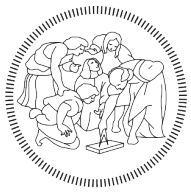
Profile of a Lean Manager
(Il profile di Lean Manager)

Milan Sharma
(835752)

Supervisor
Prof. Alessandro Brun

A thesis submitted in partial fulfillment of the requirements for the degree of
Master of Science(Laura Magistrale)
in Management Engineering



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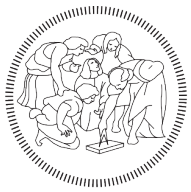

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ABSTRACT

Lean supervisor/manager are often the key cogs in the process improvement machinery. Various lean tools are employed by them for the continuous improvement. They sit on the border between management and the coal face, dealing with issues as they arrive and helping those in their charge deliver the improvements required. The person in-charge of continuous improvement in company obviously needs basic knowledge and skill-set and profile of a lean manager, which are defined in this thesis, for successful implementation of Lean practices in the respective company. Various lean principles, practices, and tools are presented in thesis work which are essential for a lean manager. Survey was conducted in association with MIP (Politecnico di Milano, Graduate school of business) and Assozione Italiana Lean Managers. Ailm and MIP have set themselves the goal of analyzing the reality of lean managers from organizational and operational point of view. Questionnaires (750 online) were sent to different Italian businesses, of which 131 successful responses where obtained. The analysis of Italian industrial sector for lean manager's profile was conducted through this survey and the average profile of a lean manager is thereby presented in this thesis work.

ABSTRACT

Supervisore/manager di Lean sono spesso fondamentali nel miglioramento dei processi. Vari strumenti lean sono impiegati da loro per il miglioramento continuo. Si trovano tra la gestione e l'esecuzione, si occupano di affrontare i problemi che nascono e di aiutare i responsabili a ottenere i miglioramenti necessari. La persona responsabile del miglioramento continuo in azienda ha bisogno, ovviamente, di conoscenze basilari, insieme di abilitá e un profilo da lean manager, che sono definite in questa tesi, per la corretta attuazione delle pratiche di Lean nella rispettiva azienda. Diversi principi lean, pratiche e strumenti sono presentati in questa tesi che é essenziale per un lean manager. Lo studio é stato condotto in collaborazione con MIP (Politecnico di Milano, Graduate School of Business) e l'Associazione Italiana Lean Managers. Ailm e MIP si sono posti l'obiettivo di analizzare la realtÃą dei manager lean dal punto di vista organizzativo e operativo. Questionari (750 online) sono stati inviati alle diverse imprese italiane, di cui sono stati ottenuti 131 risposte. L'analisi del settore industriale italiano per il profilo lean manager é stata condotta attraverso questo studio e il proflo medio di un lean manager Ãl' cosi' presentato in questo lavoro di tesi.

ACKNOWLEDGMENT

I would like to thank my advisor professor Alessandro Brun(MIP graduate business school, Politecnico di milano, Italy), whose expertise and guidance help made this work possible. He was readily available to answer any of my queries and showed considerable forbearance with me. It was a great pleasure working with him.

I would also like to thank my parents, sister and grand father and grand mother, Govind, whose steadfast support has helped me grow as an individual. A special thanks, goes to Prof. Portioli Staudacher Alberto (MIP graduate business school, Politenico di Milano, Italy),Sergio Di Tillio, president of Associazione Italiana Lean Managers, Milano, Italy Marco Diotalevi, Vice president AILM, Emilio Di Cristofaro, AILM whose invaluable guidance and teaching helped me in my studies.

Lastly, I'd like to convey my thanks to all my friends and family, they helped me silently in background without them life would be a lot less fun.

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1. INTRODUCTION

1.1 Objective

In this thesis work implementation of lean practices in different sectors of Italian industry is analyzed. With the help of survey and lean principles and tools the profile of a lean manager is identified in Italian industry. This is than compared with the overall general profile accepted in US or Japanese industry, which have high implementation of lean tools(specifically Toyota, where these tools where first developed into theory and practice in a standardized way.) The purpose of this paper is to survey manager's view, in terms of *Toolbox Lean* and *Lean thinking* and their view of implementation process in terms of a project with a time limit or as an initiation of an ongoing developmental process. The intention is to increase understanding about the relationship between how Lean production is defined and implemented. Lean management through a hierarchical level has been seen in this thesis work with special attention to the role of lean manager in Lean management. The profile of lean manager is thereby drawn.

Method: This paper is based on a case study conducted in Italian industry. Survey was conducted in association with MIP (Politecnico di Milano, Graduate school of business) and Assozione Italiana Lean Managers. Ailm and MIP have set themselves the goal of analyzing the reality of lean managers from organizational and operational point of view. Questionnaires (750 online) were sent to different Italian businesses and sectors without discrimination, Of which 131 responded and their response was cataloged. The analysis of Italian industrial sector for lean manager profile was conducted through this exercise, by comparing different survey result with the total turnover of the company and correlation was found between the implementation of various tools and activities to promoting lean and the turnover of the businesses In the end an average profile of a lean manager is reported in this thesis work.

Findings and reflection: The view on Lean has, according to managers, evolved at all management levels within the organization during the implementation. From a starting point were Lean was perceived as a set of tools by most, it has, as the managers increased their knowledge evolved into a view that is more complex and also includes behavioral and cultural issues. This would indicate that even if the starting point of an implementation of Lean ares Lean tools, it may over time come change and include issues of management protocol addressing cultural development, coaching and communication as learning regarding the organizational needs take place. The result of survey showed that managers on different hierarchical levels of the organization had differences in their view regarding Lean within the organization. The finding and conclusion are explained in more

details in the chapters on Discussions and correlation as well as in chapter Conclusion discussed later in the thesis work.

1.2 organization of thesis work

In the first chapter the objective of thesis work is defined, next literature review regarding lean practices and role of lean manager is performed. Following which a theoretical framework was created. The survey analysis of the Italian Industry is presented next a conclusion regarding the profile of lean manager involved in continuous improvement across the company is presented.

2. LITERATURE REVIEW

The core idea of **LEAN** is to maximize customer value while minimizing waste. Simply, lean means creating more value for customers with fewer resources. A lean organization understands customer value and focuses its key processes to continuously increase it. The ultimate goal is to provide perfect value to the customer through a perfect value creation process that has zero waste.

To accomplish this, lean thinking changes the focus of management from optimizing separate technologies, assets, and vertical departments to optimizing the flow of products and services through entire value streams that flow horizontally across technologies, assets, and departments to customers.

Eliminating waste along entire value streams, instead of at isolated points, creates processes that need less human effort, less space, less capital, and less time to make products and services at far less costs and with much fewer defects, compared with traditional business systems. Companies are able to respond to changing customer desires with high variety, high quality, low cost, and with very fast throughput times. Also, information management becomes much simpler and more accurate A popular misconception is that lean is suited only for manufacturing. Not true. Lean applies in every business and every process. It is not a tactic or a cost reduction program, but a way of thinking and acting for an entire organization.

Businesses in all industries and services, including health care and governments, are using lean principles as the way they think and do. Many organizations choose not to use the word lean, but to label what they do as their own system, such as the Toyota Production System or the Danaher Business System. Why? To drive home the point that lean is not a program or short term cost reduction program, but the way the company operates. The word transformation or lean transformation is often used to characterize a company moving from an old way of thinking to lean thinking. It requires a complete transformation on how a company conducts business. This takes a long-term perspective and perseverance.

Cost efficiency have been a major goal for any organization. Given the expenses involved in an organization, one can look across various areas where significant reduction in cost can be done. From waste management, to employee break hours management all the way to customer handling, every aspect of an organization has the potential to be optimized. *Lean Management* is a set of logical practices that have evolved to do exactly the same. Implemented correctly, Lean practices have shown to lower the cost by up to double digits in the overall cost analysis. Companies have seen improvements in areas ranging from Inventory levels, to delivery lead times and quicker customer response in production plants, to better investment utilization, with higher production output and

reduced manpower requirements in manufacturing and operations companies.

There is a common misconception that lean manufacturing only works in large, high-volume, repetitive manufacturing companies. The truth is Lean manufacturing has been successful in many industries. The principles apply in both small and large manufacturing companies. This is welcome news since more than 96% of all manufacturing companies have fewer than 250 employees. However the thesis work here correlates the company turnover with lean practices and based on this, profile of a lean manager is obtained via this thesis work in Italian system. Survey was conducted in association with MIP (Politecnico di Milano, Graduate school of business) and Assozione Italiana Lean Managers. Ailm and MIP have set themselves the goal of analyzing the reality of lean managers from organizational and operational point of view. Questionnaires (750 online) were sent to different Italian businesses and sectors without discrimination, Of which 131 responded and their response was cataloged. The analysis of Italian industrial sector for lean manager profile] was conducted. This is discussed in later section.

The Lean Manufacturing Manager will have the following profile and will be responsible for following duties in theory.

- He will support the development of lean manufacturing processes; continuous improvement, standard work, problem solving, value stream mapping, training and employee involvement.
- Lead, teach and coach employees at all levels on lean manufacturing processes.
- Facilitate the development of and maintain the Lean Implementation plan for the location.
- Drive lean training and implement a lean toolkit utilizing PDCA; value stream mapping; quick changeovers; Kaizen, problem solving, 5S, etc.
- Lead continuous improvement events resulting in employee skill and knowledge development and KPI performance improvements.
- Using tracking and reporting systems, prepares plans, drives performance, and assures timely completion and achievement of product/process quality and savings goals
- Identifies barriers to success and solicits help from leadership when needed.

2.1 Lean

Lean is described by Hines et al. (2004) as one of the most influential paradigms in manufacturing. The concept, heavily influenced by Toyota, has developed and expanded beyond the shop-floor and manufacturing environment of the auto industry to application throughout organizations and within industries outside manufacturing (Stone, 2012). Interest in both research and implementation of

the Lean concept is said to continue to increase (ibid.), in spite of the fact that the concept is said to be both ambiguous and difficult to implement.

The term Lean which was to be spread globally by the introduction of the book The Machine That Changed the World by Womack et al. (1990), was first used by John F. Krafcik as an opposite to buffered production systems (Krafcik, 1988). Toyota's management system is due to its origins in production and operations management said to commonly be referred to as "Lean manufacturing" (Emiliani 2006). However, this epithet implies too narrow a focus; Emiliani (2006) claims the term "Lean manufacturing" is recognized as incorrect, since Lean principles and practices can be applied to any organization.

Opinions appear to differ regarding the fundamental characteristics of the Lean concept. Hines et al. (2004) describe the concept as having evolved considerably over time; Pettersen (2009a) reports that it is a translated version of TPS that has been translated into numerous additional versions. According to Pettersen, two main versions of Lean exist, which are described as "toolbox Lean" and "Lean thinking" (ibid., p. 132).

Toolbox Lean can be perceived as internally focused and concerned with a collection of "waste reduction tools," whereas Lean thinking can be described as also being externally focused and thus taking a strategic and system-wide perspective. As described by Emiliani et al. (2007, p. 4): "Lean principles and practices have to be part of how all senior managers think about everything all the time, not just how a few senior managers think about operations." On the same topic, Hines et al. (2004) state that Lean exists on two levels; strategic and operational. The strategic thinking, which is described as customer-centered, is said to apply everywhere; the operational shop-floor tools,Sui Pheng (2014) , however, do not. The confusion and misunderstanding regarding this and an almost complete lack of discussion regarding strategic thinking in Lean initiatives is described as having led to a lack of sustainability for many Lean programs (ibid.). It appears that in initiatives to implement a Lean way of working it is common for organizations to selectively apply certain Lean tools in order to achieve short-term results (Emiliani and Emiliani, 2013). The tendency to seek short-term improvements that generate direct bottom-line financial impact, such as selecting specific Lean tools and delegating implementation of these to consultants, indicates a lack of understanding of Lean as a management system. This lack of understanding is something that Emiliani and Emiliani (2013) assert "handicaps" senior management's ability to lead enterprise-wide Lean transformations. Further, Hines et al. (2004) state that it is crucial to distinguish between Lean thinking at the strategic level and Lean production at the operational level in order to understand 21 Lean as a whole and apply the right tools and strategies to provide customer value. Companies which use only the toolbox without embracing the underlying philosophy are unlikely to gain more than limited and temporary results, according to Seddon and Caulkin (2007).

The tendency to focus on tools may thus be one reason for the reportedly low success rate of Lean implementations. Even though the concept has been widely popular for some time and is still considered a valid way to improve organizational performance, reports indicate that only 10 percent or fewer organizations attempting to implement Lean actually reach their goals (Bhasin, 2012; Bhasin and Burcher, 2006). The fact that Lean as a concept has evolved significantly and has

expanded beyond its original narrow definition around shop-floor improvements within the auto industry is stated to have led to confusion regarding what constitutes Lean and what does not (Hines et al., 2004).

