Lean Thinking: From the Shop Floor to an Organizational Culture

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Abstract. In many areas, there is a multitude of terms/designations and definitions for the same concept, leading thus to misunderstanding. This also occurs with the designated Lean Production, which started to be known as a "thing" from the shop floor. However, it was quickly realized that it is much more than that (and should be understood as much more), otherwise the transformation of the operations will not be possible, as each company has its own organizational culture that could enable or inhibit the Lean implementation. Lean Production is underneath Lean Thinking, otherwise designated as philosophy, organizational culture, organizational model, production paradigm and others. This paper intends to present terms/designations and definitions that had been associated with Lean Thinking. The objective is to clarify that Lean Thinking is, in fact, all of that. Companies need to understand this in order to improve their operations, by recognizing value for the customer and eliminate wastes.

Keywords: Organizational culture, Philosophy, Lean Thinking.

1   Introduction

Lean Production Systems (LPS) was the designation given by Krafcik [1] to the Toyota Production System (TPS). In this germinal paper, it was recognized how different LPS was, implying a mind-set change from the Fordism, mainly related to work standardization, span control, teamwork, buffers and inventories' interpretation and meaning of repair areas. People should be seen as more than "a pair of hands"; in fact, their "heads" are the most important asset of the company [2]. Buffers and inventories reflect overproduction, considered as the worst waste but common in "just-in-case" scenarios.

Moreover, repair areas should not even exist as they mean production of defects, another waste that implies more consumption of materials, energy and water, as well as more pollutants emission. To accept/make such interpretations, companies need to think and look to their operations from a different viewpoint, but most companies are not used do this. This different thinking was named by Womack and Jones [3] as Lean Thinking but it seems difficult to have these insights and be successful in lean implementation. Inhibitors and enablers have been identified and studied, and organizational culture is pointed out as a context-dependent factor, i.e., could act as both, depending on the context [4]. However, there is a plethora of terminology associated with Lean

Thinking that is prone to confusion and misunderstanding [5,6]. With this in mind, this paper characterizes and compares different terminologies used for Lean Thinking, aiming to clarify that Lean Thinking is a philosophy that should be built on a proper organizational culture. In addition, it should work according to an organizational model inside a production paradigm that demands a silo-broken strategy, among other strategies.

This paper is structured in five sections. After this introduction, the second section presents the materials and methods. The third section presents some concepts and definitions. The section four describes the enablers of lean product-oriented systems in a synthetized way. Finally, section five wrap-up some conclusions.

2   Materials and methods

This research was mainly based on a literature review, both classical (e.g. organizational culture origin) and most recent literature. Based also on observations and experience, the authors show the need to view Lean Thinking as an organizational culture transformation of the companies' culture into a lean product-oriented system. In addition, the research used a conceptual methodology to build conceptual constructs and to establish causal relationships about Lean Thinking and their evolution from shop floor operations to the need of an understanding and commitment by the highest levels of the company/organization hierarchy. As referred by Gilson and Goldberg [7], *"...conceptual papers seek to bridge existing theories in interesting ways, link work across disciplines, provide multi-level insights, and broaden the scope of our thinking.".*

3   Organizational culture background

Schein [8] referred that organizational culture as a concept had a fairly recent origin and that the interest on it comes fundamentally from the emergence of a different management style, the Japanese style [9–11]. Accordingly, other authors, namely, Glynn et al. [12] and Teehankee [13] pointed out the seventies as the decade of the initial interest in this concept. One of first authors that discussed this concept was Pettigrew [14].

According to Schein [15], organizational culture *"is the pattern of basic assumptions that a given group has invented, discovered, or developed in learning to cope with its problems of external adaptation and internal integration - a pattern of assumptions that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.".* Also he defined, for the first time, three levels of culture: 1) Artifacts - visible organizational structures and processes (hard to decipher); 2) Values – strategies, goals, philosophies (espoused justifications); 3) Underlying assumptions - unconscious, taken for granted belief, habits of perception, thought and feeling (ultimate source of values and action) [16]. In a different paper [9], he defined cultural paradigm as: *"a cultural paradigm as a set of interrelated assumptions that form a coherent pattern.",* related with the human being need for order and consistency. He also stated that not all assumptions are mutually compatible or consistent, and provided some examples of groups' dynamics and behavior, and that organizational culture paradigms are adapted versions of

broader cultural paradigms. The underlying cultural paradigm could be in the way the organization, and, particularly, the groups organize the space (open office landscape / individual office and closed doors), informality/formality, among other aspects.

