company from developing new processes that would have increased productivity.

Under the pressure of short time limits and goals that should be met, managers often fail to see that overworking will only lead to worse performance and it will remove the chances for improving the working process. Very often problems occur and they need to be solved not only for the time they happened but in a long run. Managers attribute the low performance to unmotivated workforce, rather than the real cause – low process capability. This case is described as self-confirming attribution error (Repenning, Sterman 2001)

So when the managers are convinced that the source of their difficulties is the workforce, all the actions that they take gives them extra confirmation of this attribution error. This error is thought to lead the organization to high work pressure and fewer resources are dedicated towards process improvement. The managers don’t realize that they could be in a capability trap, because the organization operations give them enough evidence that convince themselves that the problem lies in the attitude and character of their employees. Unfortunately all the action they take lead to decline in the performance and this process is
getting even worse with time. The capability trap goes beyond high work pressure and low capability, but it is also linked to organizational structures of incentives, corporate culture. The rewarding is directed towards promoting and rewarding those who save the line running or heroic efforts that find a last minute solution of a problem. These incentives are developing short-run thinking and working harder environment.

One of the most daunting challenges for every CEO’s of global firms is to keep their firm competitive in a long term (Mefford 2009). They face pressure for keeping the cost low and progressively increasing profitability and at the same time they should innovate and improve product design, so that to compete on the global market. A decision for lower cost and higher profitability would be increasing the productivity of the firm.

A challenging job for the managers in all of the studied companies in the research of (Czabke, Hansen & Doolen 2008) turns out to be the effective communication of the vision and plan for lean implementation to the workforce. Understanding the new vision, new order and communicating it at all the organizational levels seems to be a difficult task for the management as well. Sometime even when the CEO of the company is fully committed to the organizational improvement program it appears that the organization experience some problems with the implementation of the new approach. It happens very often that the implemented programs fell back to their original costly and chaotic mode. People are resistant to changes on their working place even if the management is dedicated enough efforts in training programs and explaining the values of the new practice. Especially when workers veterans encounter the new challenge of changing their way of working and when they need to be convinced in the benefits of the new technique. Many negative attitudes can be turned into a great resistance. (Mefford 2009)

A hard time is the decision to let go some of the employees who cannot accept the adoption of change and wouldn’t support the implementation efforts.

Other challenge for the managers in the beginning of the implementation process was actually to follow the new practices and principles avoiding going back to the previous stage.

Another challenge for companies is reported by a study (Lewis 2000) that gives evidences for leverage of employees leaving the company in the advanced level of lean implementation.

Employees’ skills, knowledge and experience necessary for working specific tasks throughout the company can be scarce and difficult to copy and hence provide a platform
for sustainable competitive advantage. So subsequent problems with staff retention have a major impact on operating performance and “getting into a bidding war” (Lewis 2000).

These skills have a market value for the particular company and if externally visible to other competitors in the same field (i.e. after the national training award, or other public conferences where managers describe the value of their staff), a risk of staff leaving to leverage this value appears. When key members of staff are being headhunted by other larger organisations willing to offer substantial benefits, to retain these staff becomes time consuming, expensive and can have a major impact on morale in single status firms.

The human resource policy in the observed company based on low levels of staff turnover, experience a struggle to replace key workers after their leaving. Even though that staff expressed loyalty to the company in all surveys conducted, in the face of such incentives they still left.

According to a 2005 Bain survey of more than 900 global executive, around 70% of them admit that the excessive complexity is raising their costs and impede their profit growth.

Having the examples of success in fast food restaurants chains it seems that simple is equal to profitable growth. Most of the companies though are focused on new product development as being competitive ahead of the others in their industry. In that case happens the way that the profit of the company goes rapidly down. This fact is mainly due to the complexity that they introduced to their system in trying to be innovative. In most cases the complexity starts within the product line, but soon afterwards it is spreading around the whole organization. As a response the company tries to implement tools like Six Sigma or Lean. The complexity is spread throughout the whole value chain and the tools implemented in one area are not about to make a significant change in the situation.

