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Lean Leadership Practices - A Literature Review

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Abstract

This paper presents a review of the literature on lean leadership practices. We begin with a brief review of the literature on lean origins and history, followed by a quick introduction to lean principles, building blocks, and prominent implementation frameworks in the literature, and conclude by reviewing the scarce literature on the focused subject of lean leadership in terms of tools, practices, attributes, and frameworks. A critical gap has been identified in the literature with regards to a holistic and practical leadership model for companies that are willing to make a changeover to a lean business system. This review reveals the need for a meticulously developed leadership model based on empirical evidence. It also discusses the necessity of developing new lean tools for leadership or adapting the existing lean tools to leadership tasks.

Keywords: Lean leadership; Lean management; Lean culture; Barriers to lean; Lean failure; Lean success; Lean culture

Introduction

As a business grows, inevitably the whole system including the organizational structure, functional interactions, the nature and range of products, customer relationships, and its other components, become more complex and difficult to manage. This complexity in most cases diminishes an organization's flexibility to change and typically decreases its performance eventually down to a level which threatens its viability. Competent and smart business leaders recognize the need for improvement or change initiatives early on the path. Nevertheless, substantiated by available facts, in most cases this vital need is ignored until a severe crisis emerges [1]. Over the decades, different approaches and methodologies for change have been developed and deployed. Change methodologies that are well-known today, such as TQM, Six Sigma, and lean, are all formally coded and documented in the scientific management era after the 1880's [2]. Although each of these methodologies has gained success to some extent, they are either limited to isolated improvement projects at particular points of time, or are ambiguous when it comes to application and implementation.

Lean is one of the prevalent and reputable change methodologies [3] that originated in manufacturing known then as lean manufacturing but later evolved to a continuous improvement process affecting all aspects of a business system [4-6]. Today, this is generally referred to as lean thinking or lean management. Lean thinking, as a comprehensive and continuous change strategy, touches every aspect and every function of a business. Therefore, unlike other change methodologies, lean is not just a collection of disconnected improvement projects. Nonetheless, lean has not been as successful as expected in delivering the promised results [7-9].

Lean's pioneer, Toyota and some of its successors, such as Wiremold, have reaped astonishing benefits from using lean as their change strategy and these had not been 'lucky' incidents because they have been able to repeat their success frequently in their several attempts and they also have been successful in sustaining the benefits over a long period of time. However, in striking contrast to a few significant success stories, the majority of the attempts for lean transformation either fail remarkably or at least fail to live up to the initial expectations [7-9]. In fact, an extensive survey done by Industry Week in 2007 reported that only 2% of the lean programs lived up to the expected results [10]. Lean principles and tools might sound simple, but in practice most organizations either fail at the initial implementation or fail to sustain the benefits. This high failure rate [7,11] along with those few highly successful results, bring this question to the foreground: "Why does lean work for a few companies but fail for the majority?" Many authors believe that successful implementation of lean, entails change in the organizational culture and giving enough attention to the 'respect for people' principle of lean [12-15]. Nevertheless, delving in the lean literature, one term is pervasive in many books, research papers, experts' speeches, and articles: 'Leadership'. Whether 'lack of leadership' is listed as a key failure factor or 'effective leadership' is listed as a key success factor, there is consensus on the role of leadership as an imperative in any lean turnaround [6,8,16-21].

As the result of well-established influence of leadership on the success of change strategies, and more specifically lean, clarifying different aspects and elaborating on diverse, and often cumbersome elements of lean leadership seems necessary. This accentuates the necessity for a holistic model, framework, roadmap, or instructing guide for leaders who are about to embark on their lean journey. Indeed, recognition of this need has been the motivating spark for this literature review.

After a brief description of the methodology used for this literature review, in the following sections, first we will familiarize the reader with lean's origins, and its main principles and promises. This will be followed by an introduction to leadership and imperative of leadership in lean transformations.

Subsequently, seeking available practical and theoretical lean leadership models or frameworks, we will review the efforts of lean experts and scholars in regard to identifying lean leadership attributes, practices, and tools. The results, along with the reviewed lean models in the last section, collectively will help us identify the critical gaps in the academic literature that have probably been partially responsible for the high failure rate of lean efforts so far.