Several authors considered the organizational culture concept as arising from a mixture of organizational psychology, social psychology and social anthropology [12,14,17]. Others, namely Teehankee [13], also relate it to organizational and management theory, and to the pioneers of the formal study of organizations, such as Max Weber, Henry Fayol and Frederick Taylor (scientific management techniques). He also linked to the human relations movement in organizational studies of Elton Mayo, Abraham Maslow and Douglas McGregor and systems schools promoted by Daniel Katz and R. L. Kahn. Previously, Roethlisberger and Dickson ([18] and Parsons [19] had made these relations. Finally, Teehankee [13] reinforces that the interest in organizational culture comes from business competition, mainly, Japanese competition. Meanwhile, other contributions were given to the organizational culture definition and understanding [20,21]. For instance, Gorman [21] defined cultural indicators to assist managers in understanding culture. These are: 1) stories and myths, 2) symbols and their meanings, 3) hero myths, 4) taboos, and 5) rites of passage. He also defined four functions of culture: 1) transmit learning, 2) unite the organization, 3) provide meaning to organization members, and 4) handle strong emotions. Yet, in 1996, Schein [22] considered that the organizational culture concept was not sufficiently discussed, and defined three cultures of management: 1) the "operators" – who make and deliver products; 2) the "engineers" – who design and monitor the technology and what organization does; and 3) the "executives" – who do the financial accountability. These three work and learn individually, thus inhibiting the organization to act as a unit and hindering efficiency and effectiveness. This is related to "what holds the organization together", as Goffee and Jones [23] put it, and it is a continuum [24].

Additionally, Goffee and Jones [23] reinforced the dimensions of sociability and solidarity related to four types of community. High sociability leads to better collaboration, information sharing and openness to new ideas. However, it could also have disadvantages, e.g. the friendship environment created could inhibit discussion. Still, when the organization members felt they are reflected in the organizational culture, the work atmosphere tends to be more pleasurable, which increases morale [24]. Moreover, a growing body of literature supports a connection between an organization's culture and its performance [17,24–27]. Members of an organization that identifies with the organizational culture, create a positive image and commitment that could outperform others with non-existent culture [24,28,29]. From the above, it is recognized that organizational culture is a complex interlinked concept that is not immediately recognized or identified. This means that the change requires a huge effort from the organization and is a long-term project coordinated and led by top management [30]. According to Schein [9], independently of the kind of culture, organizations (more mature or not) that have to manage a culture change, will cross through a painful process and strong resistance. Organizational culture is a deep phenomenon that should be addressed seriously [31]. Hence, knowing the organizational culture can reduce the risk of failure [30] leading thus to the need to diagnose it [24,32,33]. In this diagnosis one should be aware that more than one culture, e.g. associated to departments or hierarchy, could co-exist

within an organization [33]. This author indicate seven steps to change a culture: 1) conduct a culture audit (diagnosis); 2) cultural assessment and need for change; 3) assess cultural risk; 4) unfreezing the cultural pattern; 5) elicit support from the cultural elite; 6) selecting an intervention strategy; and 7) monitoring and evaluation.

Changing a culture is part of the organization development process. This process implies a structured complex set of trade-offs among structure, systems, people, and culture, allowing the reaching of a particular business strategy [30]. Also, a myriad of other important concepts is also related to organizational culture such as groups, dynamics, strategies, philosophy, leadership, habits, paradigms, sociability, socialization, solidarity, models, traditions, climate, skills, norms, change, behavior, patterns, among others. This shows the richness of an organizational culture and, at the same time, the difficulty to understand, manage and change it. It also explains why so many different designations are used to name "organizational culture", often wrongly used [31].

4   Lean Thinking: the literature perspective

Lean Production has been implemented in many companies, as reported by [34]. Yet, it is very common to find companies frustrated, trying to implement it without success [35]. Krafcik [1] and Womack et al. [36] described what they found in Japanese companies; particularly, Toyota has reported the differences from Lean production to the mass production and craftsmanship paradigms. Anticipating the difficulties that companies interested in implementing could have, Womack and Jones [3] developed the Lean Thinking principles as a guide to help them. Nevertheless, since it origins, Lean suffered opposition [37], which is common to happen when something new emerges.

Meanwhile, 30 years after Lean designation use, in spite of evidences, a lot of confusion and suspicious environment around Lean Production prevails, keeping people away. Some companies do not even want to hear the word "lean", but accept well a "continuous improvement" program. This reveals that those companies do not know exactly what is Lean, otherwise they will know that continuous improvement, or kaizen, is behind the fifth Lean Thinking principle [3] and is in the centre of TPS [38].