The authors ask the question: “Where is the company innovation fulcrum?” The innovation fulcrum is a turning point towards higher profit and increased sales. It could be achieved by finding the balance between complexity and innovation.

The authors (Gottfredson, Aspinall 2005) claim that Lean manufacturing techniques for reducing inventory doesn’t help against the wide range of stock keeping units (SKU’s). This is because the production process is reflected and not the product lines, where the real problem of complexity is embedded, because the product line’s size drives inventory requirements.

This problem often stays invisible for the managers, who are focused on responding to the customers’ requirements. This leads to disturbance in the system as work pressure of
finishing tasks, overproduction or incorrect forecasts, increasing costs due to errors, inability of suppliers to respond to rush deliveries, excessive or not enough inventory and so on.

The successful way to fix that situation is to focus the efforts over the source of the problem – who are your customers and what are their needs. Managers often perceive that customers would prefer their products if the choice that is offered to them is various. This is mostly delusion of bringing value to the customers in that way. Some companies launch surveys to determine what are the choices and services that the customers really need, so they efficiently provide only the required degree of complexity.

On the other hand the complexity is not always such a bad thing. It should be considered as a good way to manage possible disruptions in supply delivery, capacity and technology breakages, etc. So if alternatives are not available the risk of financial devastations is higher.

A critical challenge for managers today is to synchronize the needs of individuals, the functions and the company and its value chain in a way to achieve the full benefits of the lean enterprise while increasing the individual opportunities, functional strength and the well-being of partner companies. To achieve this goal managers need a new innovative management technique. Womack and Jones (1994) suggest an approach that would not only satisfy the above mentioned needs, but would also offer a great value to the customers. Individuals must be dedicated to a specific process, so that the value chain is flowing smoothly. Workers should be organized in small focused teams, which will make sure that the flow is continuous without bottlenecks. A good example is Honda, where engineers work on rotation. First a young engineer is assigned to a product development project to perform routine engineering tasks. After the project is completed he or she goes to his her technical specialty within the engineering department for skill improvement. At the same time the worker is being assigned to advanced engineering effort involving a search for new techniques or capabilities that the company wants to master. Then the engineer is assigned to a development team for a new product and there he or she can perform more complex engineering tasks. After that the whole process of learning and applying starts again from the initial point of a new engineering function.

The real challenge for the companies is to know how far in the lean journey they are and to manage the situation of continuous improvement in their organization.
3. Lean solutions and practical examples, case studies

The research by (Gottfredson, Aspinall 2005) determines how could be achieved the balance between innovation and complexity. The first step is identifying the zero-complexity baseline, the process cost of selling the absolute minimum number of standard products. Then the variety is bringing back to the business system considering carefully the expected sales for every additional product with following the impact over the costs throughout the value chain. When the analysis shows the costs are overwhelming the added revenues, then this point is accepted to be the innovation fulcrum.

The research evidenced for the organizational resistance when reducing complexity. Marketing claims that more product diversity is needed to be satisfied the customers’ preferences, on the other hand the operations function better with less. The model of the baseline changes the view of the managers about the business. It enables them to see the real process costs that company is losing through company’s existing complexity. By expanding the products line the company can better understand and forecast the costs of the complexity with every added unit as well as the revenues that will be gained. The techniques of marketing research and customer analysis managers can determine the choice of customers demand. Once a company is balanced on its innovation fulcrum, it needs to keep track of its product proliferation and in a period of time to reassess its optimal fulcrum point. The main purpose is that the complexity is pushed down further down on the value chain so the costs are reduced. So to speak the customization should happen at the last steps of assembly or the distribution process. What else should be considered is that innovation fulcrum can shift over time or the needs of the customers could change in terms of reducing or increasing the value of their choice towards more variety in the product line. There should be achieved a balance between the customer preferences and operating complexity.