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Methodology

Seven database search engines were mainly used for the purpose of searching literature: (remove this or else explain why this industry), Google Scholar, IEEE Xplore, Scopus, ScienceDirect, Emerald, and Engineering Village.

As a result of the searches, initially 86 papers and articles were quickly reviewed; out of which 48 were shortlisted as the most relevant and informative. Besides the shortlisted papers, 15 books were identified as containing relevant information and were used along the papers as references for this literature review.

Lean origins

In the early 1980's, Toyota had already established its strong presence in the U.S. market with lower prices and higher quality and was capturing the lead from American giant auto manufacturers [22]. This strong appearance of Japanese competitors in the U.S. market made many academic and industry researchers curious about the Japanese and in particular Toyota's mysterious production system [22,23]. Although John Krafick, a researcher in the International Motor Vehicle Program (IMVP), was the first to use the word "lean" in his master's thesis for MIT's Sloan School of Management to refer to the Toyota Production System [4-6,9,12,24] publication of the book "The machine that changed the world: the story of lean production" [25] officially and extensively introduced lean manufacturing (also known as lean production system) to the academic community as well as the industry [5,9,14,26].

Although lean manufacturing which later evolved to lean thinking, lean philosophy, or lean management system [27] is coded and documented based on the Toyota Production System (TPS), many of its principles and tools (e.g. JIT and flow), had not been originally new concepts in the late 90's [23]. In fact, Japanese lean pioneers (e.g. Eiji Toyoda and Taichi Ohno) built on the innovations of their predecessors like Frederick Taylor and Henry Ford) [5,7,23,28].

Development of Just in time (JIT) as one of the pillars of lean can be traced back to 1799, when Eli Whitney introduced the concept of interchangeable parts for the first time to the American industry [22]. Standardized work and time studies were first invented by Frederick W. Taylor (i.e. the fathed of 'scientific management') [5,22,29]. Motion studies and process mapping were introduced shortly after by Frank Gilbreth and later lay the foundation for value stream mapping (VSM) in lean [22]. Flow, as one of the main principles of lean, was originally innovated by Henry Ford in 1913 [5,28] and Kiichiro Toyoda took it a step further. Although collective efforts of pioneers like Ford and Taylor enhanced productivity and earned competitive advantage for a while [29] it did not keep the Japanese from stealing their thunder.

By the time World War II ended in 1945, Toyota was a small auto manufacturer that was struggling for its very existence. Imitating the American mass production system was not an option on the table due to several reasons, including scarce financial resources, a very small and demanding local market, and shortage and high price of land for production and storage [5,24].

After spending a whole year meticulously studying Ford's production system, Kiichiro Toyoda, son of the founder of Toyota, resolved to find ways to tailor the American mass production system to Japan's unique culture, production constraints, and economic realities. He was also inspired by the instructions of quality wizards like Ishikawa, Deming and Juran [5,22,24,28]. Statistical Quality Control,

PDCA cycle, and Pareto charts later became inseparable parts of Japan's quality movement. Jidoka (Built-in-quality) as one of the two pillars of Toyota was initially originated by Sakichi Toyoda in his self-stopping looms and is also a manifestation of Toyota's commitment to perfect quality.

Lilian Gilbreth studied worker motivation which alongside Taylor, Gilbreth and other contributors, created the concept of "waste elimination". Waste elimination is the foundation for Just in Time (JIT) production system. Second pillar of TPS, JIT, was formally developed between 1945 and 1975 and allowed for the production of only what is required by the following process by producing small batches in every run [5,30].

Masaaki Imai formally conceptualized Kaizen (continuous improvement) as one of the main building blocks of lean [31]. Japanese engineer Shigeo Shingo created the SMED method and the "Non-Stock Production" system in 1975.

One of the main contributors to the emergence of TPS was the legendary Taiichi Ohno, who invented the kanban and production leveling for the first time [5].

