What Lean Is Really About: Malaysian Automotive Perspective

A.S.M.Touhidul Islam, Shahryar Sorooshian, Shariman Bin Mustafa

Abstract*: With the tremendous advancement of lean, it has evolved a lot. Many authors have tried to express true nature of lean in various ways. But still it remains incomplete and ambiguous that it is possible to create a versatile but easily understandable and acceptably meaningful definition. Specially, lean is recommended to be practiced and followed by adapting it to the current operational and cultural status and future requirements of the specific industry. So, the author has interviewed 16 lean experts from different key functional areas in a renowned Malaysian automotive industry, and based on the analysis of qualitative data and information received from them, proposed a new definition of lean. With clear fundamental understanding, the journey of lean is expected to be more effective, efficient and sustainable to maximize productivity and quality with lower cost and time spent in any organization.

Index Terms*: Definition of Lean, Malaysian Automotive, Experts' Interview, Pareto Analysis.

I. INTRODUCTION

In social life, "Lean" means "Slim" but in organizations, the term represents reducing inventory and employees to streamline the process. Similarity exists in between reducing extra fat from a human body and waste elimination from operational process. Although in common use, terms like management, engineering, production, service, enterprise are added to lean; the objective of waste elimination remains at the center of the concept. But the sense of continuous improvement, one of the main pillars of lean, contrast to a standard of waste free method. In worst case, if achieving lean means that the company has reached at the desired position, it is an awkward situation for the management. In true sense, the demand of increased performance evolves with the achievement of certain goals and objectives set for a specific time period.

In 1988, while researching on automotive industries at Massachusetts Institute of Technology (MIT), Krafcik (1988) first proposed the term lean (Shah & Ward, 2007). The application of lean is expanding in healthcare, construction, bank and electronics, to name few. The functional area is also emerging from manufacturing operations to human resources management, supply chain management, office management etc. So, many authors have defined lean in many ways. The scope of lean is growing so much that all these instantaneous definitions provoked the obvious differences in all authors' views (Petterson, 2009). Due to this lacking in definition of lean, to measure the leanness of an organization is a cumbersome event which results in losing confidence on the effectiveness of the concept itself (Karlsson & Åhlström, 1996).

Misunderstanding of lean often promotes cherry-picking of only few specific tools that helps to get some good-looking figures in the company dashboard easily and quickly but as they are superficial, do not sustain and improve the overall objectives. In this direction, as the starting point of well acceptance and positive reflection on lean, it needs to be clearly defined in a specific context. But it is not easy to create a clear, holistic and easily understandable and all dimensions inclusive definition of lean.

II. LITERATURE REVIEW

In operation management, the definitions of lean has been found as a philosophy, thinking pattern, methodology or set of tools or a combination of these with different level of objectives to represent it as a way, a tool, a model, an initiative etc. The author has compiled 22 definitions from contemporary literature given below in Table 2.1:**MATH**

Revised Manuscript Received on December 30, 2018.

A.S.M.Touhidul Islam , Faculty of Industrial Management, Universiti Malaysia PAHANG, Malaysia

Shahryar Sorooshian , Faculty of Industrial Management, Universiti Malaysia PAHANG, Malaysia

Shariman Bin Mustafa, Faculty of Industrial Management, Universiti Malaysia PAHANG, Malaysia