A further consequence of a tools-only focus while continuing with already established conventional management practices is that it may generate what Emiliani and Emiliani (2013) call "fake Lean." Fake Lean reflects a fundamental misunderstanding of Lean management where the initial purpose is to grow and improve businesses operating in competitive markets with a win-win approach. Instead, fake Lean results in cost reductions and improved results generated at the expense of key business stakeholders such as employees, subcontractors, or customers.

Lean and the consequences an implementation of the concept may bring with it can generate criticism. A critique regarding labor relations of organized workforces and worker stress is pointed out by Stone (2012). Consequences such as highly repetitive work patterns that are intensified by kaizen initiatives and just-in-time(JIT) principles and with limited control by the employee are described by B"ornfeldt (2006). The fact that employees are expected to participate in improvement work in a monotonous and highly controlled work environment is addressed by B"ornfelt as something of a contradiction, since repetitive work with limited possibilities for one's own decisions is said to limit independent thinking and individual initiatives, as well as motivation.

Drawing on his own experiences at a Toyota affiliate and sub-contractor in Japan, Mehri (2006) describes a way of working that is radically different from what is usually presented in the literature. While much of the literature describes TPS as capable of achieving maximum production and quality while maintaining a harmonious and humane workplace, Mehri (ibid.) points to the human cost of high- productivity, product development and a global market share. Lean work according to Mehri, has little to do with improving the lives of workers and much to do with producing vehicles for the least amount of money in the quickest time. What management at the studied company said and did is described as being two fundamentally different matters. Company policies accordingly are described as either *tatemae* (public expressions of what you are supposed to feel or do) or *honne* (underlying obscure reality regarding what you actually feel and do). International enthusiasm for TPS is a consequence of western observer's inability to discern the honne within the tatemae, according to Mehri. The displayed pattern or tatemae has been readily but erroneously accepted as a given while Japanese reality and potential losses in translation have been disregarded. The true cost of the results generated by the TPS is described as the adverse impact on employees, such as an unsafe work environment and oppressive mechanisms of worker control.

2.2 Lean Production and Lean Principles

At the beginning, industry practitioners observed Toyota facilities and saw many tools and methods that were very different from what they practiced Believing this was the source of Toyota's competitive edge, many companies set out to emulate them. According to Koskela (1992), 11 important principles are essential to the lean philosophy, including:

1. Reduce the share of non-value-adding activities (also called waste)

2. Increase output value through systematic consideration of customer requirements
3. Reduce variability
4. Reduce cycle time
5. Simplify by minimizing the number of steps, parts and linkages
6. Increase output flexibility
7. Increase process transparency
8. Focus control on the complete process
9. Building continuous improvement into the process
10. Balance flow improvement with conversion improvement
11. Benchmark

These principles of lean production as reflected in the early days, suggested that lean principles were process focused. Of the principles identified by Koskela (1992), none was relevant to human resource or social aspect of lean. Implementing a few lean tools could result in some improvements, but it would never come close to the benefits that were possible from implementing the whole system (Liker 2004). Shah and Ward (2007, p. 791) conceptualized lean production as:"an integrated socio-technical system, whose main objective is to eliminate waste by concurrently reducing or minimizing supplier, customer, and internal variability". This is echoed by Paez et al. (2004) that a lean enterprise should be viewed as a socio-technical system that looks to maximizing production performance with minimal resources.

2.2.1 Waste Elimination

Identifying and eliminating waste is fundamental to a lean organization such as Toyota. Liker (2004) highlighted that the heart of the Toyota Production System is eliminating waste. Waste is anything that absorbs resources but creates no value (Womack and Jones 1996). Ohno (1988) identified the following seven wastes or "muda", namely (1) overproduction, (2) waiting, (3) transportation, (4) over processing, (5) inventory, (6) movement and (7) defect products and highlighted that the preliminary step towards application of the Toyota Production System is to identify wastes completely. Liker (2004) added one more waste: (8) waste of unused employee creativity, which resulted in losing time, ideas, skills, improvements, and learning opportunities by not engaging or listening to employees,Sui Pheng (2014). This is applicable to employees in any industries.

For example, construction companies were used to employ their employees for manual work, but have appeared to forget that their employees are able to think (Druker et al. 1996). The fact is that by capitalizing on employee creativity, companies can eliminate the other seven wastes to continuously improve their performance. The first five "muda", namely overproduction, waiting, transportation, over processing, and inventory refer to the flow of materials. The last two "muda", namely movement and defective products, together with the waste of unused employee creativity are related to work of labor Womack and Jones (1996) highlighted that lean is a powerful antidote to muda (waste). Likewise, Koskela (1992, 2000) proposed that eliminating non-value-adding activities from production is the fundamental principle based on the flow concept of production.

2.2.2 Customer Value

Hine et al. (2004) argued that a misunderstanding of lean leads to value creation being viewed as equal to cost reduction. In the shop floor, all unnecessary production has been categorized as waste or non-value-adding activities, while what is necessary for creating a "perfect" product is called value-adding activities (Koskela 1992, 2000). By eliminating all the non-value-adding activities, cost can be reduced, which ultimately helps in creating value. Since value was defined as the first principle of lean thinking (Womack and Jones 1996), Hines et al. (2004) outlined that lean had moved away from a merely "shop-floor-focus" on waste and cost reduction, to an approach that contingently sought to enhance value (or perceived value) to customers by adding product or service features and/or removing waste. According to Hines et al. (2004), this shift from a mere waste reduction focus to a customer value focus essentially provides an alternative perspective on value creation:

1. Value is created if internal waste is reduced, as the wasteful activities and the associated costs are reduced, increasing the overall value proposition for the customer.

2. Value is also increased, if additional features or services are offered, which are valued by the customer. This could entail a shorter delivery cycle or smaller delivery batches, which might not add additional cost, yet enhance customer value.

2.2.3 Lean Thinking

Lean thinking was elaborated in Womack and Jones's (1996) book-Lean Thinking-as additional theoretical framework and principles associated with lean production. The five main guiding principles of lean thinking are summarized by Womack and Jones (1996) as:

1. *Value:* value can only be defined by the ultimate customer (Womack and Jones 1996), where the customer can be considered as all downstream operations. It can be applied in the construction context in which end customers are multiple and the construction client can rarely be considered as the single ultimate customer (Jorgensen and Emmitt 2008).

2. *Value stream*: value stream analyses three types of actions along with the value stream: first, activity creating value; second, activity creating no value but is unavoidable with current technologies and production assets; third, activities creating no value and are determined to be avoidable.

3. *Flow*: once a company has reduced or eliminated waste and variation from a single process and streamlined the value stream, the next step is to make the remaining process steps flow. It is the opposite of batch and queue. The goal of this principle is to have a product move from concept to customer without interruption or delay.

4. *Pull:* this principle is closely related to the "pull" system which the TPS firstly created. The end users pull the production such that it is only produced to suit their requirements.

5. *Pursue perfection:* this principle indicates "the complete elimination of muda so that all activities along a value-stream create value" (Womack and Jones 1996, p. 350). The lean concept associated with perfection is kaizen, a Japanese word which is interpreted as continuous improvement in the West. By applying the previous four principles each time, the organization gains more and finds more hidden wastes that can be eliminated.

However, the principles of lean thinking were challenged by Koskela (2000) that these failed to provide a proper theory of lean production due to the discussion of lean thinking being practically confined to the flow conceptualization of production without incorporating the transformation and value generation concepts. It lacks an adequate conceptualization of production, which has led to imprecise concepts, such as the term "value" (Koskela 2004). In summary, lean production exists at both strategic and operational levels (Hines et al. 2004): at the strategic level, the concept helps one to understand customer value and identify the value stream; while at the operational level, it is a bundle of practices and tools that lead to the elimination of waste and encourage continuous improvement. In a similar vein, according to Shah and Ward (2007), lean production is generally viewed either philosophically or practically. The first point of view is related to guiding principles and overarching goals (see Womack and Jones 1996 and Spear and Bowen 1999); the second point of view relates a set of management practices, tools, or techniques that can be observed directly.

2.2.4 Implementation Frameworks of Lean

Empirically, based on the description of Womack et al. (1990) for lean production, Karlsson and Ahlstr"om (1996) developed an implementation model based on conceptualizing lean production as consisting of a number of principles characterizing different functional areas and the overall strategy of the lean company. These functional areas consist of lean development, lean procurement, lean manufacturing and lean distributions.

2.3 Lean manager

A lean manager may be an executive or an office worker or a line man. Lean seen through different management levels can be viewed differently.

2.3.1 Lean Executive

In determining the role of the executive within Lean, or even analyzing such an existing role qualitatively, it behooves any researcher to have a categorical system and definitive methodology for developing sound investigations and valid conclusions. First, a substantial literature review can provide good background information, as it ll as popular and historical perspectives for reference.

2.3.1.1 Definition of Executive Leadership

An executive is the highest "ranking" individual in the hierarchy of company leadership. Although some executives are involved in management (especially in smaller companies, where the executive is both president and CEO), the inherent role of the executive is generally more abstract. Primarily, the executive is to be the leader of the organization. What exactly, then, is the difference between en a manager and a leader? "A manager looks at the past to determine how to do things in the future, while a leader creates a vision of what is possible and builds a new future" (Bodek, 2008). This suggests that, fundamentally, the executive holds the vision of the company. They make comprehensive decisions and are the face of the company to the rest of the world. They should first and foremost develop vision and strategy, and subsequently make sure the managers and employees orient what they do towards the purpose of the company.

2.3.1.2 Challenges and Problems with the Role of the Executive

Sometimes, perhaps even more often than not, executives have difficulties fulfilling their intended role satisfactorily. One commonly reoccurring problem is that executives can get into micromanaging their organizations without concerning themselves with setting the overall tone of the company. As a consequence, the company's risk of losing overall vision and direction increases, narrowing the potential for success in future growth, expansion, and adaptation. Concerning the problem of micromanagement, Found and Harvey (2007) state, "A manager, by definition, has been given a position of leadership, and the differences are then essentially in style and time as managers are often preoccupied with day-to-day goal attainment, rather than long-term vision." Later in the same article they expound on the problem of leaders falling into this day-to-day management, rather than entrusting this task to the management team. All this is to stress that there are certain and important differences between en a leader and a manager. Found and Harvey seem to agree with Bodek on these. Both managers and leaders are necessary for success, but to what extent and dynamic? How can the executive stay focused on leading without getting too involved in managing? On the other end of the spectrum is an executive culpability just as common and problematic. That is, sometimes an organization faces difficulties when the executive becomes too concerned with abstract vision and does not direct enough attention to day-to-day, operational elements. however, having strong vision and leadership does not mean all of an executives work must be abstract; he must still be aware of the minutiae of the company without getting wrapped up in them.

2.3.2 Top managers view on Lean

Traditional managers have been taught to work through layers of subordinate managers. But in a Lean system, leaders are encouraged to learn for themselves. This approach might be called "management by walking around". It is a leaders job to get as many creative ideas as possible from all workers. Successful executives tend to stress that Lean is not program to be implemented; it is rather a new way to think. As evidenced by this involvement on the shop-floor, it is not

about getting employees to follow steps, but instead getting them to be more creative, careful, and conscientious.

Among the top mangers the view of Lean has changed over time from a tool oriented view to a more complex view of Lean as being about people's behavior and thinking as it ll. Lean is described as standardized tools in continuous improvement, a process of constant improvement of efficiency to generate customer value. The underlying needs for implementing Lean are said to be an increased level of competitiveness over time and the ability to run a decentralized organization and yet assure continuous improvement and mandatory company standards. The necessity of making this way of working company specific is stressed as absolutely essential. The president of the company reacted to the term Lean by saying *"we do not use the term Lean; we use the name of the company business"*

It is also stated that the company cannot compare itself with Toyota or other companies seen as lean representatives, since the tools or solutions applied within the company need to be specific for the company's need. If one looks at what Toyota does according to Lean, then it differs to other company's view. The solutions will be very different.There is a need to develop standardized tools and continuously improve them to be able to run a decentralized organization in a way that strengthens competitive ability. The desired condition to be reached by the organization by developing a Lean based business system is described by top management as a state of transparent or highly visual communication and shared insight regarding the current state and way of working. knowledge regarding how the company operates and what it does, how it compete and what its current condition is. This should be obvious just by walking through (a department).