Lean principles

Jones and Womack established the five lean principles: 1) Specify value, 2) Identify value stream, 3) Flow, 4) Pull, and 5) Perfection. Womack and Jones developed an action plan for lean transformation, which is comprised of four main steps: 1) getting started, 2) creating an organization to channel your stream, 3) Install business systems to encourage lean thinking, and 4) completing the transformation.

Liker [32] formulated Toyota's management principles by a pyramid model called 4P (Figure 1) which is formed by four layers: 1) Philosophy: long-term thinking, 2) Process: waste elimination, 3) People and partners: respect for people, and 4) Problem solving: continuous improvement. Despite valuable efforts of Womack and Jones (1996) and later many other reputed lean authors and practitioners, the mainstream perception of lean is still the toolbox view [7,33].

Jordan and Michel [34] elaborated the main concepts and principles of the Lean Enterprise Model (LEM) developed by the Lean Aerospace Initiative (LEI). Jordan and Michel [34] have identified and



Page 2 of 10

explained three ways through which lean transformation occurs: 1) Cultural transformation, 2) Major operational change initiatives, and 3. Continuous improvements. They suggest a four-step iterative lean change initiative model: 1) develop and refine project plan, 2) assess benefits: align with strategic goals, evaluate leanness, 3) assess costs and risks: customer life cycle, development and operations, long-term liabilities, 4) improvement: increase benefits, reduce costs, and mitigate risks. Murman et al. [35] put forth an enterprise wide approach to lean. They define a lean enterprise as "an integrated entity that efficiently creates value for its multiple stakeholders by employing lean principles and practices". They recommend deployment of a three-phase value-creation framework on all levels of the enterprise, which consists of 1. Value identification, 2) Value proposition, and 3.Value delivery.

Lean leadership

Some of the key requirements for change are leadership, empathy, and solid communications [36]. Therefore, leadership is one of the requirements for lean as a change strategy or as a proactive-to-change management system. Therefore, first we will briefly review some of the available definitions of leadership, and in particular lean leadership, in the literature, and then we will try to establish the significance of leadership's role in lean's success.

Bennis [37] brings attention to the challenge of defining leadership clearly: "to an extent, leadership is like beauty; it's hard to define, but you know it when you see it... at bottom, becoming a leader is synonymous to becoming yourself." Actually most of the definitions are restricted in the limits of Bennis's statement: "you know it when you see it" [38].

According to Maxwell [39] "leadership is influence- nothing more, nothing less". Bennis [40] defines leadership as: "leadership is a function of knowing yourself, having a vision that is well communicated, building trust among colleagues, and taking effective action to realize your own leadership potential."

Winston and Patterson [41] studied a large part of the plethora of definitions for leadership 160 articles and books- and have identified more than 90 variables as pieces of leadership as a whole picture. In each definition a number of these variables are incorporated.

Rost [42] distinguishes between management and leadership: "management is an authority relationship between at least one manager and one subordinate who coordinate their activities to produce and sell particular goods and/or services". Quite differently he defines leadership as "an influence relationship among leaders and followers who intend real changes that reflect their mutual purposes." Management and leadership diverge due to their approach to change. While management strives for stability, "leadership is a process of transformative change" [43].

Winston and Patterson [41] defined a leaders as "one or more people who selects, equips, trains, and influences one or more follower(s) who have diverse gifts, abilities and skills and focuses the follower(s) to the organizations' missions and objectives causing the follower(s) to willingly and enthusiastically expand spiritual, emotional, and physical energy in a concerted coordinated effort to achieve the organizational mission and objective."

Emiliani [44] suggests a "more specific and actionable" definition for leadership: "beliefs, behaviors, and competencies that demonstrate respect for people, improve business conditions, minimize or eliminates organizational politics, ensure effective utilization of resources, and Page 3 of 10

eliminate confusion and rework". He argues that this definition adds elimination of waste as new aspect of leadership's responsibility and also encompasses respect for people as one of the main elements of leadership. So it is more compatible with role of leadership in Lean paradigm.