Sl.	Lean manufacturing definition	Author(s)
1	"Lean production is an efficient way to satisfy customer needs while giving producers a competitive edge"	Storch and Lim (1999)
2	"Lean production can be understood as a new way to design and make things differentiated from mass and craft forms of production by the objectives and techniques applied on the shop floor, in design and along supply chains. Lean production aims to optimize performance of the production system against a standard of perfection to meet unique customer requirements"	Trienekens & Omta (2002), Howell (1999)
3	"Lean manufacturing can be define as a dynamic process of change driven by a systematic set of principles and best practices aimed at continuous improvement combining the best features of both mass and craft production"	Amin et al. (2018), Womack et al. (1990)
4	Lean is "a multi-dimensional approach that encompasses four lean boundless as JIT, TQM, TPM, and human resource management (HRM) in an integrated system that produces finished products at the pace of customer demand with little or no waste."	Taj and Morosan (2011), Shah and Ward (2003)
5	The term "lean manufacturing" "refers to an evolving dynamic new process of production covering the total enterprise, embracing all aspects of industrial operations (product development, manufacturing, organization and human resources, customer support) and including customer-supplier networks, which is governed by a systemic set of principles, methods and practices."	Anvari et al. (2011)
6	"Leanness means developing a value stream to eliminate all waste, including time, and to ensure a level schedule."	Naylor et al. (1999)
7	"Lean is a philosophy that seeks to eliminate waste in an aspect of a firm's production activities. Human relation, Vendor relations, technology and the management of material and inventory. Lean Production is an assembly line methodology Developed originally for Toyota and the Manufacturing of automobiles."	Modi & Thakkar (2014)
8	"Lean manufacturing is defined as a philosophy, based on the Toyota Production System, and other Japanese management practices that strives to shorten the time line between the customer order and the shipment of the final product, by consistent elimination of waste".	Singh (1998)
9	A philosophy of manufacturing that focuses on delivering the highest quality product on time and at the lowest cost	Liker and Wu (2000)
10	"Lean production is an integrated manufacturing system that is intended to maximize the capacity utilization and minimize the buffer inventories of a given operation through minimizing system variability (related to arrival rates, processing times, and process conformance to specifications)."	De Treville and Antonakis (2006)
11	"Lean is a management philosophy focused on identifying and eliminating waste throughout a product's entire value stream, extending not only within the organization but also along the company's supply chain network."	Scherrer-Rathje et al. (2009)
12	[...] not being merely a set of practices usually found on the factory floor. Lean is rather a fundamental change in how the people within the organization think and what they value, thus transforming how they behave	MIT (2000)
13	Lean is a "system to remove continuously multiple forms of waste, smooth production flow, improve understanding of human resource management issues, maintain quality and increase customer service, while also yielding a significant competitive advantage."	Simpson and Power (2005)
14	Lean is an alternative integrated production model to combine distinctive tools, methods, and strategies in product development, supply management, and operations management into a coherent whole.	Womack and Jones (1994)
15	"Lean production is an integrated system that accomplishes production of goods/services with minimal buffering costs."	Hopp & Spearman (2004), Shah & Ward (2007)
16	Lean manufacturing is defined as the systematic removal of waste by all members of the organization from all areas of the value stream	Worley (2004)

17	Lean manufacturing is a program aimed mainly at increasing the efficiency of operations	Hallgren and Olhager (2009)
18	"lean production is now more commonly considered as a broad production paradigm including an array of manufacturing systems containing some variety of lean practices, such as just-in-time inventory systems, teamwork, multi-tasking, employee involvement schemes, and policies for ensuring product quality throughout the production process."	Rothstein (2004)
19	Lean production refers to a manufacturing paradigm based on the fundamental goal of continuously minimizing waste to maximize flow	Seth and Gupta (2005)
20	"Lean Production is evidenced as a model where the persons assume a role of thinkers and their involvement promotes the continuous improvement and gives companies the agility they need to face the market demands and environment changes of today and tomorrow."	Alves et al. (2012)
21	"Pursuing perfection to meet or exceed internal and external customer requirements by focusing on the entire value stream and a dedication to continuous improvement, learning and waste reduction"	Czabke (2007)
22	LM is commonly known as an efficient tool in order to enhance the shop floor productivity by eliminating the seven common wastes	Fliedner and Majeske (2010)

Table 2.1 Definitions of Lean

Malaysian automotive production dates back to the initial 1960s. It is one of the foremost developed segments, and it signifies substance of domestic pride. Currently, this sector is expected to bring the nation's economic development to the position of an advanced country (Sultana & Ibrahim, 2014). In the ASEAN Automotive Market, Malaysia is the 3rd largest automotive market after Indonesia and Thailand in the passenger car segment (Sahari, 2015).

It is been a decade since Malaysian automotive started the lean journey ("SME Corp.," 2010). Under Malaysian-Japan Automotive Cooperation (MAJAICO) program until 2011, a total of 87 companies had participated to get benefits from lean (Chay, 2014). Recently, Malaysian Automotive Institute (MAI) has taken lean initiatives strongly and in broader scale ("Sustainable of Manufacturing," n.d.)

III. METHOD

An interview session was planned with lean experts or experienced in a reputed automotive industry in Malaysia. The industry is in operation for long time and has produced many world class brand vehicles. Their lean journey is worthy of representing the whole Malaysian auto industry. The author contacted with head of HR and explained the subject matter and purpose of the study and selected 16 personnel who were interviewed with the below questionnaires (Table 3.1 and table 3.2). Interviewees are all experienced on lean in the same company, so the homogeneous group was expected to provide reliable information.

