

Standardizing the Concept of Lean: A Literature Review

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Abstract. In modern day's global competition, companies adopting lean management to maximize productivity and quality with lower cost and time spent. But the success rate of lean implementation is far below than assumed. The authors noticed that there is a scope to research on understanding lean by definitions. Fundamentally, the term "Lean", mostly representing the Toyota production system has been being defined by many authors in many forms. But still the uniformity and clarity is not gained to come to a conclusion with consensus. Hence this paper aims to eliminate variability in defining lean by creating a versatile, easily understandable and acceptable meaning by reviewing contemporary literature and interviewing industry experts.

I. Introduction

It matters to define a term, because it's the starting point of acceptance, imagination and subsequent reflection on the subject matter. If the term is not easy enough to get a small but clear idea in the first impression, most likely it remains as an unconfident phenomenon. People are attracted to new things and accepts as and when understands. Again a commonly used term like lean, if targeted to create another meaning related to a vast area, must provoke frequent changes in thoughts and explanations.

In 1988, a researcher (Krafcik, 1988) initially proposed the term "Lean" in his thesis on "Bridging the significant performance gap between Western and Japanese automotive industries" at Massachusetts Institute of Technology (MIT) (Shah & Ward, 2007), which was later popularized by two books named "The Machine that changed the World" written by Womack et al. in 1990 and "Lean thinking" by Womack & Jones in 1996 both published by Simon and Schuster. But the scope of lean is constantly growing, leaving all definitions as instantaneous, supports the obvious differences among all authors' views (Pettersson, 2009).

To create a definition that not only captures all the dimensions but also provides clear, holistic and easy understanding of lean is a difficult test. Pettersson (2009) finds no fixed definition of lean while reviewing the contemporary articles and finally, comments that the formulations of the overall purpose of the concept are significantly different.

II. Literature review

According to Oxford dictionary, Lean as a noun means a deviation from the perpendicular or an inclination; as a verb, it means to be in or move into a sloping position with synonyms like bend, tilt, tip, bias, sway etc., or cause something to rest against with synonyms like be propped up, be supported etc.; as a phrasal verb, like 'lean on' means to rely on or derive support from with synonyms, or to put pressure on (someone) to act in a certain way; 'lean to/towards' means to incline or be partial to (a view or position).

The authors compare the different definitions of lean in contemporary literature showing that it is considered as a way, system, tool etc. and the applicable areas range from production to all business

process covering many objectives. From the analysis it's evident how hard it is to conclude with an agreement on the definition of lean.

Table 1: Viewpoints, applicable areas and objectives of Lean in different definitions

Sl. #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Author(s)	Comm and Mathaisel	Liker and Wu	LAI (MIT)	Cooney	Shah and Ward	Alukal	Hopp and Spearman	Worley	Rothstein	Haque and Moore	Simpson and Power	Seth and Gupta	Taj and Berro	Narasimhan et al.	De Trevino and Antonakis	Shah and Ward	Czinkbe	Hallgren and Olhager	Flecher and Majeske	Taj and Morosan	Anvari et al.	Alves et al.	Pascal Dennis
Year	2000	2000	2000	2002	2003	2003	2004	2004	2004	2004	2005	2005	2006	2006	2006	2007	2007	2009	2010	2011	2011	2012	2016
A philosophy	X	X				X																	
A practice	X	X	X								X												
A concept				X																			
An approach					X																X	X	
A system							X	X															
A manufacturing paradigm									X			X											
An enterprise initiative										X													
A thinking																	X						
A program																		X					
A tool																			X				
A model																						X	
A means																							X
Entire value stream	X						X									X	X						
Distribution				X																			
Manufacturing					X	X						X	X										
Production								X				X	X		X								X
All business processes									X														
Shopfloor																			X				
Reduce required time	X	X				X														X			X
Transform behaviour			X																				
Eliminate waste					X	X		X		X	X	X	X	X	X	X	X	X	X	X	X		
Minimize inventories						X							X	X									X
Ensure quality	X	X							X														
Improve flow										X		X											
Continuous improvement											X						X						X
Satisfy customer needs					X												X						X
Create competitive edge																				X			
Optimize performance																							
Lower cost	X	X				X																	
Increase operational efficiency											X							X					
Create agility						X																	X
Use less resource																							X

III. Method

The research is carried out through the use of internet and databases. To avoid non-authenticated information, Google Scholar is used to find quality research papers. Starting with keywords like “lean production”, “lean management”, “Toyota production system”, “lean concept”, “just in time (JIT)”, and “lean literature review” found that only “lean literature review” gives papers related to lean. So that keyword is used to downloaded 145 papers, and studied to gather various definitions of lean. All these papers do not contain the definitions. Hence the keyword “definition of lean” was tried and 6 additional articles were found connected to the topic of this research. Some more important papers were found through the cross-references, and have been reviewed as relevant to the definitions of lean. In total, 102 papers have been reviewed which belong to over 58 international journals and 14 conferences dated from 2000 to 2016.

The limitation to the search methodology was the availability of the papers to the authors. Primary databases searched for the papers were Emerald, Taylor & Francis, Elsevier, IEEE, and Springer publishing groups. Some papers were reviewed from cross-references because these contained the required information.

IV. Result

Every management system has some objectives to fulfill using a set of tools and belongs to a philosophical thinking which can be expressed in term of principles in use. With the technological advancements and increased expectations of performance, when any current goal is achieved, the demand evolves. Lean management system is no exception to this.

Interestingly, lean has also been being suffixed by various terms like management, engineering, production, service, enterprise etc. But the mostly emphasized objectives of lean are waste elimination and reduction of time (lead time, processing time, development time etc.).

According to dictionary, the term 'Lean' represents streamlining the process with the reduction of inventory and the number of team members, when the meaning is taken as "slim". Like reducing extra fat from a human body, some may argue that lean also means waste elimination. Then a standard of waste free method is required which contrast the sense of continuous improvement. In worst case, when it's assumed as an adjective, meaning already reached at the desired position, it is an awkward situation for the company management.

Again, it's more confusing when the term "management" is replaced with construction, healthcare etc. like lean construction, lean healthcare etc. But adding terms like principles, way, methodology etc. to mean lean management principles etc. does not conflicting with the base understanding.

V. Discussion

Due to the lack of a precise definition of lean, to measure the leanness of an organization is very difficult, and the effectiveness of the concept itself is in question (Karlsson and Åhlström, 1996). And the misunderstanding of lean may create attraction to only few specific tools, and results in frustrations as not fulfilling the expectations or even worsening the situation.

"Gap" is a common word. It gets people immediately connected because everyone is always in a position towards filling the gap of many unfulfilled expectations. Any desired outcome represents a gap from the current status. For example, there is a gap between customers' exact demands, and our requirements to meet those demands. Again, gap is a concept of space which is continuous and can be divided into any number of gaps. So it contains the idea of the scope of continuous improvement.

Searching with Goggle search engine, nothing found as "Gap Management" except a company named GAP calls their QHSE (quality, health, safety and environment) management system as GAP "MANAGEMENT SYSTEM". So we may replace "Lean" with "Gap Management (GM)" with a definition like it's a way to continuously find and fill the gap between current and desired status of any process.

Finally, to evaluate the effectiveness of GM concept, organization may use the ratio of change for improvement towards desired outcomes for a specific case in any decidedly broader or narrower scale. We know that a big achievement for a case company can be happen to not so significant or even below the current status for another case. Hence with the variation of urgency, importance, feasibility etc. from case to case, in GM, we may consider any current performance as standard and continuously raise the bar towards excellence.

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