As Bodek (2008) puts simply, "Lean needs leaders!" Moving into a Lean context, however, the role of the executive appears to become more complicated. One of the more prominent ideas about executives in Lean is that they should spend a significant amount of time on the shop-floor rather than tucked away in an office. This level of involvement is often what sets the truly Lean businesses apart, as the executives actually take the time and initiative to visit the most basic levels of their organizations in order to observe and improve. Psychologically, however, this involvement also shows the employees how seriously the executive takes efficiency, lending to much greater effects than most people would realize.

Another idea is that an executive must be able to identify problems in an organization before attempting to implement Lean solutions. The consensus seems to be that Lean actualization must begin with identification of clear problems (or as some call them, growth opportunities). In other words, a Lean approach does not work when the executive does not believe it to be necessary (Bates, 2010b). To some, Lean can be broken down sequentially into goals, then principles, then tools. Executives must at least vocalize the goals and exemplify the principles. Engineering managers, for example, then determine which "tools" best fit the job (Abdulmalek et al, 2006). In this model, the executive must be the one to communicate goals to subordinates, setting a higher standard to be reached. As Flinchbaugh (2004) writes, *"Leadership is moving people toward the ideal state, and you can't lead people to where they already are. If Lean is about transforming thinking, then in order to lead Lean, you must be able to teach."* Here, again, and this time in a Lean context, the transformational style of leadership surfaces as dominant.

2.3.3 Middle managers view on lean

The middle managers describe Lean can see it as a way of maximizing customer value and assuring that employees grow as professionals. Focus is long term company survival by minimizing waste and by utilizing all the competence within the organization. Lean has grown over time. In the beginning it was more of a set of methods and tools with an interesting philosophy behind it. The need to make improvements and way of working company specific is also mentioned at middle management level it must be understood that they are developing a way of working. To focus on implementation would be to exclude the employees from development process, which must be avoided. of what Lean Production (LP) is, measuring results when implementing it will prove difficult unless the organization has clearly defined what LP is to them. According to Pettersen (2009) it would be unreasonable to expect LP to generate certain results since any results would be determined by how the concept of LP has been interpreted and translated within the organization intending to implement it. Pettersen (2009) shows in his analysis that:

3. THEORETICAL FRAMEWORK

The theoretical framework will address the Lean, and managerial barriers to Lean implementation. In line with the purpose of the thesis, which is to explore the Lean Manager's profile in Italian industrial set up. a conscious effort has been made to explore management's ability to implement and sustain a Lean-based enterprise system, along with the fact that the Lean concept is approached through an organizational learning perspective, organizational learning; management along with employee training and learning culture will also be addressed. Toyota is widely recognized for having developed an effective management system which continues to interest both service and manufacturing companies and researchers. The initial descriptions of the Toyota Production System available in English appears to be the paper entitled "Toyota production system and Kanban system Materialization of just-in-time and respect-for-human system," by Sugimori et al. (1977). In 2001, the Toyota Motor Corporation published an internal document called "The Toyota Way 2001," which states the two objectives of "continuous improvement" and "respect for people" as top-level company principles. This document is not publicly available, but most of its content can be found in "The Toyota Way" (Liker, 2004).

In keeping with the two main company objectives mentioned above Liker and Hoseus (2008) describe the following five foundational principles. Challenge: We form a long-term vision, meeting challenges with courage and creativity to realize our dreams. Kaizen: We improve our business operations continuously, always driving for innovation and evolution. Genchi Genbutsu: We believe in going to the source to find the facts to make correct decisions, build consensus, and achieve goals at our best speed. Respect: We respect others, make every effort to understand each other, take responsibility and do our best to build mutual trust. Teamwork: We stimulate personal and professional growth, share the opportunities of development, and maximize individual and team performance (ibid., p. 15).

To support working according to these principles, there are methods or tools such as 5S, SMED, TPM, Kan-Ban, Poka-yoke, Value Stream Mapping and A-3 Reports. These tools are sometimes in themselves regarded as Lean but they must be seen in the context of the basic values and principles they emerged from in order to be sustainable. As stated by Seddon (2005): "The tools that have resulted from the codification of Ohno's methods have valuable uses and can certainly solve problems in manufacturing. But it is the philosophy behind the tools- how managers think about the design and management of work- that is key" (p. 15).

Indicated here is a managerial view that focuses on processes as well as goals in order to support learning, and on systemic understanding in order to reveal and eliminate waste. These are

characteristics of a learning organization. The tools of TPS were designed to highlight and identify problems within the organization. According to Liker (2004, p. 37), the key to success is to have a production system that highlights problems and a human system that produces people who are able to identify and solve them. Toyota Production system implemented lean with a unique approach focusing on "respect for people" and "continuous improvement" as they should go hand in hand.

3.1 Lean Tools and Techniques

Many companies start off their Lean journey by viewing Lean as a set of 'tools' to implement. Sometimes the tools are even implemented individually. This may be beneficial for a while but will not suffice on the long run. The Lean tool and techniques are, the backbone of Lean management and the most common tools that are implemented are highlighted below and these were included as part of the survey conducted:

1. 5S 5S is one of the most popular lean management tools used. 5S is a very powerful tool and should not be equated to cleaning or tidying up. The real objectives of a 5S program are:

   - To reduce waste
   - To improve variation
   - To improve productivity

   Thus 5S should be used as a 'pull' activity (that is it should be used when the need for it arises). Companies that have implemented 5S have reported some of the following positive results:

   - Improved communication and information sharing
   - Lower accident rate (thus the safety has improved) - The levels of product quality has been improved.
   - To improve productivity Machine downtime has reduced(Hobbs 2011, 10).

   The original 5S is in Japanese and are Seiri, Seiton, Seiso, Seiketsu, and Shitsuke. This is commonly translated to Sort, Set in order, Shine, Standardize and Sustain (Bicheno & Holweg 2009, 78). The 5s are enumerated below

   (a) Sort : All items in the work area are sorted. First they are sorted into those that are needed and those that are not. Those that are not needed or serve no purpose in the work area must be immediately discarded. When in doubt the company may choose to red tag items. A red tag is a label with a date on it and if the item is not used up until the date then it is discarded.

   The items are further sorted according to the frequency of use.The sorting should be done periodically, perhaps once a month, but this should be done as a regular activity and not

as a re-launch of 5S.The results of the sorting could be used for visual communication by taking before and after photographs and putting them on a 5S board for all the employees to see the improvements. (Carreira 2004, 243).

(b) Set in order: Set in order deals with the location of each item. Each item should be placed in the best place that is ergonomic and that everyone knows where it is.

(c) Shine: The work area should be kept physically tidy on a regular basis, and the workers should also be scanning the area for anything that is out of place and try to immediately correct it. One way of doing this is by having a five minute routine clean up every day.

(d) Standardize Standards must be developed for the first 3Ss so as to ensure that the workers are doing what the company wants/requires of them. Standard work aims at creating processes and procedures that are repeatable, reliable, and capable.

(e) Sustain: All workers should make the first four Ss a habit, and must therefore continuously strive at utilizing and improving them. Audits are carried out to make sure the 5S principles are being upheld.

2. Just-in-Time (JIT): Just-in-Time is a lean technique that focuses on the continuous process of eliminating waste and improving productivity. Waste is defined as any activity that does not add value to the products/services created. Typical examples of wastes are excess lead times, overproduction, and scrap. (Lai 2009, 11). JIT may be thought of as a 'pull' activity based on customer demand rather than pushing products based on projected demand. (Lean Production.com 2010).

   The main objective of JIT is to "produce and transport just what is needed, just when it is needed, in just the amount needed, within the shortest possible lead time" (Drew et al. 2004, 27).

3. Kaizen: Kaizen is one of the most recognized Japanese words. "Kai" means continuous and "zen" means improvement. It focuses on the fact that no process can ever be perfect and there is therefore always room for improvement. There must be continuous improvement, in small increments, at all levels [of the company], forever. Kaizen is the center of many lean tools and techniques as, after implementation, they can continuously be improved upon. A less known word is 'kaikaku' which is a radical or revolutionary event, unlike kaizen that is an incremental event. "Proponents of re-engineering would be more likely to endorse kaikaku". (Trent 2008, 140; Bicheno & Holweg 2009, 193).

4. Kanban : It is seen as a type of mechanism that is utilized in a pull-based process. "Kanban is the classic signaling device for production pull systems" (Bicheno & Holweg 2009, 149). There are several types of Kanban that are used in manufacturing systems and they will be highlighted below. An example of kanban is shown in figure 3.1

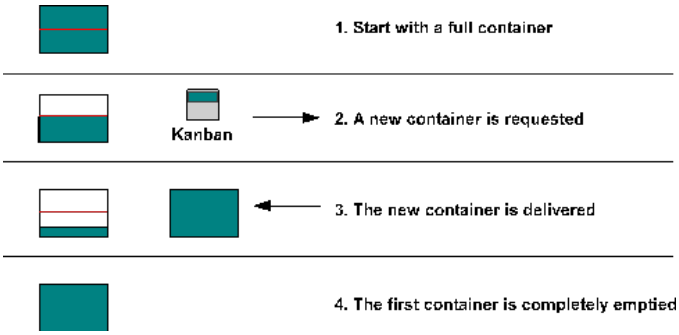

Fig. 3.1: Example of a kanban system

- Single and dual card kanban The most popular type of kanban used in lean management systems is the single card kanban. A single card kanban is a single card (or a pull signal) that is used between pairs of work stations. A product kanban is a type of single card kanban. In product kanban, whenever a product or container is pulled from it, another one simply replaces it. If there is no pull then that means that there was no authorization and therefore no production.

- Dual card kanban was established by Toyota and entails the use of two kanban cards; the production kanban card and the conveyance kanban card. The production kanban card is for the supplier process and the conveyance kanban card is for the customer process. The supplier process is the process of a supplier replenishing parts, while the customer process is any process that involves raw materials being converted to finished products (such as assembly). (syque quality 2005)

5. Improvement Cycles: PDCA and IDEA
   Improvement cycles give the framework for the process of continuous improvement. Having a standardized approach towards continuous improvement is of great value for any organization. There are different variations of improvement cycles but the concept is similar.

   - Plan Do Check Act (PDCA): In this cycle, a company must begin by planning.After planning comes doing, after this is the checking phase which involves checking if what was done was as predicted/planned, and if not why not. Once the checking stage is complete, the company can then act on the results of checking.
   - Investigate Design Execute Adjust (IDEA) : This cycle begins by investigating anything that gives the company cause to investigate; a problem, customers, data, and so on. After investigating, a new solution is designed. The new solution is then executed and is subsequently adjusted to prepare for the next cycle and to bring it closer to company requirements. (Bicheno & Holweg 2009, 183).

6. Value Stream Mapping:
   Value Stream Mapping is a visual improvement tool, that involves the creation of maps to show the "Current State, Future State, Ideal State, and Action Plan of a company" . The process of mapping must lead to action otherwise it will be regarded as waste. The maps are typically created for a specific area in a company.

7. Poka-yoke:
   "Poka-Yoke is fool-proofing, which is the basis of the Zero Quality Control (ZQC) approach, which is a technique for avoiding and eliminating mistakes."(Poka-yoke 2011). This technique is not limited to use in manufacturing only but can also be used in office processes (such as invoicing), hospitals, among others. Poka-yoke enables a company to prevent a problem or defect from occurring, or stop a process immediately a problem occurs.

8. Takt time:
   The word takt is German for the baton that a conductor would use when orchestrating in order to maintain a certain speed. Thus Takt time is "rate time ". "Lean Production uses Takt Time as the rate that a completed product needs to be finished in order to meet customer demand."(isixsigma 2013).

3.2 Lean Six Sigma

Lean management is often combined with the quality management tool, six sigma. They should, however, not be used interchangeably The term 'Six Sigma' derives from the spread or variation inherent in any process" (Bicheno& Holweg 2009, 174. Six Sigma allows for a company to deduce how many defects (on average) occur per process. These defects are deviations from pre-determined bound limits. A company would typically set upper and lower bound limits. Any product or service that is defined to be either higher than the upper bound limits or lower than the lower bound limits would be described as defective. (Bicheno & Holweg 2009, 174). The implementation of Six Sigma is done through the improvement cycle DMAIC - Define Measure Analyse Improve Control.

3.2.1 Define Measure Analyze Improve Control.

"The Six Sigma methodology uses a variation of PDCA known as DMAIC" (Bicheno & Holweg 2009, 183). Unlike PDCA however, DMAIC has expanded on the 'Plan' stage, which is often viewed as the critical stage. (Bicheno& Holweg 2009, 183). Phase of DMAIC improvement are : a) Define b)Measure c)Analyse d)Improve e)Control

3.2.2 5.3 Integrating Lean and Six Sigma

Lean and Six Sigma are both powerful concepts. Integrating both requires a company to carefully outline a plan of action on how to do so otherwise implementing them separately would be costly.