Companies that can manage the proper balance between innovation and complexity create more efficient operations and more profitable relationships with customers. They also pursue the competitive advantage within their industry.

Lantech is a company investigated by Womack and Jones (1996) and presents a good example of the challenges that a company overcome in the process of implementing lean principles on every level.

The company is created with the lean idea from the beginning. But the process towards really getting lean passes through a lot of errors, improvements, developing new models
and changing approaches till the best solution for the company’s efficiency is found. One of the challenges at the very first stages was consolidation of several departments to work together for developing new models of products. Lantech experienced communication barriers between the different departments especially the information flow was highly difficult from marketing group to manufacturing engineers. With the growth of the company the things get even worsened as Lantech cannot identify properly the added value in the different steps as well as cannot achieve operations flow. A series of steps are taken for overcoming this situation.

The first approach was reorganization of the company into separately generating the profit through basic product lines and specialized products. This way the variability could be decreased and the actual profit of highly customized products will be organized into flow. Total quality management was introduced to respond to the customers’ demand. Another important step is improving the communication (information flow) and building trust between management and workforce throughout the different departments within the company. Managers with high level of control and authoritarian style of leadership were replaced by those willing to work in a team-based organization. Even though these approaches are essential for the company’s survival they lack the direct connection with the core activities of Lantech.

The step that the company took was so called kaikaku phase – the time when the things were taken apart and recombined back again in a totally different way. Lantech needed to change the mindset about work and how people work together. Important here was to clarify the work of each employee, so that they can understand the whole process and feel part of the project. Essential fact for the success of the step was that the chief engineer and manufacturing director accepted this strategic turn and truly devoted his work to it. The top manager take the long view for successful performance and although the setbacks, he gives all his support to the new approach. The company also hired external consultant who had the technical skills to work the bugs out of the system. The kaikaku team mapped the entire value flow and removed the wasted time and efforts. Another lean technique that could be found in that company is visual control, which shows the stages of each process to all the employees, so that every employee can see the status of an activity and to be able to take appropriate action – in this way was influenced the customer pull.

The authors Womack and Jones (1996) suggest that the business should be measured by the profit generated after its renewal. If the transition of the company costs higher
investments or the company’s ability to satisfy the customers’ needs, it could be called a revolution in business processes.

Elimination of inefficient tasks reconfigured the tools and rethought the development processes. The transformation reduced the amount of resources, which dramatically influenced meeting customer preferences and generating solid profit.

By making continuous incremental improvements in their pursuit of perfection, companies can usually double productivity again within two to three years and valve inventories, errors, and lead times. Because a company can put operations through kaikaku and kaizen scrutiny over and over again, indefinitely, it will never react an end to the improvements it can make. Results of this magnitude could be the antidote to stagnation in the advanced economies.

In the lean enterprise the functions has two major roles – to serve as a school for learning, systematically to summarize the current knowledge, search for a new knowledge, and teach this to the new members that spend time on value-creating process teams. The second role is to develop guidelines – best practices and to include all those companies throughout the value chain which are eligible for a long term partnerships. There should be developed also rules which will govern how these companies will work together and solve the problems that may arise as well as establishing behavioral codes so that one company does not exploit another in the value chain. Participation of a company in a lean enterprise requires that it should manage to do a narrow set of tasks that can do best according to its core activities. At the same time lean enterprise will need to participate in several value streams involving different companies providing range of products and services. But learning from the others and how their different way of thinking is the key to continuous improvement. An important thing for the lean companies to be able to work together and assure their survival is the development of new principles for regulating their behavior. There must be a clear agreement on target costing (what price the customer would pay for the product), total activity, performance requirements for the individual activities, the reward formulas. An example in this case is Nissan, which has worked hard to establish the principle governing its relationships with suppliers. These includes permanent commitment to suppliers, that makes continuous effort to improve their activities, determine a place for each supplier and ways of reducing costs throughout the value chain. Nissan even agrees on helping its suppliers to improve their key processes which strengthen the group pursuit of the lean enterprise.
Lean system suppliers partnership requires an important set of presence variables that includes: cooperation, trust, developing and monitoring performance standards and joint efforts to improve. The supply chain is becoming an essential part of the firms’ strategy to increase long term competitiveness. (Mefford 2009)