Dombrowski and Mielke [8] suggest a new definition for lean leadership: "Lean leadership is a methodical system for the sustainable implementation and continuous improvement of Lean Production System (LPS). It describes the cooperation of employees and leaders in their mutual striving for perfection. This includes the customer focus of all processes as well as the long-term development of employees and leaders."

Some surveys report success rates as low as 2% for lean attempts [10]. While most companies achieve satisfactory results from their initial process improvement attempts, as they move forward everything slips back to the previous chaos [45]. Scrutinizing this phenomenon, the underlying reason may be explained by Liker's 4P model that describes Toyota's management system by a four-layer pyramid consisting of philosophy (long-term thinking), processes (waste elimination), people and partner (respect for people), and problem solving (kaizen and continuous learning) [13]. Overemphasis on process and ignoring the other three layers are what feed this defective trend. Simply put, if lean benefits are to be sustainable, lean tools need to be applied in an environment that encourages and espouses respect for people, a process-oriented mindset, and a continuous improvement culture [14].

The leader is in a position to form the culture of continuous improvement and respect for people by influencing his/her followers and constantly challenging and coaching them and clearly defining and promulgating the organization's values, vision, and goals [8]. The lean toolkit approach alone is not enough for a sustainable success and quality improvement should be "the foundation for all management activities" and "large-scale and transformational change" require "active and unwavering leadership" [46]. Lean leadership is the missing link between the lean toolbox and lean thinking and 80% of a successful lean transformation is achieved through change of leaders' behaviors, mindset, and practices [17].

What brought leadership into foreground are findings of a number of researchers, who have tried to identify the barriers to implementation of lean? Achange et al. [47] identified leadership and management as one of the four key main factors that are critical for the implementation of lean manufacturing within SMEs.

The natural resistance to change shared by the workforce and management - the anxiety that it takes and the time that the management have to put to be seriously involved in the process, motivate its workforce, and lead them by example are opposing forces to lean implementation [23].

Halling and Wijk [12] have compared two emergency health care units with a large manufacturing company in Sweden and have identified "leadership" one of the eight common barriers in both manufacturing and healthcare. Bodek [19] associates failure of lean undertakings with the difference between leading and managing.

Koenigsaecker [48] mentioned "lack of sufficiently-self-developed leaders" as one of the reasons for low rate of true lean success. He insists that if lean is to succeed, the senior leadership needs to "push up" his/ her "personal learning curve", be an active member of the initial VSM team, and gain personal experience by actively participating in kaizens. Top management resistance, lack of top/senior management focus leadership, lack of top/senior management involvement (commitment and support), lack of communication between management and workers, lack of empowerment of employees, lack of cooperation and mutual trust between management and employees are among the barriers to lean by manufacturing firms mentioned in the literature [20].

Ahmed [18] explained the reasons for the failure of a majority of lean efforts under six categories which are all directly related to a leader's responsibilities: 1) distinction between management by objectives (MBO) and lean management; 2. the use of incentives; 3. hiring outsourcing consultants or delegating the responsibility to a continuous improvement department; 4) aligning the improvement efforts with the overall demanded outcomes for maximum efficiency; 5) the use of cost benefit analysis in decision making; and 6-short-term focus on cost reduction.

Shaping or reshaping the organizational culture is one of the primary roles of leadership. Consequently, the highly determining role of leadership in successful lean turnaround is implied indirectly by some authors by highlighting the culture as an imperative in a triumphant lean transformation. The human aspect of lean, which is signified by an organization's culture, is a crucial determinant in the success of a lean turnaround [11]. Indeed, among 68 British manufacturing organizations, the main challenge for leaders in lean organizations was fostering a conductive culture to lean [14]. The Toyota leaders' way for achieving sustainable benefits out of process improvements also has been cultural transformation [49].

Lean leadership's attributes and practices

While no holistic model, framework, or road map could be detected in the literature, some attempts have been made to elucidate leadership's contributing or inhibiting attributes, attitudes, behaviors, or roles in a lean transformation. Shook [49] believes that changing behaviors and attitudes through lean techniques, such as andon, in fact precedes the change of culture, not the other way around. Therefore, leaders can instill the culture of continuous improvement and waste elimination by consistently applying lean tools and techniques that make problem identification easier.