Please specify one occupational category that describes you best.	
Production / Maintenance / Marketing / Sales / Finance / Human Resources / Distribution / Information Technology / Industrial engineering / Process Engineering / any other	
Please indicate the duration of your involvement practically with lean.	
<2 years or 2 – 5 years or >5 years	
Which of below best describe your experience with lean?	
Manager – all levels of management or Non-management employee	
Which of the following best describe your organization's lean success? Pls mark X in one	
Best in class (embraced lean as a part of corporate culture)	
Industry average (implemented in some areas of the business)	
Laggard (still learning and/or facing challenges/resistances)	
Failed (have given up the lean journey or stagnated)	

Table 3.1 General questions

	Lean may be													applicable in						with objective(s)												
Sample #	A system	A philoso-phy	A way	A concept	A practice	An approach	A thinking	A program	A manu-facturing paradigm	An enter-prise initiative	A tool	A model	A means	Manufacturing	Service	Production	Shopfloor	Distribution	Entire value stream	Continuous improvement	Eliminate waste	Satisfy customer needs	Create competitive edge	Optimize performance	Reduce required time	Ensure quality	Lower cost	Transform behaviour	Minimize inventories	Improve flow	Increase operational efficiency	Create agility	Use less resource

Table 3.2 Information about lean

IV. RESULT AND DISCUSSION

Based on questionnaire in Table 3.1 the author collected the below information given in Table 4.1. The interviewees from different functional area and different level of experience helped to get a global idea.

Sam-ple #	Occupation category	Experienced lean as	Experience with lean	Perception of company's success in lean
1	Engg/Tech/Maint	Non-management	2 – 5 years	Laggard
2	Engg/Tech/Maint	Non-management	>5 years	Average
3	Finance/Admin	Non-management	2 – 5 years	Failed
4	HR/Training	Manager	2 – 5 years	Average
5	IE	Non-management	<2 years	Failed
6	IT	Manager	<2 years	Laggard
7	Log/Dist/Proc	Non-management	2 – 5 years	Failed
8	Marketing/sales	Manager	2 – 5 years	Average
9	Marketing/sales	Manager	>5 years	Failed
10	Process Engg	Manager	<2 years	Laggard
11	Process Engg	Manager	2 – 5 years	Laggard
12	Production/Ops	Manager	2 – 5 years	Laggard
13	Production/Ops	Non-management	2 – 5 years	Laggard
14	Quality	Manager	>5 years	Average
15	Quality	Non-management	2 – 5 years	Laggard
16	S, H & E	Manager	2 – 5 years	Average

Table 4.1 General information of the interviewees

Based on questionnaire in Table 3.2 the author collected some qualitative data presented in below Table 4.2 and Table 4.3:

Sample #	Lean may be												
	A system	A philosophy	A way	A concept	A practice	An approach	A thinking	A program	A manufacturing paradigm	An enterprise initiative	A tool	A model	A means
1											X		
2					X								
3											X		
4	X												

5													X
6	X												
7												X	
8	X												
9									X				
10										X			
11					X								
12			X										
13			X										
14									X				
15									X				
16		X											
Fre-quency	3	1	2	0	2	0	0	0	3	1	2	1	1

Table 4.2 Information about lean (part 1)

Sample #	Lean is applicable in						with objective (s)												
	Manufacturing	Service	Production	Shopfloor	Distribution	Entire value stream	Continuous improvement	Eliminate waste	Satisfy customer needs	Create competitive edge	Optimize performance	Reduce required time	Ensure quality	Lower cost	Transform behaviour	Minimize inventories	Improve flow	Increase operational efficiency	Create agility	Use less resource
1	X			X				X				X		X						X
2	X		X				X	X				X	X	X			X	X		
3	X	X				X			X	X										X
4	X	X				X	X	X							X				X	
5	X		X					X			X	X	X				X	X		X
6	X		X		X			X				X		X					X	
7					X			X								X	X			X
8	X		X									X					X			
9	X	X	X									X					X		X	
10	X		X					X				X	X		X		X	X	X	X
11	X		X				X	X					X					X		
12	X		X				X	X	X		X	X		X			X	X		X
13	X		X				X	X			X	X						X		
14	X		X	X			X	X	X	X	X		X	X	X	X		X		X
15	X		X					X	X		X		X			X				
16	X		X	X				X						X					X	X
Freq-u ency	15	3	12	3	2	2	6	13	4	2	5	9	6	6	3	3	7	7	5	8

Table 4.3 Information about lean (part 2)

Based on these data, Pareto analysis given below shows most experts consider lean as a system or a manufacturing paradigm (Figure 4.1) while the applicability of lean is pointed, basically in manufacturing (Figure 4.2). The third analysis presented in Figure 4.3 clearly shows that the main objectives are to eliminate waste from processes and reduce required time.