Zara, the Spanish clothing chain, is a good example of a firm which has employed lean principles throughout its entire supply chain developing a new category of retailing called “fast fashion”. Zara utilizes its entire supply chain as a competitive weapon by integrating all steps from manufacture through retail sales into a tight knit system that can design and stock a new fashion in its thousands of retail stores within two or three weeks. Zara has found the lean model, which has allowed it to expand rapidly and profitably throughout the world (Ferdows et al., 2004)

The study by (Panizzolo 1998) points out the necessity of involving the other organizational functions in order to fulfill the “continuous quality improvement plans” set up in the lean production implementation. Human resources are given a strategic role in the process based on changes required for increased commitment and empowering of the employees. Attention was also given to the relationships between product development and manufacturing departments. The developing of the product design that would make easier the implementation of the new manufacturing method is considered as highly important factor.

The study explores the relations between implementing the best practices in manufacturing process and how these correspond to the other processes within the organization.

Panizzolo (1998) develops another research model which conceptualise lean production as consisting of a number of improvement programs/ best practices that characterize different areas of lean company. The model (Panizzolo 1998) conceptualizes the lean production as consisting of improving programs and best practices characterizing different areas of the company (process and equipment, manufacture planning and control, human resources, product design, supplier relationships, customer relationships)

A multiple case study (Panizzolo 1998) explores how the lean production model has been adopted by 27 firms operating in international markets and recognizes the areas caused difficulties in implementing it.

The paper posts the transition from traditional production systems to innovative systems, from Lean production method to Lean management technique and how should the company follow this path of “continuous improvement”
The research methodology includes sampling process of the best companies known for their overall management and performance excellence, acknowledged as such from the top 30 European companies, “Europe’s 500 growing firms”. After preliminary discussion over telephone, 27 companies agreed to participate. The data collection method was face-to-face structured interviews with high-level managers of various functional areas within each organization. The interviews were collected by researchers with at least five years of experience in operations management. The purpose of the interviews is to show the extent to which the best practices of Lean are adopted in the company’s reality. Six functional areas towards achieving lean adoption have a great importance in the observed companies. These are:

- Process and equipment
- Manufacturing planning and control
- Human resources
- Product design
- Supplier relationships
- Customer relationship

The results of the study show that most of the improvement programs are focused on the inter-firm level, where the control over the management methods and operational planning can be directly transformed. The real challenge for the observed international companies turns out to be the adoption of innovative practices which concerns the management of external relationships with customers and suppliers. Panizzolo (1998) poses a quest for a change in the perspective of analysis and move “from operations management to relationships management”\(^2\), developing one different approach for integrating value adding parties concerned into the value stream - meaning setting up strong links with suppliers and engaging customers in the organization actions towards products and services. There are a lot of important points that should be taken into consideration on that matter. If we look at the possible partnership with supplier, we should be aware of the following facts:

- Industrial structure and size of the company - to which extent could be reduced the number of sources of supply

\(^2\) (Panizzolo 1998 p.238)
- Technological complexity of the product – how many suppliers are available
- Risks of supply disruptions when supply is only from one source
- Fluctuation in delivery schedule when dealing with dual sourcing

Regarding the customer relationships other issues appears as important:
- New dimension of customer service – from technical to relational as consequence of customer sophistication and market maturity
- The appropriate path to introducing service capabilities in manufacturing organization – do you need to be excellent in your production for doing that
- Quality and competences in servicing of technologically sophisticated product
- Service could be consequence of product differentiation opposed of a means to differentiate a product

4. Critics of Lean and barriers for implementation.

The authors (Hines, Holwe & Rich 2004) are developing a set of factors that criticizes Lean. Reviewing the literature regarding lean evolution it seems that many shortcoming of lean come up. The research defines the key aspects of this criticism, which are lack of contingency and ability to cope with variability, as well as lack of consideration of human aspects and strategic perspective.