Senior leaders contribute to lean's success in five ways: 1) developing and implementing structures and processes that anticipate and respond to the difficulties of a lean initiative that crosses internal boundaries; 2) transforming commitments to change into actual change, supporting and sustaining new behaviors and practices; 3) increasing the odds that process improvements survive the transition from project mode to ongoing process; 4) establishing and maintaining new, process-focused measures alongside conventional measures of results; and 5) creating a sustainable lean culture of continuous improvement [17].

Emiliani [29] defines the lean behaviors as: "behaviors that add or create value. It is the minimization of waste associated with arbitrary or contradictory thoughts and actions that leads to defensive behavior, ineffective relationships, poor co-operations, and negative attitudes." He also coined the term 'fat behavior' as opposed to 'lean behavior'. Emiliani believes that one of the major negative outcomes of fat behaviors of leaders is 'loss of employee commitment' and inevitably diminishing participation level.

There are a number of key differences between leaders and managers including: 1) independent thinking vs. providing solutions, eliminating waste, showing respect, overcoming resistance upfront, encouraging as much ideas as possible from workers, cultivating a There is a balance in Toyota's emphasis on executive's involvement through the time s/he spends on the shop-floor and in the office [50].

Dombrowski and Mielke have extracted five basic principles for lean leadership: 1) continuous improvement culture, 2) self-development, 3) qualification, 4) gemba (genchi genbutsu), and 5) hoshin kanri. Dombrowski and Mielke have listed 15 practical leadership guidelines under these five basic principles.

Pokinska et al. [9] reported lean managerial and leadership practices in five lean case organizations: 1) visible in the gemba and more effective interaction with employees, 2) more time for face to face meetings with employees and also use of visual tools as a means for facilitating information flow, 3) focus on cultivating employee's problem-solving competencies and gradual empowerment and delegation of responsibility, and 4) instilling values in the employees, sharing objectives, and serving as a role model and coach.

Aij et al. [16] have reported three common leadership characteristics that are critical to successful lean implementation in the context of healthcare practice: 1) going to the gemba, 2) empowerment and trust, and 3) modesty and openness.

Liker and Balle assert that a relentless PDCA cycle - comprised of 3 elements: 1) Standards, 2) Visualizing and reporting abnormalities, and 3. Kaizen - is the first responsibility of lean leaders and managers.

There is a trivial difference between the skills and competencies required from leaders for making the lean transformation in the first place and later for sustaining the benefits.

Effective communication is mentioned repeatedly as a positive leadership behavior if a leader is to play the role of a motivator, coach, and supporter. Pamfilie et al. [51] stated that "in a successful lean Six Sigma project the leader is an efficient communicator". Similarly, Gelei et al. [33] have verified the significance of leadership as a key success factor and also confirmed communication as a contributor leadership attribute.

Given the complexity and fuzziness of recommended leadership behaviors and practices, iconic lean companies, such as Toyota and Wiremold, may serve as practical examples to be used by leaders. Emiliani et al. [44] recounted Art Byrne's steps including announcing a new strategy and rigorously refining it in iterative cycles, selecting initial kaizen opportunities, conducting initial kaizen training, selecting kaizen team leaders, and identifying cross-functional team members.

Byrne [52] set the lean practitioners straight about the way to go about lean: leaders have to understand and commit to three management principles: 1) lean is the strategy, 2) lead from the top, 3) transform the people. He also suggests four principles to be adhered to by leaders in implementing lean: 1) work to talk time, 2) create onepiece flow, 3) establish standard work, and 4) connect your customer to your shop floor through a pull system.

Lean implementation in health care changes leadership practices in seven major ways: "a) Align the aims and objectives of health regions; b) authorizes attention and resources to quality improvement and change management; c) provides an integrated set of tools for particular tasks; d) changes leaders' attitudes or beliefs about appropriate leadership and management styles and behaviors; e) demands increased levels of

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expertise, accountability and commitment from leaders; f) measures and uses data effectively to identify actual and relevant local problems and the root causes of those problems; and g) creates or supports a 'learning organization' culture."