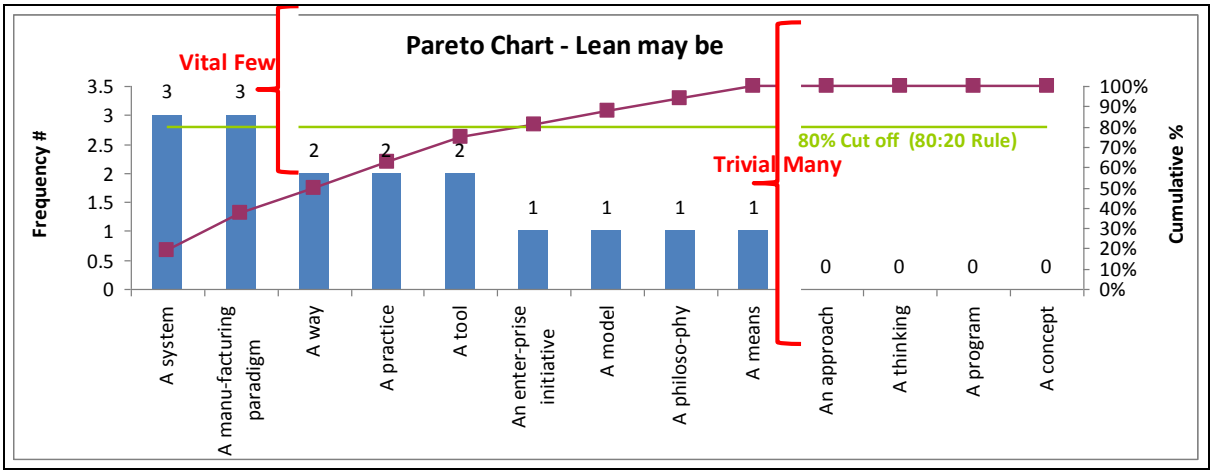

Figure 4.1 Pareto chart for "Lean may be"

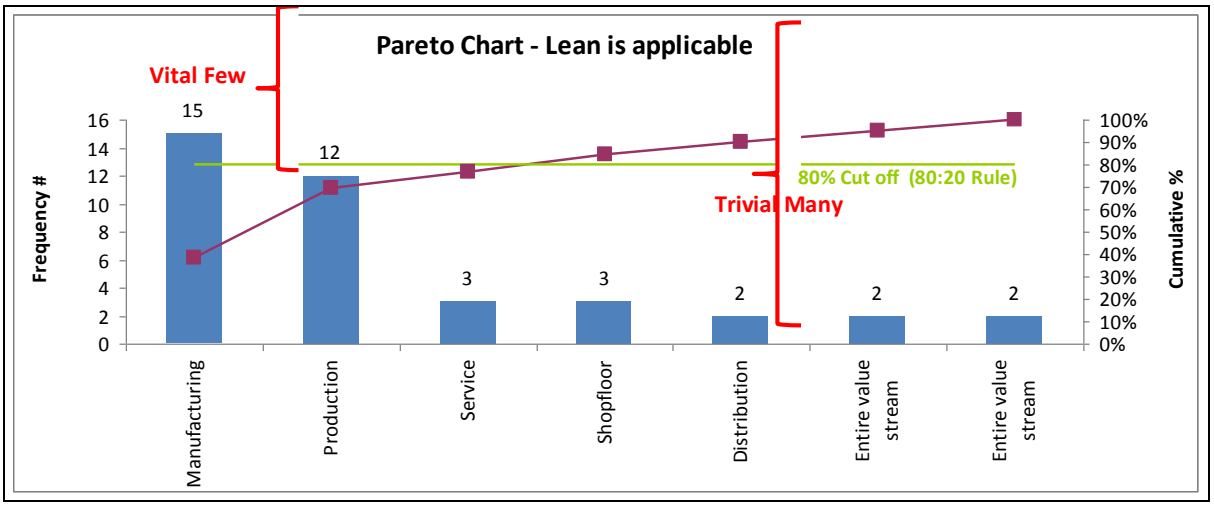

Figure 4.2 Pareto chart for "Lean is applicable in"