One way of integrating both is by implementing a top down Lean Sigma program where Lean eliminates wastes and non-value adding activities, while Six Sigma is used to control variation of the value adding activities. (Bicheno & Holweg 2009, 178)

3.3 Leaders and leadership

Throughout Toyota's history, key leaders have been found within the company, at the right time, to shape the next step in Toyota's development. Toyota does not go shopping for "successful" CEOs and presidents because their leaders must understand the Toyota culture and philosophy well. These include the former president Fujio Cho, who grew up in Toyota and was a student of Taiichi Ohno, where he and Ohno created the theoretical basis for the Toyota Production System, to the current president Akio Toyoda, who has also worked for Toyota for approximately four decades. These leaders lived and thoroughly understood the Toyota culture day by day (Liker 2004). For this reason, Toyota cannot readily recruit leaders; they must take people who have some natural leadership abilities and develop them to think and act in the Toyota Way every day-a process which easily can take decades or more to home (Liker and Hoseus 2008).

3.3.1 Thoughtful Leaders and Servant Leadership

Toyota's internal document, the Toyota Way 2001 cited in Liker and Hoseus (2008, p.319), defined thoughtful leaders as: "having the ability to energize and invigorate others, willingly giving realistic challenges and development opportunities and fostering a sense of accomplishment in subordinates. Thoughtful leaders monitor individual and team performance, holding people accountable for their actions and taking responsibility for their activities Unlike the traditional manager's image as a monitor and controller under a command structure, Toyota leaders focus on confirming that all the works are followed by a set of defined rules of takt time, operations-standard work, 5-S, etc. rather than catching people make mistakes and blame them. Management should have a shop-floor focus because they are taught that all value-added activities start on the shop floor and their job is to support the team members (Convis 2001). Moreover, thoughtful leaders do not assume that the right rewards and punishments will produce impact on the behaviors of their employees. Rather, thoughtful leaders develop a culture in which they can effectively delegate to and trust their team members to produce excellent results (Liker and Hoseus 2008). Servant leadership is the concept formalized by Mikio Kitano, TMMK's 3 second president (Liker and Hoseus 2008), who prioritized the team members at the top and put himself (and other leaders) at the bottom in an upside-down pyramidal model [see Fig. 3.2 adapted from Liker and Hoseus (2008)].

In this model, the group leader is the first level of "management", who leads a small group of approximately 5-7 people. Both team leader and group leader has three basic responsibilities: (1) support the operations, (2) promotion of the system, and (3) leading change (Liker and Meier 2006). The key concept of servant leadership recognizes that the value-adding work is the process of building cars where team members can directly add value. Leaders only add value by supporting

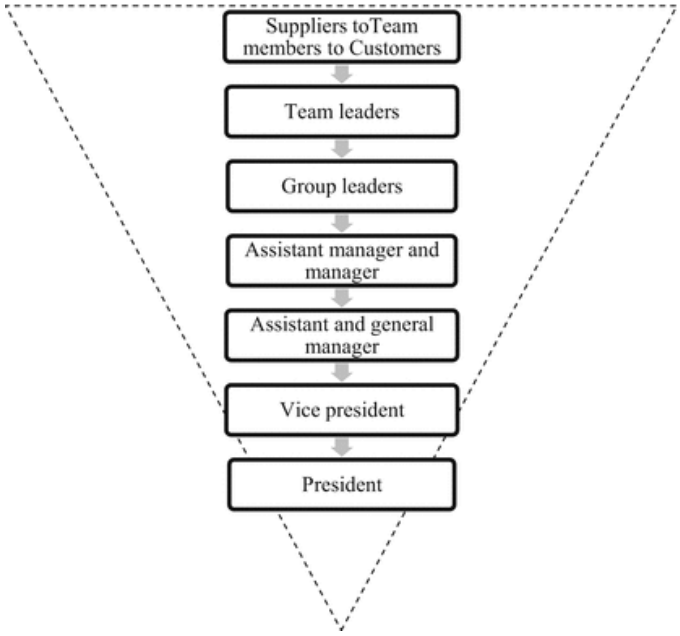

Fig. 3.2: Servant leadership in Toyota plants

those who are most actively adding value to the process, and therefore, leaders are posted to the bottom of the pyramid. This is unlike in a traditional top-down organization, where the capacity and imagination is limited to a few leaders at the top.

Traditional Western leadership	**Toyota leadership**
Quick results	Patient
Proud	Humble
Climb ladder rapidly	Learn deeply and horizontally and gradually work the way up the la
Results at all costs	The right process will lead to right results
Accomplish objectives through people	Develop people
Overcome barriers	Take time to deeply understand problem and root cause before act
Manage by numbers and graphs	Deeply understand the process

Tab. 3.1: Traditional Western leadership compared to Toyota leadership

In summary, the current leadership tenets of the Toyota Way can be summarized as:

1. Support the culture: Toyota invests years to develop leaders who carry the DNA of the company in their thoughts, words and actions. In turn, the leaders should make efforts to support the culture in order to create the environment for a learning organization.

2. Support the people doing the work: The absolute core of the Toyota philosophy is that the culture must support the people doing the work (Liker 2004, p.176). This feature of Toyota

leadership is sometimes described as "servant leadership". The higher leaders go, the less direct power they have.

3. Toyota wants leaders who live the core values, including the spirit of challenge, kaizen, genchi genbutsu, respect, and teamwork.

3.3.2 Individual Work and Training

The top leadership should develop Individual Work and Training in line with the objectives of lean management, continuously improving people in addition to process. Figure 3.3 shows Step-by-step progression to stable job performance using training. Normally it is an ongoing long-term process. Prior to the team members being assigned to the team, they receive training in what Toyota calls "fundamental skills ". Workers are then assigned to a team with a team leader and group leader who introduce them to the first job they need to learn. This job has been broken down into tiny work elements that are taught piece by piece using the Toyota job instruction training method. In addition, the individual member continues to be supported full time until he or she is comfortable with doing the job (Liker and Hoseus 2008). 1. Fundamental skills training Fundamental skills are necessary for people to be able to successfully perform their work. This is the basis for the further development of additional capabilities, such as improving communication skills and leadership abilities, planning, and developing new methods or procedures.

2. Job instruction training Job instruction training is the key to developing the employee's exceptional skills, which is also known as the four-step method. The four steps are to prepare workers, present operations, try out performance and follow up. It is based on two main processes: the training material and the training method. The training method is developed within a stable environment, where the work has been broken down to the tiniest details under the principle of standardization. Liker and Hoseus (2008) advised that because most companies cannot have the high degree of stability or level of standardization as Toyota does, it would be more appropriate for them to be selective about processes or areas and develop some level of stability in that area for training purposes. The learning in these pilot areas can then be extended to other areas and eventually across the plant.

- Toyota suggestion programs: Suggestion schemes represent an individual mechanism for capturing worker knowledge and thereby improve the quality of the product and manufacturing process. It differs from most traditional suggestion programs based on the premise that people inherently want to improve their work environment, and that the contributions of the employees provide long-term continuous improvement (Liker and Meier 2006). Moreover, the benefits of the Japanese system are often measured by looking at the number of suggestions per employee and year (Karlsson and Ahlström 1996). This is an important element of the lean production model.

- Quality circles: Quality circles are an essential part of kaizen in Toyota. These have been an ongoing management tool for productivity and quality improvement for decades and are

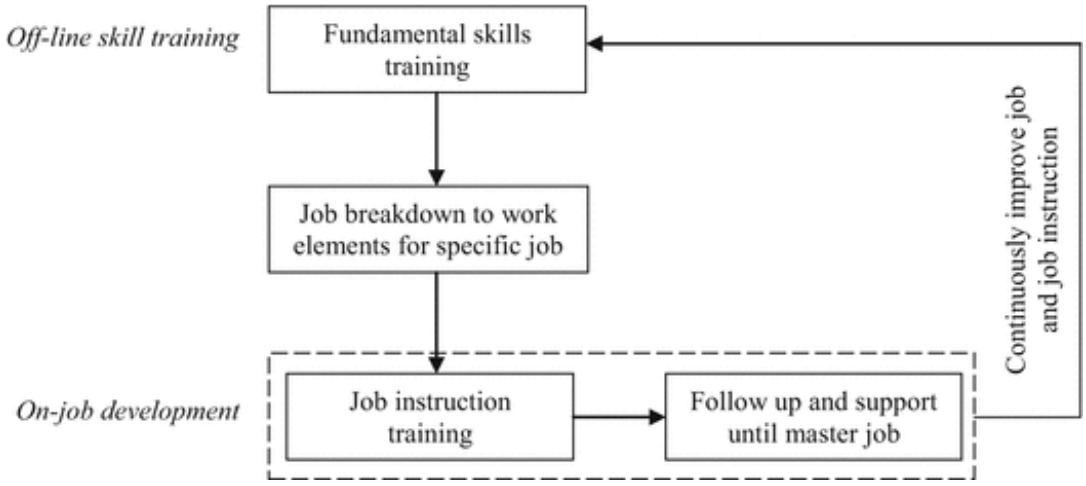

Fig. 3.3: Step-by-step progression to stable job performance

excellent to promote teamwork and develop the capacity of individuals to make continuous improvement. The circle is responsible for setting goals and meeting schedules, and the group leader acts in an advisory role. Most circles deal with issues in the work area, where meetings are conducted.

- Developing team associates for leadership roles: Selecting and developing team members for leadership roles is a critical matter in Toyota (Liker and Meier 2006). The leaders are responsible for teaching and coaching others in the Toyota Way. They must convey the message to the next generation and also be responsible for sustaining the daily operation and for continuous improvement.

4. SURVEY ANALYSIS

A lean manager is one who promotes and manages improvement in the company or business. Following survey was conducted in association with MIP (Politecnico di Milano, Graduate school of business) and Assozione Italiana Lean Managers. Ailm and MIP have set themselves the goal of analyzing the reality of lean managers from organizational and operational point of view. 750 online questionnaires were sent to associated Ailm and alumni MIP, 131 companies provided the feedback for the questionnaire. A response rate of about 18%.

Following questionnaire was prepared and sent. The questionnaire were sent in Italian whose English translations have been enumerated here.

1. *How is the manager/promoter of continuous improvement in your company known?*
   The name or title assigned, informally, to manager or staff member involved in continuous improvement specified as lean manager in literature. Some of the titles are Management (VP, DG, etc.), company-specific name (DIP, BPS, FPS, etc), Process Engineering, Operation Manager, Lean Manager (20 different denominations). Hereby all these are referred to as lean manager and are represented graphically in 4.1 as they are all responsible for continuous improvement, with distinction mentioned specifically if job title is required to make an explanation.

2. *Indicate the formal name of his position in the company (open question)*
   The formal title)of the lean manager manager in the company was mentioned in this portion,

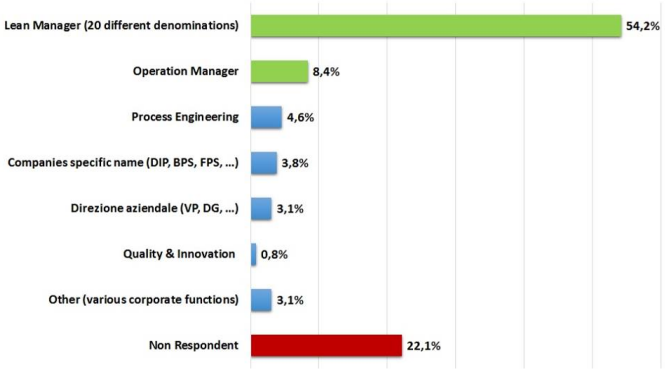

Fig. 4.1: informal nomenclature of lean manager in company

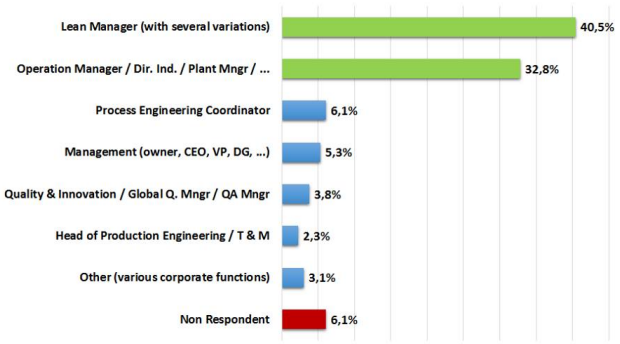

Fig. 4.2: Company specific formal nomenclature of lean managers

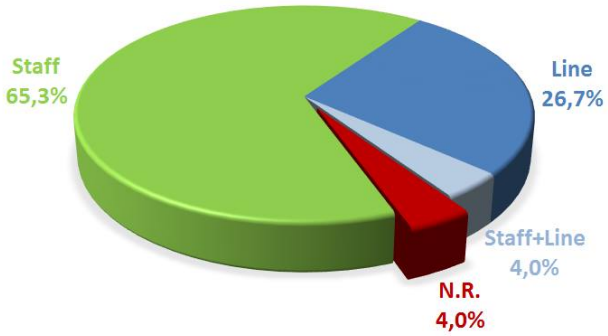

Fig. 4.3: Roles of lean managers: staff or line

these titles varied from Head of Production Engineering, T & M Quality & Innovation, Global Q. Manager , QA Manager , management (owner, CEO, VP, DG, ...), Process Engineering Coordinator, Operation Manager / Dir. Ind. / Plant Manager , Lean Manager (with several variations), etc. Following figure 4.2 shows distribution of title among respondent companies.