- Lack of contingency is a factor connected with the major focus of lean implementation on the shop floor processes and neglecting the other important factors in the external environment like creating tiers with the suppliers for example. They insist that integrative lean approach should be applied in the organization and not only a piecemeal application of one lean tool in one area of the companies’ operations. Another aspect is the responding to customers’ demand. Hardly any manufacturer would decide on producing according to pull by order approach. The fear of losing a customer forces the manufacturer to keep higher safety stock with build-to-forecast approach and the inventory is waiting to be sold –which progressively increase the costs.
- Human aspects. Lean approaches can be viewed as Marxist’s being exploitative and creating high pressure to the shop floor workers, which leads to de-
humanizing effect, Williams et. al. (1992). Although the authors on the opposite side don’t support these views, they still raise the question of the importance of showing respect to the employees. And that lean thinking should not be regarded as a set of mechanistic hard tools and techniques that would repress the motivation. Creating a good atmosphere for your workers is really challenging, but most of the authors argue that this is the key to a long term sustainability of any lean programme.

- Scope and lack of strategic perspective is concerning lean transformation within the whole organization and how the lean should be put into perspective and applied at the leadership level and not only perceiving as a tools that could improve only one part of the processes.

- Coping with variety is a key aspect of the lean approach. The best ways of managing variety should be found within the implementation process that would add value to the customers. In case of demand variability lean approaches as model scheduling and level scheduling can be developed. But some authors argue that such approaches are not always as flexible as they need to be to respond adequately to the customer driven variability.

Western implementations of Lean thinking are based on misinterpretation of the word “lean”. In its early years lean is often related to “least cost”, leading to outsourcing, downsizing, low investments in research and development. The unstable marketplace has forced the organizations to adopt short-term views with efficiency gain and expectations for a fast profit. Instead of embracing lean thinking as a system-wide organizational philosophy, many organizations have treated it as an isolated initiative.

The early criticism of lean refers to the increased autonomy of workers and the intensification of work, which some authors describe as “mean production” or “management by stress” Skorstad (1994), Berggren (1993) as cited in (Radnor, Boaden 2004). Improvement programs add stress to the organization, because the work pressure is higher and oppose to investing more time in improvements. In situations when people could allocate some time in improvement programs, the result is short-term drop in performance as the time spend on working falls. This happens at the border where the improvement program is still not giving positive results, which convince the managers that the program won’t work out and abandon it. These dynamics strengthen stereotypes and
conflicts that hurt organizational performance, but society as well. As these attributions are repeating and shared, they become institutionalized and part of the organizational culture. Considering the characteristics of lean as a dynamic system approach that pursue continuous improvement, it requires change and modification in the current state of the organization. This makes it a fragile system that is working close to the organizational limits of change acceptance from the inside organizational actors. What is more the delayering, decentralization and downsizing as outcomes of lean lead the managers towards cost reduction, which makes some authors use the analogy of a human body as a way of describing leaness within the organizational context as the disease “anorexia”(Radnor, Boaden 2004) They define leanness as “not fat, thin” and use the analogy of elimination of waste or non-productive capacity with starvation of the body. From English Lean means “skinny”.