Emiliani is convinced that most leaders are "lost" in the lean journey and he lists 11 common errors that hampers their success including a manufacturing tool-box view, batch-and-queue mindset and business metrics, 3-lack of direct participation, inefficient policy deployment, destructive relationship with suppliers, short-term business horizon, shareholder focus rather than customer focus.

Emiliani [53] proclaims that the missing link in competency models, which renders many of them unsuccessful in delivering their promises despite the substantial investments, is underestimation of beliefs that are entrenched in the organizational culture and leaders' mind-set.

Self-development and leadership tools

As the lean way of operating the business takes a completely different mindset, culture, and set of skill and competencies, naturally leaders need to change their own mentality and develop their leadership skills if they are to coach and develop their subordinates. Therefore, self-development is one of the main elements of leadership's new role in the lean context [54] uses music as a framework to help leaders appreciate lean leadership. Emiliani notes precise timing and synchronization, signified by tact time and beats in lean and music respectively, as the most evident similarity between two. He asserts that similar to learning to play a musical instrument, senior managers and leaders need to recognize the need for long-term and persistent commitment to self-development and learning.

Found et al., have confirmed the necessity of double-loop learning cycle at all levels of management for a sustainable lean implementation. Liker and Convis have formulated a lean leadership development model based on Toyota's systematic way of leadership development (Figure 2). Implementing lean in its entirety is significantly more difficult to be understood and practiced than it may sound. Thus, the creation of new tools or adaptation of already existing tools that can help leaders to perform their newly emergent roles seems necessary. Schwagerman and Ulmer elaborated on the role of the A3 report as a leadership or management process for ingraining the continuous improvement culture in the organization. They assert that frequent and consistent application of the A3 method, which is founded on PDCA and continuous improvement mentality, gradually instills the culture of continuous improvement in both leaders and employees.

Emiliani [55] put forth the idea of standardized work for executive leadership. He believes that standardized work for leaders can reduce inconsistencies in decision-making and also bad decisions which are the root causes of variability and errors. Jordan and Michel suggest the use of the balanced scorecard [56]. Based on this balanced scorecard any lean strategic goal has to be assessed from four different perspectives: 1) customary financial goals, 2) goals relating to customers' viewpoint, 3) goals relating to efficient and effective operations, and 4) goals relating to preparing for the future through learning and growth. However, Jordan and Michel added two more perspectives: 1) goals relating to globalization, and 2. goals relating to innovation.

Lean leadership/management vs. other managerial systems

Lean management principles and practices have borrowed elements from or share some characteristics with other managerial or leadership paradigms. However, some unconventional counterintuitive properties of true lean leaders has made it unique and of added-value to the leadership's corps of knowledge.

Ballard and Tommelein found lean project management more efficient and powerful than traditional project management as the complexity and uncertainty of the project grows.

The similarities between 'developmental leadership' and 'lean leadership' significantly exceed the differences as they both concentrate on leadership behaviors and cultivation of productive leadership



Page 5 of 10

behaviors. Notwithstanding, lean leadership behaviors are intended to serve the overriding purpose of continuous improvement through waste elimination, but developmental leadership model merely seeks for getting the leaders own up their behaviors and self-develop [57].

Holm [6] suggests that 'shared leadership' and 'authentic leadership' are two complementary concepts that fit well into lean paradigm. She claims that: "Team leadership is central for lean" and in order to operationalize this team leadership, she believes that authentic leaders have to be the reported-to authorities.

Lean models

Using Axiomatic Design (AD) principles Houshmand and Jamshidnezhad [58] proposed a practical hierarchical structure to visualize the lean implementation process and the required tools and techniques. Customer needs (CNs) as the ultimate goals of lean, reside at the top of the model. These models need to be translated into functional requirements (FRs), represented by the conceptual notions of lean production. These FRs, in turn, need to be explained by the design parameters (DPs), represented by principles. Finally, process variables (PVs), represented by lean methodologies at the bottom of the model, are what operationalize the upper layers (Figure 3).