3. *Please indicate their role*
   The role of the individual associated with lean, if they work in staff or line. This is represented in the pie chart in figure 4.3

4. *Whom to report?*
   Here the answer to the question if the lean manager is required to report to a direct or not is answered, the answer was overwhelming yes and is shown in the pie chart in figure 4.4.

5. *Personal under lean manager's direct responsibility?*

Fig. 4.4: Whom to report

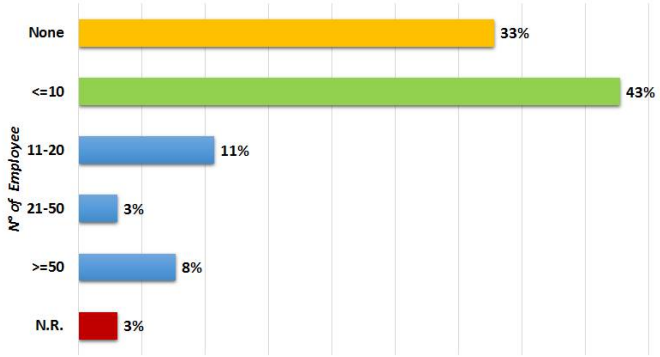

Fig. 4.5: Number of people under supervision of lean manager

Here the number of person under lean manager are listed. Most(i.e. 43%) of respondents companies had less than 10 people working directly under the lean manager as represented in bar graph figure 4.5 .

6. *Which of the following statements best describes the autonomy of decision for the lean manager:*
The respondents were asked to select an answer from the options made available to them.

   (a) My role does not have any kind of autonomous decision means any decision that has an impact in terms of commitment of resources (employees) or investments must be approved by my superiors;

   (b) I have limited decision-making autonomy, which, however, allow me to allocate the necessary resources (time mainly men) to carry out small improvement projects ("Quick win" or "Just Do It");

   (c) I have a range relatively wide decision, which allows me to allocate the necessary resources (both time and man-pocket costs) to carry out improvement projects (both "kaizen blitz"

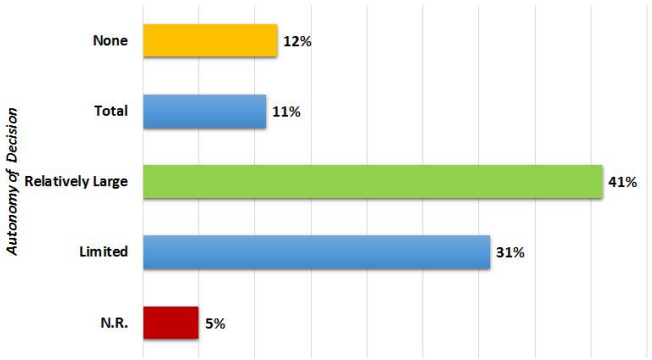

Fig. 4.6: Autonomy of decision for lean manager

that broader, such as DMAIC projects in the Six Sigma) and proceed in most cases with the implementation of the identified solutions; whereas the investment required for the implementation of the solution were "important" *, I should instead present the business case and get approval to proceed with the investment;

(d) They are responsible for a totally independent structure from the P&L point of view: it is my responsibility to ensure that the savings from improvement projects fully covering the costs of my structure (primarily the cost of FTEs of my structure).

(e) If possible, provide an indication of the maximum investment threshold.

It was found that most of the lean manager enjoyed large autonomy (41%), with relatively limited autonomy enjoyed by 31%, while total autonomy was enjoyed by 11% in most cases they are the head of the departments, while some had no autonomy(12%), no response was obtained from the rest 5% of respondents., this is represented in the bar chart of figure 4.6

7. *Indicate the department typically involved in improving functions(company specific):*
It was raised as an open question in the survey and the possible responses from respondents differed for each company, some of the typical responses were: Production, Logistic, Industrial Engineering, Technology, Quality,Digital Production,etc. The respondents response are represented in the bar graph of figure 4.7 in percentile form.

8. *What is the percentage of the working population of your organization actively involved in improvement projects:*
The breakdown of this statistic among the 131 respondents is shown in the bar graph of figure 4.8

9. *What resources / external powers have been involved in the management of improvement?:*
The respondents where asked to select from the following options (multiple answers were

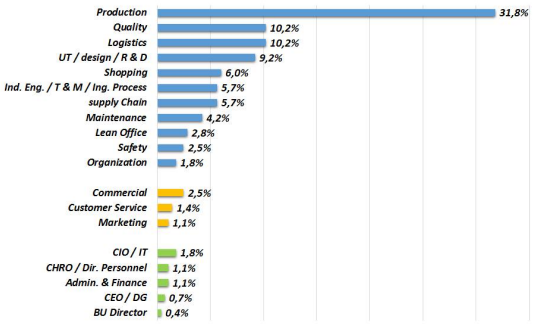

Fig. 4.7: Department associated with lean

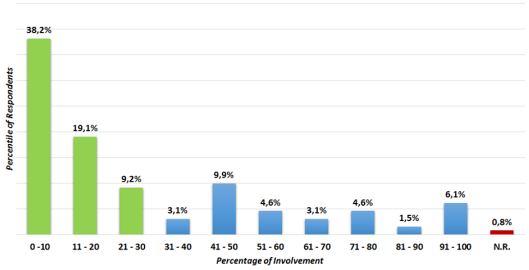

Fig. 4.8: %ge of working population involved with lean

accepted). The response for the 131 respondents can be summarized in the bar graph of figure 4.9

(a) consultancy firm / consultants

(b) University

(c) Interim Manager

(d) No resources / external competence

(e) Other (specify)

10. *What skills should a Lean Manager/Manager of Continuous Improvement possess?* (Indicating up to a maximum of 3 of the following choices)
Following options were provided in the survey to which the respondents response was obtained and following observation were made as shown in graphical form in figure 4.10

(a) Technical / methodological in its sector

(b) Management / management / business

(c) relational

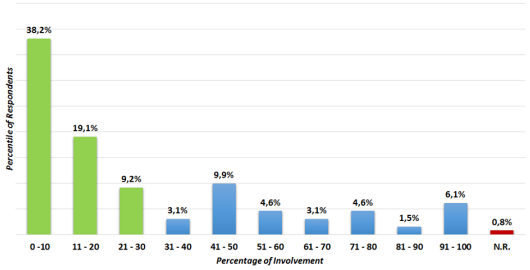

Fig. 4.9: External support acquired by the company for Lean management

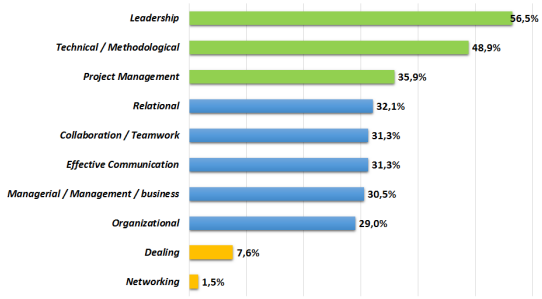

Fig. 4.10: Skills considered important for lean manager among the survey respondents

(d) organizational
(e) networking
(f) Project Management
(g) effective communication
(h) dealing
(i) leadership
(j) collaborative / teamwork
(k) Other (specify)

11. *Stating 5-6 Lean management tools such as Six Sigma, Operations Excellence, Quality Improvement, ... what lean tools are most frequently employed in the company*
This was an open answer question, so the answers where subjective too, The views from the workers in company was taken and it involved answers from managers varying from "Given that I am not a lean expert, Standards, PDCA, Problem Solving, Communication, MRP, Skill Improvement, Operational, Visual Management, Process performance, KPIs, etc. Supply chain improvement while another manager gave precise answers such as "Visual Management, Standardization, 5S, Kaizen Events, Pull flow ". Response from quality and innovation

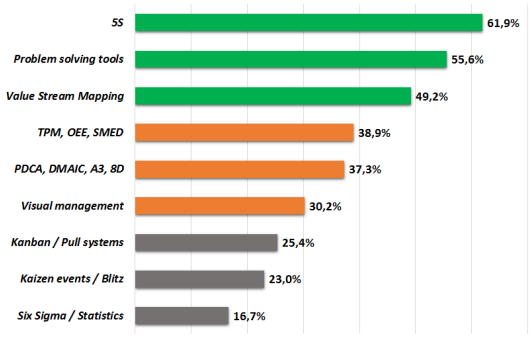

Fig. 4.11: Lean management tools employed among the respondent companies

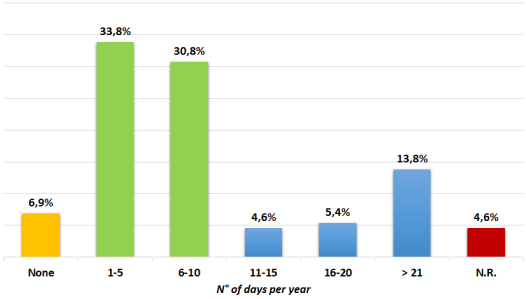

Fig. 4.12: Number of days per year of training on techniques and tools for the improvement of operations (attended on average over the last 5 years)

manager who reported to Head of Quality & Innovation responded with "Shop Floor Management, Visual Management, 5S, Value Stream Mapping, Problem Solving", while another lean manager response was "programming, industrial organization, logistics, quality, production, tooling,etc.". The various tool used across the respondent companies are represented in figure 4.11.

12. *Stating the number of days/year of training courses on topics related to techniques and tools (for the improvement of the average frequented operations over the last five years)*
This involved varying responses, which were analyzed and the result of this analysis is represented in figure 4.12

13. *What certifications are achieved? (Eg "Certified Six Sigma Green Belt" at ASQ, "LSS Specialist" at MIP Politecnico di Milano, ...)*
The certification obtained by the participants over the years for deployment of lean tools in the company. The graphical representation of the certification is depicted in the graph 4.13

14. *How is the improvement program called/defined in your company?*

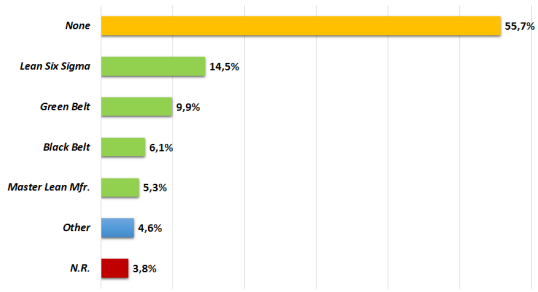

Fig. 4.13: certification obtained by the respondents

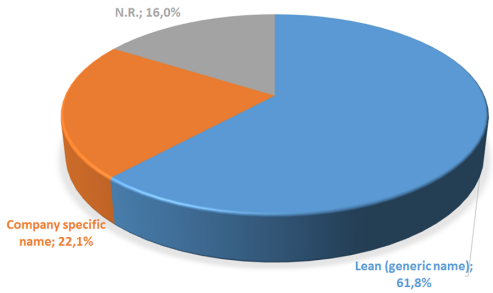

Fig. 4.14: Defining the continuous improvement program

The process is defined as Lean or by generic names such as Quality master, Kaizen, process improvement, continuous improvement, etc. by 62% of the respondents. While 22% identified the process of continuous development by company specific name such as BPS, etc., while the rest 16% gave no response for this questions. The pie chart 4.14 shows the naming convention in different companies.