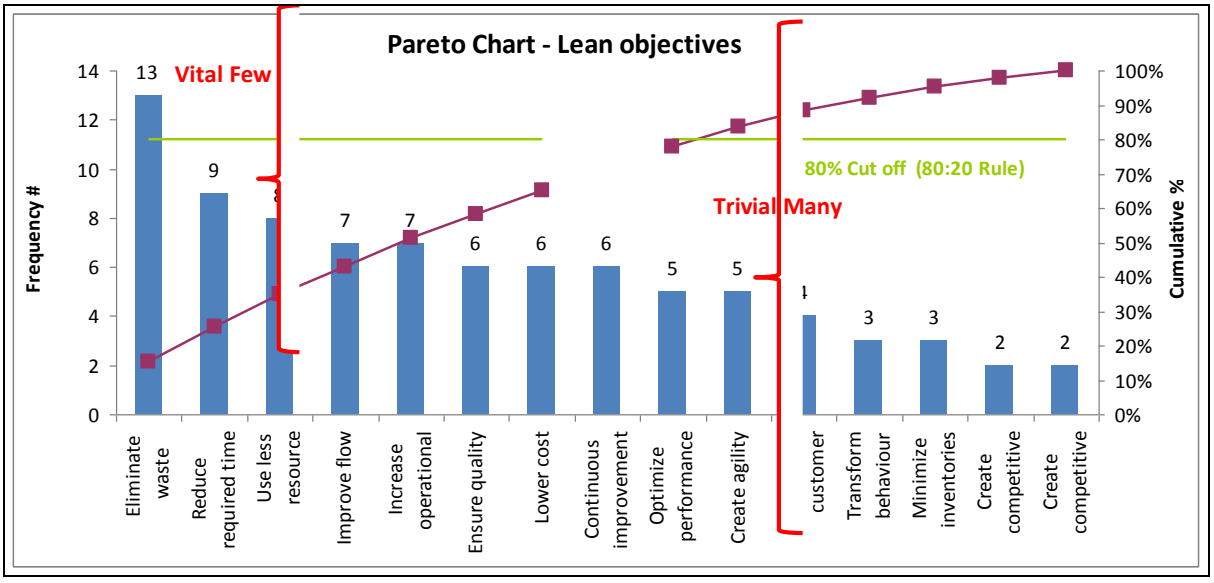

Figure 4.3 Pareto chart for "Lean objectives"

V. CONCLUSION

From the analysis it's evident how hard it is to conclude with an agreement on the definition of lean. Only in context of Malaysian automotive industry, lean may be defined as a manufacturing system to reduce required time by eliminating waste.

VI. ACKNOWLEDGMENT

The authors thank UMP, RDU1703213 for the research grant.