The authors (Smart et al. 2003) criticize the Lean model for achieving efficiency gains through cost reduction at the expense of loss of mission, integrity and failure. Lean model needs to be understood as an operating philosophy in its original context. What the researchers (Repenning, Sterman 2001) suggest is that the successful improvement must happen followed by significant shift in the mental models of the leaders -managers and participants - employees in the improvement effort. The focus should be on finding solutions of the problem, not rewarding those who caused it. When the cycle of self-confirming attributions is stopped, any improvement tools and methods can be applied for improving the capability. Otherwise any effort would be losing of time and none of the tools even with the highest potential would work.

In the research are observed two companies as practical examples how the capability trap could be successfully overcome. A good innovative approach is used by the company DuPont, who created a team that transferred the problems that need solving into an interactive role playing simulation that was performed off-site. The team was assisted by experienced modeler that helped the team to discuss and test the model identifying the areas in the company that need improvements. The team initiated a couple of days workshops as so called learning lab, where all the participants experienced all the sides of the problem so that to face all the emotional and cognitive issues that need to be overcome to find the best solution of the problem.

Researchers argue that flexibility, quality and teamwork are facades and too often they are replaced with practice to control, exploit and surveillance. Lamming (1996) as cited in
(Smart et al. 2003 p.734) suggests that lean system lacks flexibility in terms of “space to experiment” and “time to think”. Some define lean production system as “fragile”. Lean is often associated with the description of “doing more with less”, which explains the efforts for improving utilization of the organizations’ resources. This definition goes beyond the original definition of lean production popularized by Womack el al. (1990). Based on that some authors (Radnor, Boaden 2004) consider the possibility of reaching the state of “corporate anorexia” – the inability of the company to utilize or balance effectively its resources. Implementing process improvement initiatives changes the operations. The process of change often ignores the effects it might have over various aspects of the organizational reality such as management practices, performance results, relationships between principles of organizational operations. It is comparatively hard to predict the consequences of the change and in particular can lean initiative have harmful influence over the organizational operations. The authors try to answer the question to which extent lean could lead to so called anorexic condition of scarcity in resources and activities. Higher levels of leanness can be disabling if they remove essential levels of the system redundancy or organizational slack, which are needed to deal with contextual uncertainty and resultant non-routine activity.

Managers encounter many impediments for improving productivity in their firms and supply chains. Most difficult to overcome is organizational resistance to change and finding the proper means of dealing with it.(Mefford 2009) The lean approach requires changes not only in the organizational practices but in the philosophy of management that guides it (cite). Lean is new paradigm of how to manage and affect everything that a firm does. These barriers can be overcome with the truly commitment of the management in a long term perspective.

Another challenge for the management is to actually trust the employees and respect them as an important change factor in the lean enterprise. The reduced responsibility of management and empowerment of the employees changes the management’s role from the boss and controlling function to a mentor and supervision’s function. The transition from decision making to being a coach for the employees is the lesson that firms needs to master in their attempt to adopt lean approach. This way the organizational culture of these changed relationships employee-managers is getting built up, mutual respect and trust, patience and takes some time to be accepted and as part of the everyday organizational reality.
Other barriers to the improvement process appear to be supplying of the resources needed, the use of consultant on the first stages of the process, measuring and monitoring results, reward system for performance improvement and developing of cooperation and trust with the supply chain partners. These are not easy issues, but essential for successful implementation efforts.

Despite the fact that many researchers (Womack and Jones 1990; Baines et al. 2006; Crute 2003) claim the applicability of the lean approach throughout variety of organizations despite of their industry they operate and countries they are situated, there are some challenges in terms of political and economic instability, infrastructure deficiencies and shortages of skilled workers and managers. All of these factors may degrade productivity and quality issues.

Japanese managers at the top of the organization support enthusiastically with all needed resources and involve themselves personally in the implementation process. On the other hand American managers often adopt piecemeal approaches and partly commitment of resources for training and process change.

For firms that are willing to challenge their views and the role of management is on the required level, another barrier is rising. Learning by doing is required in order to receive guidance and enough knowledge to perform the process improvement tasks and to accomplish process improvement goals. Firms that successfully adopted lean production experienced most difficulties in the inability of management to change their philosophy.