Miina [59] proposed an empirical lean implementation model in the form of a 5-step closed loop that guarantees continuous improvement. Five iterative steps of his model are: 1) lean knowledge acquisition, 2) lean house development, 3) lean house communication and training, lean implementation process planning, and 5) lean implementation process execution (Figure 4).

Ahlstrom and Karlsson [60] explored the role of the management accounting system in the lean adoption process. They summarized their observations on the role of the management accounting system as follows:

- The management accounting system can create impetus for changes in the direction of lean production, but not until traditional performance measures have reached a certain threshold (Figure 5 right).
- Another important way to create impetus for change is to raise the level of the unit of analysis... and to shift the focus from single machines and/or operators to the whole production flow. Second, there is a need to shift the focus from the operating level to the whole production system (Figure 5 - left).





• The management accounting system affects the adoption process in three concurrent ways: technically..., formally..., and cognitively... Thus, it is not enough to implement a technical change in the management accounting system... Perhaps most important is making sure that the cognitive perspective changes, since it affects the other two perspectives."

Boyer [61] examined the relationship between a company's commitment to lean production and the actions taken by management to develop infrastructural issues represented by four infrastructural investments: quality leadership, problem solving groups, training, and workers' empowerment. This relationship is illustrated by the model of commitment to lean production (Figure 6). Commitment to JIT and TQM takes a profound commitment to developing the workforce and the manufacturing infrastructures, if lean is to deliver on its promises.

Dibia et al. incorporated leadership in their 'lean "Leadership People Process Outcome" (LPPO) implementation model' (Figure 7). This model distances lean implementation from toolbox approach and brings it closer to lean thinking by incorporating 'people' and 'leadership' in the lean implementation [62].

Testani and Ramaknishnan proposed the lean transformational leadership model (LTL) (Figure 8). This model describes the gravitational pull that transformational leadership behaviors and transactional leadership behaviors impose on dynamics of the interaction within and between different levels of enterprise (levels of a living (open) system). They believe transformational leadership behaviors pull the organization's culture toward a more adaptive and lean culture.

Conclusions

It has been more than 25 years since Womack and Jones brought Toyota Production System (TPS), also referred to as 'lean', under the academic spotlight. However, despite an abundance of books, articles, and paper that try to conceptualize lean or offer a quick lean Citation: Ashtiani NN, Bhuiyan N, Zanjani MK (2017) Lean Leadership Practices - A Literature Review. Ind Eng Manage 6: 226. doi:10.4172/2169-0316.1000226

Page 7 of 10



Figure 5: Raising the level of the unit of analysis in a management accounting system for lean production (left)- the impetus for changing the management accounting system (right).





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Page 8 of 10



Figure 8: Lean transformational leadership organizational conceptual model.