15. *Since what year the company/organization started the so-called Lean Journey?*
In response to this question most companies about 46 % responded with a typical response of 2-5years, The complete breakdown across the respondents is as shown in the table below in 5.1, and graphically in the bar graph 4.15

16. *Indicate the types of improvement projects in the company (may indicate more than one answer)?*
Multiple options were provided to the survey participants, they are enumerated below:

    - Streamlining product / service (standardization, modularization, ...)
    - Streamlining processes and reducing NVA activities;
    - Reducing set-up times;

Years	percentage
<= 1	13
2-5	46
6-10	21
> = 11	13
NR	8

Tab. 4.1: Percentage company distribution since implementing Lean

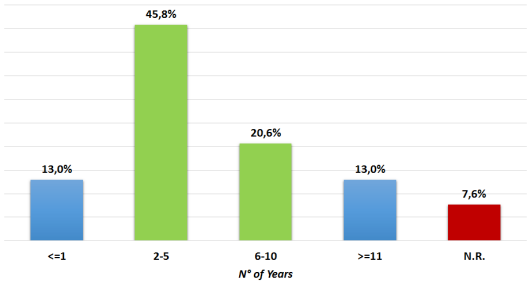

Fig. 4.15: Lean journey in years

- Waste reduction / improving quality (conformance / reliability of the process);
- Improved planning of operations (eg. Planning level);
- Reducing stock and technical WIP / implementation Just in Time (kanban, visual management, Andon systems, ...);
- Organizational changes (job enlargement, job enrichment - self-control, self-maintenance, flexible working hours, workload analysis, job design ...);
- Interventions on suppliers (delivery reliability, quality certification to the source to deliver free-pass, ...);
- Others (specify)

The response to this questionnaire was analyzed and following graphical report is generated in 4.16

17. *"Scope" / "Range" of typical improvement projects:* The responses can be broadly categorized into following, and it is response is graphically represented in figure 4.17

    - limited area of management (eg .: a team or a department) in 27.5% respondents
    - The entire direction (eg in the case of plant operations, the entire shop-floor)with 26.7% respondents

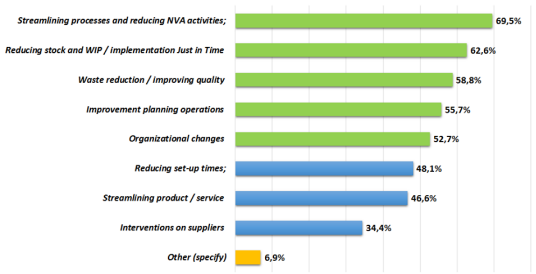

Fig. 4.16: distribution of different improvement projects among the 131 respondents out of 750 online requests

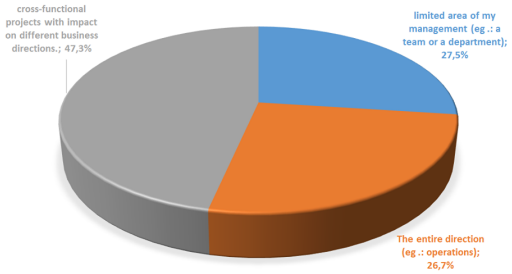

Fig. 4.17: Range of improvement projects

- cross-functional projects with impact on different business directions. in 47.3% respondents

18. *Duration of projects (may indicate more than one answer)*
The responses where invited in following categories with response shown in graphical form in figure 4.18

    - One-day workshops (eg just-do-it projects, Quick Wins, Poka Yoke implementation);
    - One-week full immersion (eg Kaizen Blitz);
    - Projects with a duration of 3.6 months with a committed part-time work teams (eg DMAIC projects with commitment to 4/8 hours per week);
    - complex projects with full time commitment of a dedicated team for several months (eg industrialization of a new product / service in total costs; major reorganization projects, construction of lines "U" just-in)
    - Other (to be specified)

19. *Indicate the fraction of working time dedicated to managing improvement projects by the managers*:

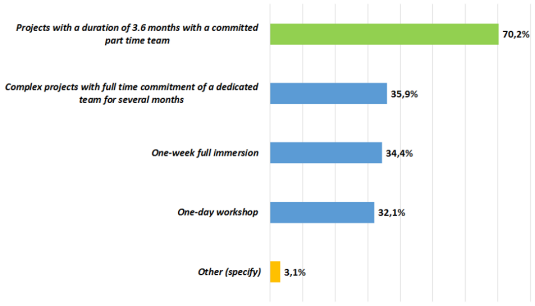

Fig. 4.18: duration of implementation for improvement projects

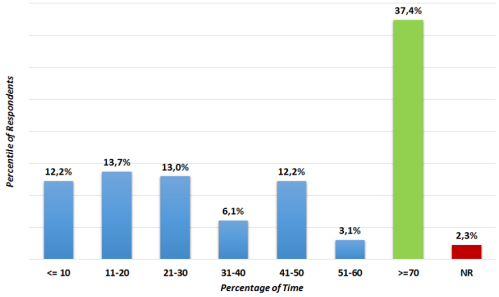

Fig. 4.19: fractional duration of time used in implementation of improvement projects

Here the respondents indicated the percentile of their working time involved with the development and implementation of improvement projects, graphically analyzed in figure 4.19

20. *Number of people involved in improvement projects (indicate the number of FTE per project)*
The bar graph in Figure 4.20 indicates the total number of people involved in improvement project in the surveyed companies.

21. *If possible, provide a quantification of the impact (overall) of the improvement projects carried out in the last 12 months (eg improvement% waste; reduction% stock; FTE saved by eliminating NVA activities; ...)*
Figure 4.21shows response result in terms of Productivity reduce costs, Quality / Reduce. Waste / complaints, inventory reduction, Lead time reduction, Best. OEE, space optimization, Best. level of service, Best. Safety, etc

22. *What are the key activities of manager's role? and what percentage of his time dedicated to individual activities?*
Key activities of the manager are Communication, Troubleshooting / day to day management, Standardization / industrialization, Coordination / involvement, improvement plan-

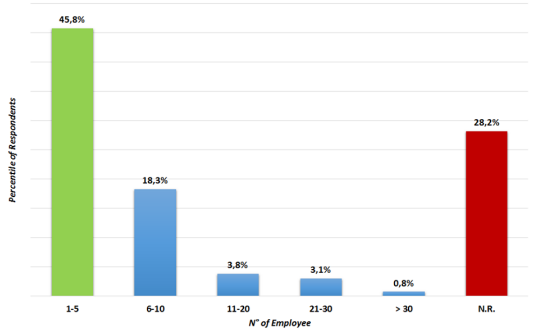

Fig. 4.20: Number of people involved in the project

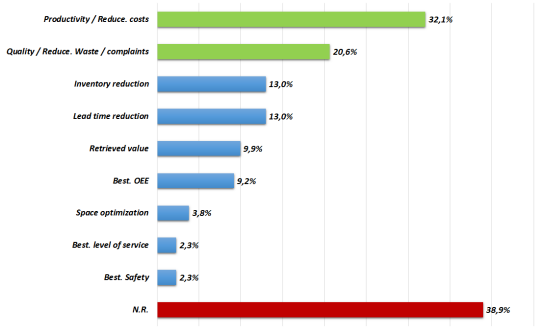

Fig. 4.21: percentage improvement by key category

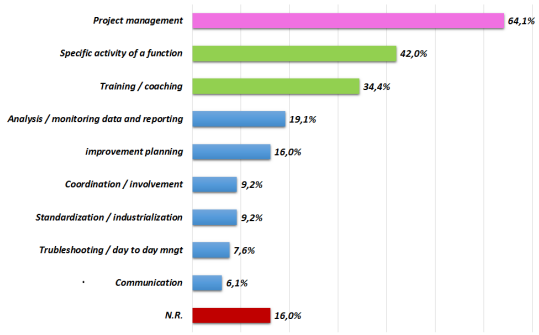

Fig. 4.22: percentage-wise Key activities response

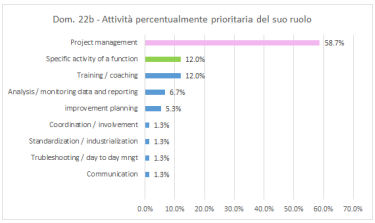

Fig. 4.23: percentage wise priority key activity

ning, Analysis / monitoring data and reporting, Training / coaching, Specific activity of a function, Project management. Their percentage wise distribution according to the survey results is presented in graph 4.22 Priority wise activity distribution among the key activities mention in previous questions can be presented in figure 4.23

23. *How many projects are initiated every year in its operational reality?*

    Number of projects Launched each year in its operational each year among the respondent companies is shown in percentage form in pie chart of figure 4.24

24. *What %ge of these projects are completed?*
    The projects which are completed in the companies who undertook the lean management survey is shown graphically in 4.25

25. *projects are defined in its business reality by what logic?*

    The projects are defined in following three project distribution pattern

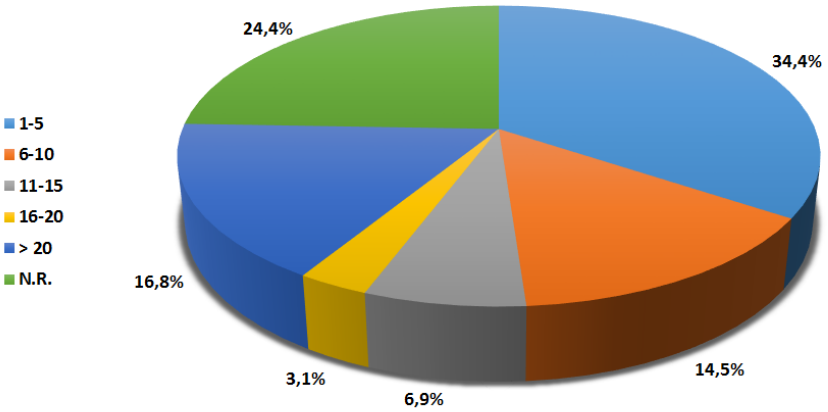

Fig. 4.24: Number of projects Launched each year

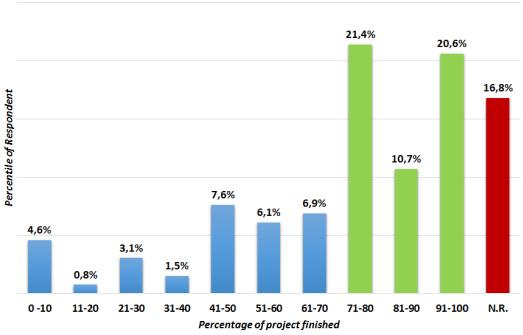

Fig. 4.25: Number of completed projects

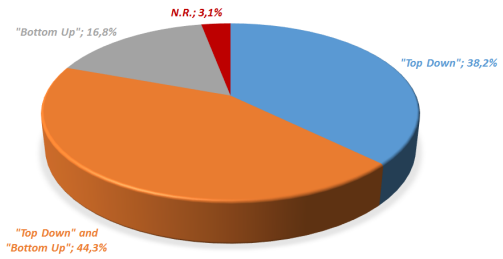

Fig. 4.26: Percentage of companies following each project distribution pattern

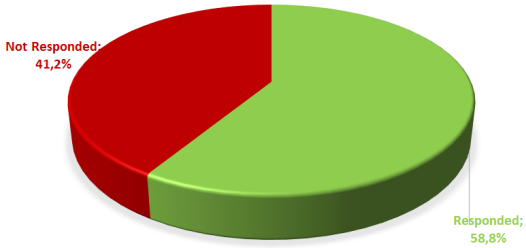

Fig. 4.27: Percentage of respondent willing to provide company name

(a) Mainly according to a logic "Top Down"

(b) Equally "Top Down" and "Bottom Up"

(c) Mainly "Bottom Up"

The percentage of companies following each distribution is represented in the pie chart of figure 4.26

26. *Company name (optional)*
58.8% responded positively and provided their company name. While 41.2% chose not to specify. The response in pie chart form is as shown in figure 4.27

27. *Belong to a group.*
This was a yes or no question, and the response is shown in the pie chart of the figure 4.28

28. *Registered office in Italy (Province)* The distribution of the surveyed companies has their headquarters in different provinces of Italy and their region wise distribution is presented in figure 4.29.

29. *Industry type*
The surveyed industry belonged to one of the following categories .