In pursuit of high performance the real challenge is to integrate the principles of the system - Lean which are new for the organization into coherent sequence depending on the specific inter-organizational factors and external partners.

The research by (Repenning, Sterman 2001) suggests that the inability of most organizations to gain the full benefits of the implementation of an innovation is less connected with the particular technique that is being selected. The roots of the problem lay at the way this improvement program has been introduced to the company and how the process reflects the whole system. The real problem in implementation is the way the tool interacts with the physical, economic, social and psychological structures of the organization. It is a systemic problem created by the interaction between improvement program, the employees, equipment, and management.
Part III. Competitive advantage and sustainability with Lean

The globalization and changing conditions on the market force companies to rethink the decisions on every organizational level and to search new ways of thinking and working. Time traps and waste of resources have to be localized and eliminated. The control of the value chain of added value is also considered to be a factor of success. To secure their competitiveness in a new environment companies must be able to provide prompt advantages at competitive prices and services. According to (Mertins, Jochem 2001) this requires:

- transparent costs and processes;
- a change in the way of thinking;
- qualified and motivated employees;
- efficient organizational structures and work flow;
- quality management (QM) and environment management (EM) systems that are used efficiently and updated regularly on a day-to-day basis;
- overcoming grown structures when introducing data processing (DP) systems;

processes that are controlled by the market and are documented comprehensible in response to customers’ voice.

Economic viability presses the companies to develop a distinctive capability that would give them a competitive advantage over the potential competitors.

Based on the notion that achieving a competitive advantage requires that companies need to concentrate on their core competences and to develop long lasting relationships with specialized firms for design, development and supplement of materials. Movement of information and materials in a synchronized and coordinated way among collaborating enterprises presents the idea of extended enterprise. (Jagdev, Browne 1998)

Core competences are those competences central for the achievement of the firm’s business objectives and which deliver low cost and product differentiation. The extended enterprise takes the form of a network of customers and suppliers, as opposed to a linear value chain. To address the today’s competitive challenges the companies need the active support from their suppliers and the close collaboration with their customers.

Porter (1988) introduces the concept of the value chain as a devise to diagnose the ultimate enhancers of a competitive advantage for a company. Porter suggests that value chain analysis would help a manager to separate the underlying activities of the firm regarding the functions of designing, producing, marketing and distributing its product or services.
The value chain takes the view over a set of interdependent activities, which are all together the building blocks of competitive advantage in two ways – optimization of the processes and dividing of the responsibilities to the members depending on who is best in which activity and secondly as a coordination to achieve a superior performance.

The companies not longer work for their own profit, but support each other throughout the value chain. The companies involved in a lean enterprise should target the best opportunities for exploiting their collective competitive advantage. Their strategic thinking should be focused in exploring a new way to sustain the relationships that are sufficient to achieving a superior performance.

Lean also yields benefits in terms of being more flexible and having shorter lead times, major advantages in a highly competitive global marketplace.

Following the developed conceptual framework discussed above, if the important elements of Lean model establish a strong support, the companies should realize various benefits. The function that benefits most from lean thinking is manufacturing regarding reduction of defects, inventory size, work in process, lead time, redesigning manufacturing processes and manufacturing floor space. Most surprising is the fact that performing these activities does not engage major capital investments. This led to the next benefit of becoming cost effective and as a result highly profitable.

Another benefit was the improvement of the communication and cooperation between management and employees.

Data analysis identifies the significant benefit of creating a new culture (with lean trainings and suggestions system) that enables solving of occurring problems.

This study reports the great benefits that lean thinking implementation had over marketing function expressing in robust product lines, more efficient new product development processes. These improvements helped for increasing of customer satisfaction and growth in sales. The companies experience closer customer relationships with the lean implementation, which lead to gaining a significant competitive advantage over other companies in the same industry field.