Literature				
Imperative	Dombrowski and Mielke explained lean's low success rate by Liker's 4P model.	According to Bhasin sustainable lean takes an environment that encourages respect for people, a process-oriented mindset, and a CI culture.	Mann believes %80 of a successful lean transformation is achieved through change of leaders' behaviors, mindset, and practices.	Achange et al. introduced leadership as one of the critical factors for the implementation of lean manufacturing within SMEs.
	Halling and Wijk identified "leadership" as one of the common barriers to lean in both manufacturing and healthcare.	According to Bodek the difference between leading and managing is responsible for lean's failure.	Koenigsaecker mentioned "lack of sufficiently-self-developed leaders" as one of the reasons for low rate of true lean success.	According to Jadhav et al. lack of focus leadership, and lack of management involvement are among the barriers to lean.
Attributes and practices	According to Mann leaders contribute to lean by supporting new behaviors and practices, process-focused measures, and culture of Cl.	Emiliani, defines lean behaviors as: "the minimization of waste associated with arbitrary or contradictory thoughts and actions."	Bodek listed differences between leaders and managers including showing respect, and creating a blame-free environment.	Marksberry and Hughes believe that there is a balance in Toyota executives' time on the shop-floor and in the office.
	Dombrowski and Mielke extracted 5 principles for lean leadership: Cl culture, self-development, qualification, genchi genbutsu, and hoshin kanri.	Pokinska et al. reported lean leadership practices as: more visible in the gemba, more face to face meetings, and serving as a role model and coach.	Aij et al. reported 3 critical leadership characteristics: going to the gemba, empowerment and trust, and modesty and openness.	According to Liker and Balle a PDCA cycle- comprised of Standards, visualizing and reporting abnormalities, and Kaizen- is the first responsibility of lean leaders.
	Pamfilie et al. believe that "in a successful lean Six Sigma project the leader is an efficient communicator".	Gelei et al. confirmed communication as a contributor leadership attribute.	According to Byrne leaders have to commit to 3 management principles: 1- lean is the strategy, 2- lead from the top, 3- transform the people.	Emiliani, believes that the missing link in competency models is underestimation of beliefs entrenched in the culture and leaders' mind-set.
	Emiliani listed errors of lean leaders including tool-box view, batch-and- queue mindset, lack of participation, and inefficient policy deployment.	According to Goodridge et al. lean implementation changes leaders' beliefs about leadership styles; and increases demand for commitment from leaders.	-	-
Self- development and tools	Emiliani uses music as a framework to help leaders appreciate lean leadership.	Found et al confirmed the necessity of double-loop learning cycle at all levels of management for lean sustainability.	Liker and Convis formulated a lean leadership development model based on Toyota's practices.	Schwagerman and Ulmer elaborated on the role of A3 report as a leadership process.
	Emiliani believes that standardized work for leaders can reduce inconsistencies in decision-making and also bad decisions.	Jordan and Michel suggest use of balanced scorecard to assess any strategic goal.		
Comparative studies	Ballard and Tommelein found lean project management more efficient than the traditional one as the complexity and uncertainty grows.	Ljungblom believes that the similarities between 'developmental leadership' and 'lean leadership' exceed the differences.	Holm suggests that 'shared leadership' and 'authentic leadership' are two complementary concepts that fit well into lean paradigm.	
Lean models	Houshmand and Jamshidnezhad proposed a practical hierarchical structure to visualize the lean implementation process and the required tools.	Ahlström and Karlsson, explored the role of the management accounting system in the lean adoption process.	Boyer, examined the relationship between a company's commitment to lean production and the actions taken by management to develop infrastructural issues.	Dibia et al. incorporated leadership in their 'lean "leadership People Process Outcome" (LPPO) implementation model'.
	Testani and Ramaknishnan proposed a model explaining the gravitational pull that transformational or transactional leadership impose on the interactions of different levels of enterprise.			

 Table 1: Literature review summary.

prescription, soft aspects of lean including change management, respect for people principle, lean culture, and leadership requirements are hardly discussed. Alarmingly, a low success rate of lean endeavors has been the driving force behind a wealth of researches for exploration of root problems. Dominated by the human-related and intangible elements of lean, the identified failure causes and barriers confirm existence of the same problem in the industry. Leadership with the highest influence over all the human aspects, is one of the top-priority research topics in this regard. However, as there are scarce resources on this subject matter, this literature review evidences lack of sufficient attention to the imperative of lean leadership by the scholars and lean authors.

Table 1 summarizes the available literature in the realm of lean leadership. Given the last row of the table (lean models), although Dibia et al. have considered leadership as one of the main components of their lean implementation model, their model still does not provide leaders with clear guidelines or a comprehensive roadmap. Similarly, although the lean transformational leadership model (LTL) by Testani and Ramaknishnan is a valuable effort for explaining the influence of leadership style on lean implementation, it still lacks the practical aspects necessary to satisfy the vital needs of lean leaders. So, delving into the scant available resources, a gap has been identified for a holistic leadership model that provides a clear and practical roadmap for the leaders who are about to begin or are already on their lean journey.

The third row of the table (self-development and tools) also suggests a lack of sufficient attention given to development of new lean leadership tools or adaptation of already-existing lean tools for leadership tasks. Given the critical role of leaders in the lean transformation, providing them with practical, versatile, and diversely-applicable leadership tools is imperative.

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Page 9 of 10

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Page 10 of 10