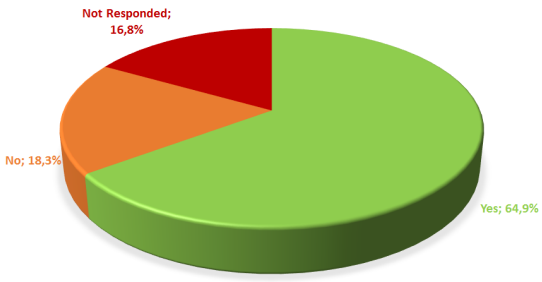

Fig. 4.28: Percentage of respondent companies belonging to a group

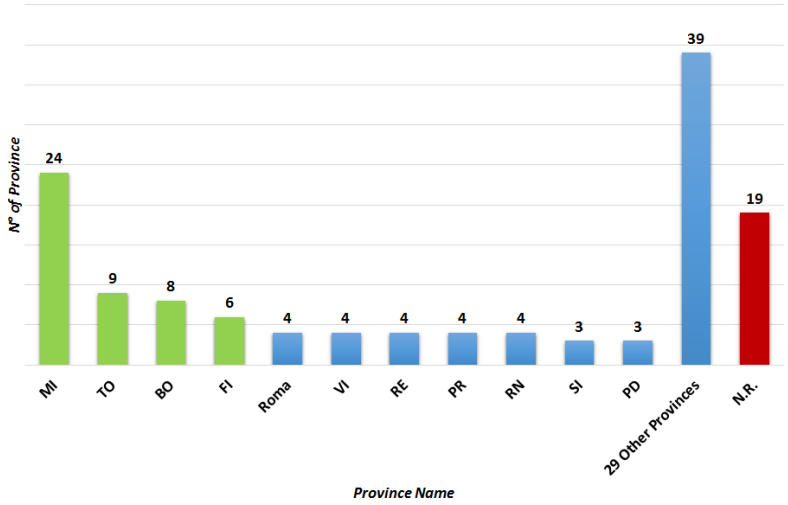

Fig. 4.29: company Headquarters of surveyed industry across provinces

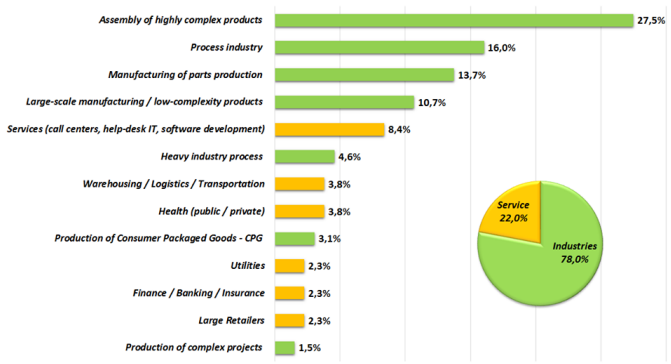

Fig. 4.30: Industrial sectors respondent company belongs to

- Large retailers,
- Finance / Banking / Insurance,
- Utilities,
- Production of Consumer Packaged Goods - CPG ,
- Health (public / private),
- Warehousing / Logistics / Transportation,
- Heavy industry process ,
- Services (call centers, help-desk IT, software development),
- Large-scale manufacturing / low-complexity products ,
- Manufacturing of parts production,
- Process industry,
- Assembly of highly complex products,etc.

The percentile of companies belonging to each sector are mentioned in figure 4.30

30. *Number of employees*
The number of employees in the above mentioned sector differed greatly, and the number of employee in each company may also vary in the same industry too. The company size of most companies (about 30%) is above 1000, while 51-100 employee industry under survey constitute 16% of total companies surveyed. The percentile distribution is shown in figure 4.31

31. *Turnover (in €)*
The companies where classified based on their turnover. Most companies had a turnover of about 51 to 200 million €. Company distribution in terms of turnover is represented in the bar graph of figure 4.32.

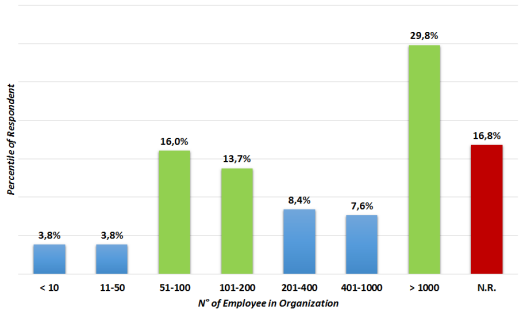

Fig. 4.31: Company size in terms of employees(surveyed companies)

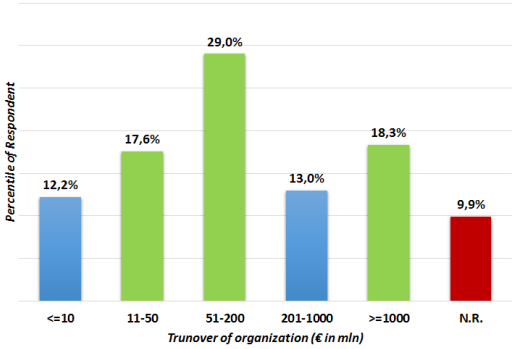

Fig. 4.32: Company distribution in terms of turnover

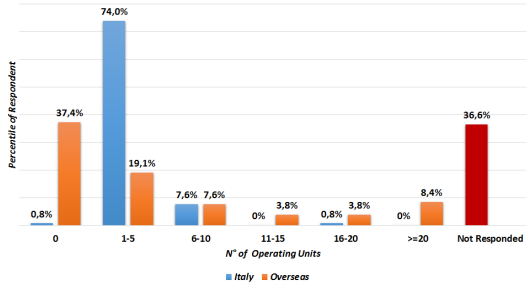

Fig. 4.33: Company distribution in terms of number of operating units

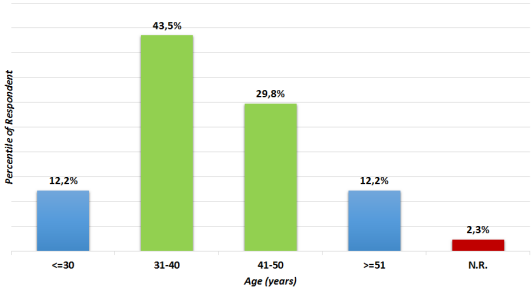

Fig. 4.34: Average age of employees involved in lean

32. *Number of operating units.*
In this category the number of operating units of each company where identified based on the number of countries they are located in and in hoe many numbers. The bar graph indicates the number of units that the respondent companies had in percentile form in figure 4.33

33. *Age*
Average age of employee involved in lean or continuous improvements in each companies was surveyed and represented in figure 4.34

34. *Qualification (specify)*
The qualification of managers involved in continuous improvement was gathered in this column, represented graphically in figure 4.35

35. *Number of years of service in current company?*
In this column of the survey two data of lean manager where collected i.e. the experience of the manager and the number of years the manager is with the company, represented in figure 4.36. and total working experience of the lean manager is represented in figur 4.37

36. *Please indicate your current contractual status:*

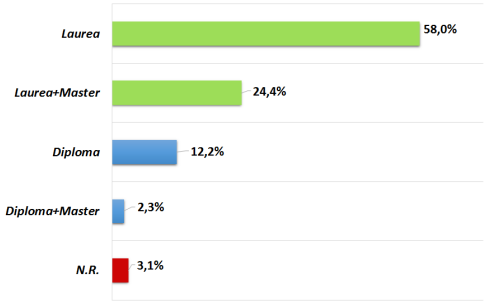

Fig. 4.35: Qualification of employee(lean manager)

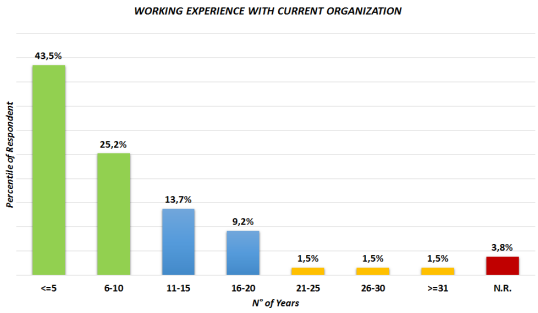

Fig. 4.36: Years spent by lean manager in current company

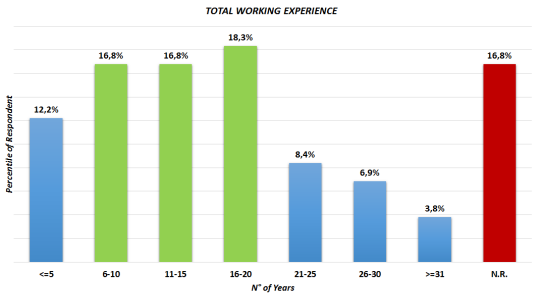

Fig. 4.37: Total working experience

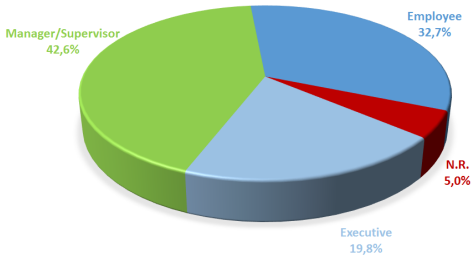

Fig. 4.38: Contractual status

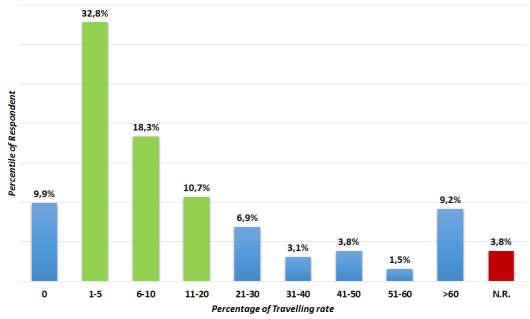

Fig. 4.39: annual working time devoted to travel for the manager

The employee contract of manager was classified into Dirigente(Leader), Quadro(management), Impiegato(office worker) in this survey. The result of survey represented in figure 4.38

37. *Indicates the percentage of his "traveling rate"* (Annual working time devoted to travel and to work out from your office is recorded here and is represented in the bar graph in figure 4.39

38. *Could you describe in a few lines his overall career (with the first position to date)?*
The short personal profile of manager responsible for lean management was taken in this section of survey, the profile of managers varied greatly.

39. *I consent to the processing of my personal data Legislative Decree 196/03 after taking complete the information on the site MIP (www.mip.polimi.it/it/privacy/).*
In this section the consent of the manager was asked to share the personal data with respect to the legislative Decree 196/03

40. *Contact details (optional)*
For further study, to send the results of the Survey, participants were asked to furnish contact details in this section .

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5. DISCUSSION AND CORRELATION

From the results of survey whose questionnaire where discussed in previous chapter following observation can be made by using the correlation tools available.

- The first correlation was plotted in the bar graph of figure 5.1 is drawn between the participant organization turnover (in million €) and number of days/year training of lean managers involved in company is conducted. The graph is color coded. It can be observed that there is no direct relation between the two, indicating that the training is either not significantly improving the skills of lean managers or the lean tools are in general not implemented in a well defined and organized manner, even after the lean training of employee, or better and more structured training with focus on implementation of lean tools is required. and hence, a lot of scope for improvement is evidently present.

- The second correlation is drawn between the percentage of time manager(lean) devote for the continuous improvement process and the turnover of the company. It was noted that a company with well defined lean manager profile for continuous improvement has better turnover, i.e. the managers time is mostly utilized for process improvement, as is evident from the graph in figure 5.2. This indicates that only training the employees does not help, time must also be devoted for actual work of continuous improvement in the organization

- The percentage of workforce and time involved by different departments in improvement projects are presented in figure 5.3