The authors (Crute et al. 2003) identified five essential factors that points out achievements with lean production. These are:

- Managing low inventories, production pull in response to the customer, work organization into teams with multi-skilled workforce who eliminates the non added value, integrating the complete value chain into the lean process.
Globalization has necessitated a complete rethink for some firms in terms of how they can organize and reconfigure themselves. Here are some of the reasons that make a big company as Boeing to decide to implement lean strategy:

- Achieve greater quality
- Organize corporate wide work teams accountable for their work product
- Create a culture that encourages employees to make suggestion for better ways of fulfillment of performance goals
- Focus on core competences and moving up the value chain
- Reduce company cost structure
- Globalize to a greater degree

Transferring these views into the current situation of constant change, managers are turning their attention to reconfigure their organizations through application of Japanese management philosophies, such as lean thinking.
Conclusion

Inspired by the excellent performance of Toyota, many companies would be interested in looking for more knowledge about Lean and the conditions required for implementation of the system in their own organizations. Most firms are actively working on improving their operational processes and develop their capabilities. The main purpose for everybody in the business world is to respond quickly to the demands of their customers. To stay competitive on the market managers today need to choose the best one of a great number of innovative tools and techniques. The real challenge is the question concerning how to incorporate these tools into day-to-day activities of the company towards successful implementation of these improvement programs in a long run.

Very often Lean is being associated with a manufacturing approach – a set of tools applied on the shop floor, without considering the customer-centered strategic thinking. So it’s being suggested that lean production should be used on the shop floor according to the Toyota’s example, but regarding lean thinking – it should be referred to the strategic value chain. Lean exists on two levels – strategic and operational. The distinction between Lean thinking at the strategic level and lean production at the operational level plays a crucial role in understanding Lean as a whole, in order to apply the right tools and strategies for achieving the customer value. Unfortunately much of the discussions about lean thinking in academic literature are still centered around applying the model on the shop floor.

The focus over value creating activities towards the final customer is still missing in most of the companies implementing lean. Lean value system is evolving throughout the implementation process and involves series of value adding network of operations between the companies taking part in the value chain. What is more the last tendency is how to lean value systems can be created in a green field environment. The application of this approach would require a contingent application which will be unique to the particular value system and industrial sector. But what is more it will probably raise the question how this evolution would be achieved in under-researched sectors such as low-volume manufacturing or service sector, which are still in the early stages of lean evolution.

The research of (Hines, Holwe & Rich 2004) develops a theoretical framework of the Lean evolution that argue that connection of Lean with only the shop floor tools that Toyota applies to achieve its success is actually not enough to cover all the different faces of Lean.
Lean is applied in other sectors and industries outside the automobile one, aerospace (Crute et al. 2003), wood manufacturing (Czabke, Hansen & Doolen 2008).

Advanced lean transformation across the enterprise gives many positive results in regards to developing employees as problem solvers and increasing levels of work satisfaction, changing the management culture from command and control to fact-based and flexible, extending the transformation from the shop floor to finance, engineering, marketing and other support areas improving their activities. What is more the implementation of lean principles at key suppliers and at their key suppliers and transitioning from a tools-based implementation path to a course that applies lean management as a complete business system, change the way organization thinks and conducts business on a daily basis.

“Great lean leaps are made during tough economic times. Taiichi Ohno pushed the Toyota Production System through the entire Toyota Motor Company in 1950 during the great crisis that left Toyota on the brink of bankruptcy.” (Shook 2009) Now, more than ever, is a time for advancing lean transformation processes. Not only to free cash by eliminating excess inventory, to protect profit margins by improving quality and productivity, to strengthen ties with customers by improving service, or to convert orders-to-cash faster by reducing lead times, but also to acquire enduring competitive advantage and sustainable business excellence.

An economy dominated by lean enterprises that continually trying to improve their productivity, flexibility and customer responsiveness, could provide the long south antidote to economic stagnation.
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