REFERENCES

1. Alves, A.C., Dinis-Carvalho, J. and Sousa, R.M. (2012), "Lean production as promoter of thinkers to achieve companies' agility", The Learning Organization, Vol. 19 No. 3, pp. 219-237.
2. Amin, A. N. M., Mahmood, W. H. W., Kamat, S. R., & Abdullah, I. (2018). Conceptual Framework of Lean Ergonomics for Assembly Process: PDCA Approach. Journal of Engineering and Science Research, 2(1), 51-62.
3. Anvari, Alireza, Yusof Ismail, and Seyed Mohammad Hossein Hojjati. 2011. A study on total quality management and lean manufacturing: Through lean thinking approach. World Applied Sciences Journal 12: 1585–96.
4. Czabke, J. (2007). Lean thinking in the secondary wood products industry: challenges and benefits. Unpublished Master thesis, Oregon State University, Oregon State.
5. De Treville, S. and Antonakis, J. (2006), "Could lean production job design be intrinsically motivating? Contextual, configurational, and levels-of-analysis issues", Journal of Operations Management, Vol. 24 No. 2, pp. 99-123.
6. Fliedner, Gene, and Karl Majeske. 2010. Sustainability: The new lean frontier. Production and Inventory Management Journal 46: 6–13.
7. Hallgren, M. and Olhager, J. (2009), "Lean and agile manufacturing; external and internal drivers and performance outcomes", International Journal of Operations & Production Management, Vol. 29 No. 10, pp. 976-999.
8. Howell, G.A. (1999), "What is lean construction-1999?", Proceedings Seventh Annual Conference of the International Group for Lean Construction, University of California, Berkeley, CA, July 26-28.
9. Hopp, W.P. and Spearman, M.L. (2004), "To pull or not to pull: what is the question?", Manufacturing and Service Operations Management, Vol. 6 No. 2, pp. 133-148.
10. Karlsson, C., & Åhlström, P. (1996). Assessing changes towards lean production. International Journal of Operations & Production Management, 16(2), 24-41.
11. Krafcik, J.F. (1988), "Triumph of the lean production system", Sloan Management Review, Vol. 30 No. 1, pp. 41-52.
12. Liker, J.K. and Wu, Y.C. (2000), "Japanese automakers, US suppliers and supply-chain superiority", Sloan Management Review, Vol. 42 No. 1, pp. 81-93.
13. MIT (2000), "Transitioning to a lean enterprise: a guide for leaders", 1/2/3, available at: http://lean.mit.edu/Products/TTL/TTL-vol1.pdf (accessed December 3, 2012).
14. Modi, D. B., & Thakkar, H. (2014). Lean thinking: reduction of waste, lead time, cost through lean manufacturing tools and technique. International Journal of Emerging Technology and Advanced Engineering, 4(3), 339-334.
15. Naylor, J.B., Naim, M.M. and Berry, D. (1999), "Leagility: integrating the lean and agilemanufacturing paradigms in the total supply chain", International Journal of Production Economics, Vol. 62 No. 1, pp. 107-118.
16. Pettersen, J. (2009). Defining lean production: some conceptual and practical issues. The TQM Journal, 21(2), 127-142. Retrieved from https://en.oxforddictionaries.com/definition/lean
17. Rothstein, J.S. (2004), "Creating lean industrial relations: general motors in Silao, Mexico", Competition and Change, Vol. 8 No. 3, pp. 203-221.
18. Sahari, M. M. (2015). Malaysia Automotive Industry Review & Insight 2014 / 2015 [PDF file]
19. Scherrer-Rathje, M., Boyle, T. A., & Deflorin, P. (2009). Lean, take two! Reflections from the second attempt at lean implementation. Business horizons, 52(1), 79-88.
20. Seth, D. and Gupta, V. (2005), "Application of value stream mapping for lean operations and cycle time reduction: an Indian case study", Production Planning & Control, Vol. 16 No. 1, pp. 44-59.
21. Shah, R. and Ward, P.T. (2007), "Defining and developing measures of lean production", Journal of Operations Management, Vol. 25 No. 1, pp. 785-805.
22. Shah, R., & Ward, P. T. (2003). Lean manufacturing: context, practice bundles, and performance. Journal of operations management, 21(2), 129-149.
23. Singh, R. (1998), "Lean manufacturing: changing paradigms in product manufacturing, design & supply", The Third International Conference on Quality Management, available at: www.qmconf.com/Docs/singh98.pdf (accessed January 20, 2012).
24. Simpson, D.F. and Power, D.J. (2005), "Use the supply relationship to develop lean and green suppliers", Supply Chain Management: An International Journal, Vol. 10 No. 1, pp. 60- 68.
25. SME Corp. 2010. SME Annual Report 2009/10. Retrieved from http://www.smecorp.gov.my/index.php/my/sme-annual-report/book/2/Array
26. Storch, R.L. and Lim, S. (1999), "Improving flow to achieve lean manufacturing in shipbuilding", Production Planning & Control, Vol. 10 No. 2, pp. 127-137.
27. Sultana, M., & Ibrahim, K. A. (2014). Challenges and Opportunities for Malaysian Automotive Industry. American International Journal of Contemporary Research, 4(9), 175-182.
28. "Sustainable of Manufacturing with Lean Production System and Automotive Supplier Excellence Programme" [PDF file].
29. Taj, S. and Morosan, C. (2011), "The impact of lean operations on the Chinese manufacturing performance", Journal of Manufacturing Technology Management, Vol. 22 No. 2, pp. 223- 240.
30. Trienekens, J. H., & Omta, S. W. F. (Eds.). (2002). Paradoxes in Food Chains and Networks: Proceedings of the Fifth International Conference on Chain and Network Management in Agribusiness and the Food Industry (Noordwijk, 6-8 June 2002). Wageningen Academic Pub.
31. Womack, J. P., Womack, J. P., Jones, D. T., & Roos, D. (1990). Machine that changed the world. Simon and Schuster.
32. Womack, J.P. and Jones, D.T. (1994), "From lean production to the lean enterprise", Harvard Business Review, Vol. 72 No. 2, pp. 93-103.
33. Worley, J. (2004), "The role of socio-cultural factors in a lean manufacturing implementation", unpublished master thesis, Oregon State University, Corvallis, OH.