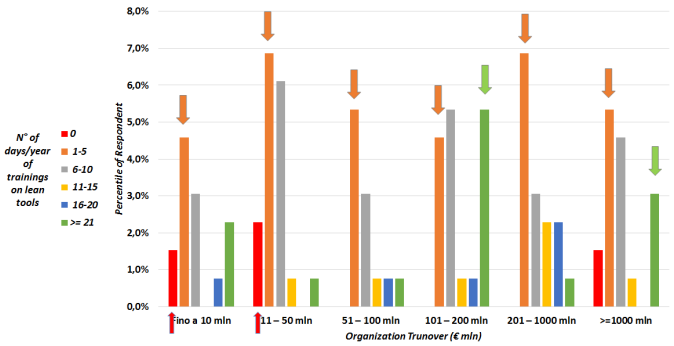

Fig. 5.1: Turnover(in million €) vs training days/yr

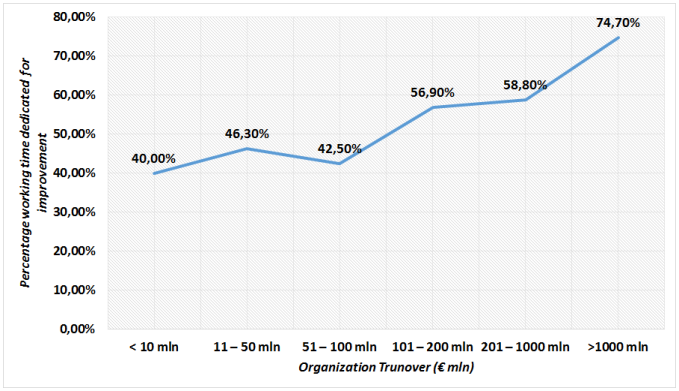

Fig. 5.2: Turnover(in million €) vs percentage of time devoted by the manager

Funzioni tipicamente coinvolte nel miglioramento	Fatturato (in Euro)					
	Fino a 10 mln	11 – 50 mln	51 – 100 mln	101 – 200 mln	201 – 1000 mln	>1000 mln
Non hanno risposto	3,0%	1,7%	0,0%	0,0%	3,8%	3,2%
Tutte le funzioni	3,0%	1,7%	2,6%	5,5%	1,9%	22,6%
BU Director	0,0%	0,0%	0,0%	0,0%	1,9%	3,2%
Ammin. & Finanza	3,0%	0,0%	0,0%	3,6%	0,0%	0,0%
CEO / DG	3,0%	1,7%	0,0%	0,0%	0,0%	0,0%
CHRO / Dir. Personale	3,0%	1,7%	0,0%	0,0%	1,9%	0,0%
CIO / IT	3,0%	1,7%	0,0%	1,8%	3,8%	0,0%
Customer Service	3,0%	1,7%	0,0%	1,8%	1,9%	0,0%
Marketing	0,0%	0,0%	0,0%	3,6%	1,9%	0,0%
Commerciale	3,0%	3,3%	0,0%	5,5%	0,0%	0,0%
Organizzazione	0,0%	0,0%	0,0%	3,6%	3,8%	3,2%
Sicurezza	0,0%	1,7%	2,6%	5,5%	0,0%	0,0%
Lean Office	0,0%	0,0%	5,3%	3,6%	7,7%	0,0%
Supply Chain	9,1%	5,0%	5,3%	1,8%	5,8%	9,7%
Manutenzione	6,1%	1,7%	2,6%	5,5%	1,9%	3,2%
Acquisti	9,1%	10,0%	7,9%	3,6%	1,9%	0,0%
Ind. Eng. / T&M / Ing. Processo	3,0%	5,0%	7,9%	1,8%	7,7%	9,7%
UT / Progettazione / R&D	12,1%	6,7%	7,9%	10,9%	7,7%	6,5%
Logistica	3,0%	11,7%	13,2%	12,7%	13,5%	0,0%
Qualità	6,1%	11,7%	15,8%	1,8%	11,5%	3,2%
Produzione	27,3%	33,3%	28,9%	27,3%	21,2%	35,5%

Fig. 5.3: Departments and improvement projects correlation across industry

I'm responsible for a totally independent structure from the Profit & Less perspective	7,1%	21,7%	13,3%	9,1%	28,6%	4,2%
I have a range relatively wide decision	35,7%	47,8%	40,0%	54,5%	38,1%	37,5%
I have limited autonomous decision	50,0%	30,4%	33,3%	22,7%	23,8%	33,3%
My role does not have any kind of decision-making autonomy	7,1%	0,0%	13,3%	13,6%	9,5%	25,0%
	<= 10 mln	*11 – 50 mln*	*51 – 100 mln*	*101 – 200 mln*	*201 – 1000 mln*	*>=1000 mln*

Tab. 5.1: Turnover(in million €) vs autonomy in decision making for lean managers

Top Down	50,0%	40,9%	35,7%	47,8%	27,3%	36,4%
Bottom Up	18,8%	9,1%	7,1%	21,7%	18,2%	18,2%
Top Down + Bottom Up	31,3%	50,0%	57,1%	30,4%	54,5%	45,5%
	< 10 mln	11 – 50 mln	51 – 100 mln	101 – 200 mln	201 – 1000 mln	>1000 mln

Tab. 5.2: Turnover(in million €) vs process implementation approach

- Autonomy of decision is compared with the turnover of the companies, it was found that Most companies with turnover over 10 million €gave lean managers wide autonomy in decision, as against the total autonomy in decision making for the lean managers, while limited autonomy is prevalent in small companies with turnover below 10 million €. The autonomy is tabulated in Table 5.1.

- The different logical approach for project implementation using lean strategies across organizations, which are differentiated according to turnover is tabulated in table 5.2.

- In the box plot of figure 5.4 overall impact of the improvement projects carried out in the last 12 months (Percentage improvement by category) is shown. The main areas of development are Productivity/ cost reduction, Quality/ waste reduction, etc.

- The lean journey of different respondent companies is plotted against the organization categorized by turnover in a color coded graph and is represented in figure 5.5

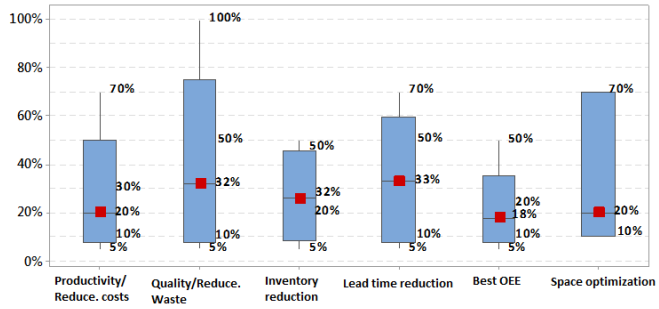

Fig. 5.4: overall impact of the improvement projects carried out in the last 12 months (% improvement by category)

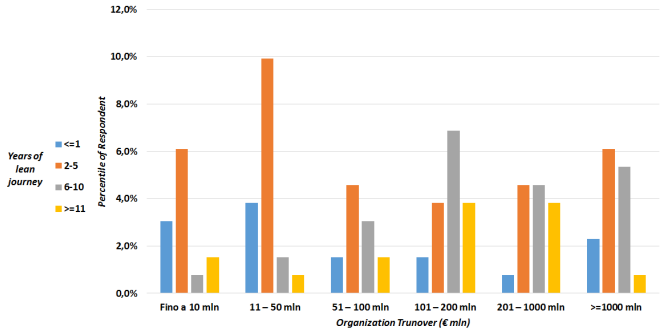

Fig. 5.5: Turnover(in million €) vs percentage of company wrt their lean journey in years

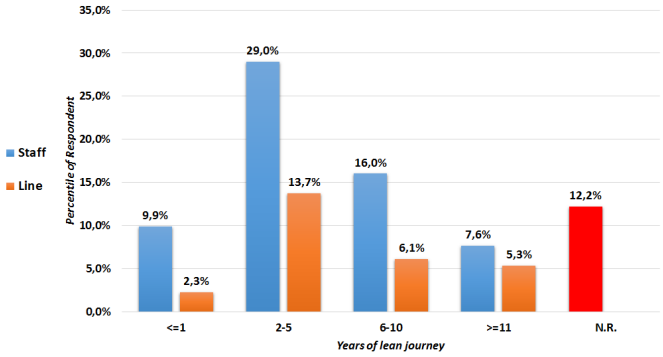

Fig. 5.6: Turnover(in million €) vs employee involved in lean presented wrt their lean journey in years

- The lean journey is correlated with type of employee involved in lean management i.e. staff or line across the respondents categorized in terms of their turnover is done in figure 5.6

6. CONCLUSION

In this thesis work, the concept of lean management is explained, along with the various tools, practices,thinking etc. used in its deployment. The management views and role in lean implementation for continuous improvement has been the focus here. The survey mentioned in this thesis was used as a tool to understand the Italian industrial sector, and penetration of lean practices in Italian set up, immaterial of the type of sector i.e. Large retailers, Finance / Banking / Insurance, Utilities, Production of Consumer Packaged Goods - CPG , Health (public / private), Warehousing / Logistics / Transportation, Heavy industry process , Services (call centers, help-desk IT, software development), Large-scale manufacturing / low-complexity products, Manufacturing of parts production, etc. However, the 131 respondent companies can broadly be categorized into following sectors by AILM:

- Assembly products of high complexity (27.5%)
- Process Industries (16.0%)
- Production manufacturing of parts (13.7%)
- Manufacturing on large scale/ products of low complexity (10.7%)

The unified approach of implementing lean at varying business sectors, only considered one criteria of categorizing businesses and company, namely Turnover (in million €). The survey questions where both open ended(where opinions where invited from the respondent and they could be either very subjective or objective) and close ended(where the respondents were supposed to answer as directed among the options provided in the survey). The health of industry therefore, was measured in terms of lean implementation. Of-course, a direct relation between the turnover and lean is futile and can't explain on its own the effectiveness of Lean system. But what is important is that a holistic approach is being employed, in conjunction with AILM and MIP, to answer questions like (a) how the wastefulness of the system is removed, and its correlation with the company turnover? (b)what are the improvement areas visible upon lean implementation over the year and results categorized in terms of company turnover. Chapter 5 gave answers to all such kind of question using graphical and statistical tools such as pie chart, bar graph and box plot.

In addition, the survey questions are explained and a preliminary analysis of various answers is presented in the chapter 4. Lastly, the profile of a lean manager in Italian industry based on the survey emerged which can be summarized and enumerated from the analysis of the survey as discussed in next section

6.1 Lean Managers profile

A lean manager is person responsible for not only continuous improvement but someone who inculcates the culture into the fabric of organization, thereby creating a culture where creativity, improvement, customer focus, waste minimization, efficiency are all developed with a holistic approach and not in bits and pieces, with a long term prospective on growth in terms of thinking and doing. Following conclusion on a general profile of a lean manager is drawn in by analyzing the survey result.

The average age of a lean manager in Italian industries and business based on the responses is 39 years, with a almost 80 percent being graduates, and have been working in the industry for about 15 years on an average, indicating experience is counted as a valuable requirement inside an organization to become person in charge of deploying lean tools. In general the person holding lean managers profile is 43 % likely to be a manager and 33 % likely to be other employees, while there is a 20% chance that the executives or leaders of the company hold the profile in Italian industry. Most times they report directly to th4 department heads or top executives while some time they may report to department like Production. About 11 % of the lean manager total autonomy in decision making such as deployment of resources at their disposal for usage in management purposes such as implementation of lean tools and practices which were described in previous section. While 43 percent enjoy large autonomy but not total autonomy of resource and time management. The others either have limited autonomy of decision making or chose no to respond. This has also been depicted in a piece hart in chapter 4. The certification obtained by different management levels have been reported n the survey and it was found that about only 30% of lean managers had Lean, Green & black belt while 48 % had no certification, indicating poorly trained lean manager in many Italian organizations, while the rest chose not to answer. The primary skills that Italian businesses look in a lean manager were Leadership (56%); technical(49%); project management (36%).

The time dedicated by lean manager solely on improvement activities by lean managers on an average came out to be 50%, of course this varies from company to company, as some companies has dedicated staff for continuous improvement, while for some other companies it is a part of their job description of a manage, and not the only sole responsibility, the size and turnover are crucial in deciding this factor in an organization. The key activity of lean managers however remain management of improvement project for about 60% od surveyed respondents. The analysis of lean implementation was done based on turnover of the company as can be seen in the chapter5. The surveyed industry

Of-course the above profile is just the mean (average) profile of lean managers among surveyed companies. The lean manager profile greatly varies with company to company and across different industrial sectors. It must be considered here that the sever limitation of responses (131 in total out of 750 requested), is at best a small to medium level sample of Italian industrial sector. Therefore, the validity of the conclusion although very good for respondent companies, falls short when the whole industrial sector of Italy is considered as a unit. A greater data set must be needed for this.

6.2 Future work

MIP is also conducting training and research in role of executive in Lean management. Various programs are being started by them in conjunction with AILM and other institutes for certification and training of employees in implementation of Lean tools and six sigma approach. Therefore a closer and more integrated relationship is needed with the industry. It must be understood lean is not a tool for quick and rapid changes, but a tool to bring about slow and gradual changes, which become a part of the organization culture.

Although lean was known to Italian industry, only recently has the companies started to show great interest in it. MIP in conjunction with AILM Milano is working on creating a bigger data set of companies by requesting and including more businesses under the survey, at the same time continuously improving the survey questionnaire and methodology. Here in this thesis main aim was to analyze the survey and gain an inside into the profile of a lean manager in Italian industrial set up. In future work their profile can be compared to the global standard or to Japanese standard or to Toyota's standard. Also the results of this survey is not only limited to creating a profile of lean manager, it can be used to gauge, how different lean tools effect the companies of different sizes, based on the standard of employee in terms of education and training, and how the company of different sizes in terms of turnover, employee size, etc handle the challenges related with lean deployment? The impact of employing lean management as a half hearted and partial measure or manner can be compared to the case when it is employed as a medium to bring about a culture change in the company ecosystem. This needs to be further studied in Italian system, through survey and analysis.

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