For sure, one of the causes is the misunderstanding of Lean meaning, due to the plethora of terms associated. Among such myriad of terms and concepts, and hided by them, is the organizational culture. This motivates the authors of this paper to initiate this research. It starts with a literature review, of papers (nineties onwards) that present Lean as a different "thinking". In these papers, terms and designations used by the authors for "thinking" were collected but only the most frequent, such as: culture (sometimes appears just this word), organizational culture, model (solely), organization model, paradigm, philosophy and socio-technical system. Lean production/manufacturing/management, production system, or others similar, were discarded because they are the most common. This review comprehended 75 papers, from 1993 to 2019. Due to the number of analysed papers, it is not possible to present a table with the respective authors; however, the Fig. 1 synthesizes the main findings. The term most used is philosophy (> 50%); nevertheless, the combination of culture and organizational culture represents 63%, which means that this aggregation is the most used.
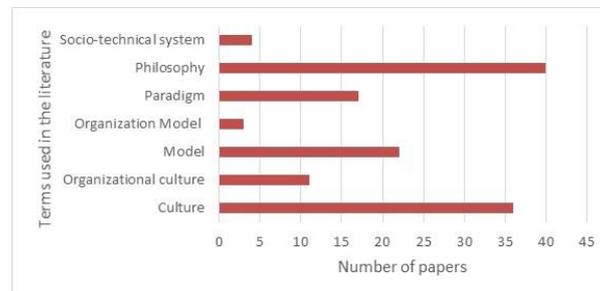
Fig. 1. Terms/designations used in the literature by the authors of Lean papers.

As so, some authors have been recognizing Lean as organizational culture. Nevertheless, attending to the extensive literature in Lean [39–41], it is possible to conclude that this is just a small "crumb". Of course, the sample used in this research is also small (75 papers) and biased (just papers related with Lean Thinking as a conceptual term). An important work on highlighting Lean culture ambiguity was the systematic literature review of Dorval et al. (2019). In this research, the authors want to reinforce the need for companies/organizations to recognize Lean Thinking as an organizational culture in the light of the organizational culture definition by the experts, referred in section 3. Also, this strengthens the literature that presents culture as an inhibitor or barrier to Lean implementation, namely, Hodge et al. [42], Salem et al. [43] and Shrimali and Soni [44]. Other barriers, related to terms associated to organizational culture referred in the section 3, could also be pointed out, namely, 1) lack of top management support [44–50], 2) lack of commitment [44,51–53] and 3) lack of training [44,52,54,55].

Organizational culture is a key factor in successful lean processes implementation [56–58]. This means that before implementing Lean in a company, its culture should be analysed and understood, and the founders/owners/top managers must have sufficient insight into their own culture to make an intelligent transition process possible, as referred by Schein [15]. At the same time, this knowledge will allow them to make a decision if Lean should be implemented or not. Not all companies have to introduce a different culture just because neighbourhood has or is the "flavour" of the moment.

Implementing Lean tools is not synonymous of implementing Lean Thinking. It is possible to implement isolated Lean tools but only with marginal gains. Only with a global approach, it is possible to achieve sustainable results, but this demands an organizational culture change. In either cases, implementing just one tool or changing the organizational culture, demands knowledge about Lean. Even in the first case, it is important to devise what tool could be used without demanding changing the culture. If it is a tool related to changing habits, probably, the hard decision to change the culture must be made. However, changing from a culture that values autonomy is very different of changing from one that values hierarchical authority, as exemplified by Dyer [33], or vice-versa, e.g. a company with roots in Fordism culture, willing to implement Lean.

Consequently, as recommended by Dyer [33] and Schwartz and Davis [30], to change organizational culture, companies needs extensive training, team building, role negotiation, new reward systems and new structures to support the change, namely a good communication system. As referred by Alves et al. [59], Lean promotes thinkers, but it is necessary to provide some conditions, namely the need to become a learning

organization. In fact, learning in organizations is vital for the organization success [60] and, according to Revans [61], the rate of learning must be greater than (or at least equal to) the rate of change. Furthermore, Powell and Reke [62] reframe the TPS as a learning system where, rather than on pure process improvement, the focus is on the development of personal competences (both technical and creative), across all levels of the organization (i.e. from shop-floor workers to top managers).

5   Conclusions

This paper presents a seminal work about Lean Thinking and the need to recognize it as an organizational culture. The organizational culture concept is relatively recent and emerged because, at that time, a different management style was recognized, the well-succeed Japanese style. This triggered the need to study this phenomenon and understand the reasons of it. While this do not happen, many companies will try to implement Lean without the proper knowledge and mind-set. Nevertheless, they must be aware that changing the organizational culture is a hard endeavor demanding a lot of continuous effort and energy, until it becomes a sustainable and natural Lean culture. The authors recognize some limitations in this research: the sample used is small and biased. Having this in mind, the authors have as objective for future work to develop a systematic literature review about this topic.

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