

A framework for managing change in lean manufacturing implementation

Norani Nordin,

Department of Technology Management,
College of Business, Universiti Utara Malaysia

Baba Md Deros, Dzuraidah Abdul Wahab, Mohd Nizam Ab. Rahman

Department of Mechanical and Materials Engineering,
Faculty of Engineering and Built Environment,
Universiti Kebangsaan Malaysia

Abstract:

Lean manufacturing is a proven approach for success in manufacturing industry. However, several organisations failed in their attempt to implement lean manufacturing system. The transition to lean manufacturing requires radical change which involves a total reshaping of purpose, system and culture of the organisation. The purpose of this paper is to develop a framework that could assist a manufacturing firm to implement lean manufacturing system successfully. The insights of literature and multiple case studies are combined to develop the organisational change framework. Leadership and direction, and change agent system found to be the most critical factors in managing change to lean manufacturing. Furthermore, the smooth transition also requires effective communication, workers' empowerment and lean review system. Failure in recognising the required organisational change factors to be adapted in lean transition may hinder the long-term benefits of the company.

Keywords:

Lean manufacturing, organisational change framework, multiple case studies

1. Introduction

Lean manufacturing has become a widely acceptable and adoptable best manufacturing practice across countries and industries. The ultimate goal of a lean organisation is to create a smooth, high quality organisation that is able to produce finished products at the rate of customer demands with no waste. However, in reality, many organisations are not able to transform themselves to lean manufacturing organisations towards creating world-class companies. Transformation towards the lean manufacturing is full with formidable challenges. It is reported that many of lean manufacturing implementations, even those undertaken with the best intention, are often destined to a failure at some point of their implementations [1, 2].

In truth, lean manufacturing should be implemented comprehensively and holistically in terms of scope and content [3]. Many researchers have argued that the transition from traditional to lean environment requires cultural change in the organisation rather changing the manufacturing or technical issues [4, 5]. The transformations to lean manufacturing usually involved a radical change in structure, strategy and technical side of an organisation [6]. A clear understanding in managing these changes is required to ensure successful lean transformation. Many reported literatures have discussed the lean manufacturing transformation in great details but very few has discussed it in the perspective of organisational change management issues.

However, many of the studies on lean manufacturing implementation or transformation are not explicitly framing the relationship between organisational change management issues and lean manufacturing implementation. There are some reported studies that have developed some lean implementation models [7-9], but many of them only focuses on technical elements of the implementation. Very few researches focus on the people change management issues or dimensions that may affect lean manufacturing implementation [2, 6].

The change from traditional manufacturing system to lean manufacturing system is a radical process and not an easy task [6, 10]. Lean manufacturing represent a holistic approach to change. In order to create the foundation for lean manufacturing to take hold, a significant organisational change must occur within the organisation. According to Narang *et al.* [11], the process of lean transition requires significant changes in the functions of the company. In the analysis of managing the change towards a lean enterprise mentioned by Smeds *et al.* [6], lean transition requires emergent strategy. This emergent strategy emerges when the environment of the organisation becomes recognised and legitimised. Among all the emergent change approaches, Kotter's model is said to have a long standing high reputation that has flexibility to deal with vast numbers of problems and issues that may be experienced during change [12]. Kotter's model proposes eight steps for successful organisational change as shown on Table 1.

Table 1: Kotter's Eight-steps model [13]

Kotter's eight steps to successful change	
Step 1	Establishing a sense of urgency.
Step 2	Creating a guiding coalition.
Step 3	Developing a vision and strategy.
Step 4	Communicating the change vision.
Step 5	Empowering broad-based action.
Step 6	Generating short-term wins.
Step 7	Consolidating gains and producing more change
Step 8	Anchoring new approached in the culture.

Lean manufacturing involves changing and improving process. Changes that requires in lean manufacturing can be divided into four categories as suggested by Cao *et al.* [14]. Table 2 shows the changes requires during the transition to lean manufacturing. In order to success, there are prerequisites to the transition of lean manufacturing. Leadership and management commitment is the most critical success factors in lean manufacturing followed by communication, team development, cultural readiness and employee autonomy. Transformation to lean manufacturing system can fail if the relationship between organisational changes is not fully understood. To stay competitive in today's global manufacturing environment, companies must develop a systematic change process and plan to support lean manufacturing implementation.

Table 2: Organisational Changes Required In Lean Manufacturing

Categories in organisational change	Changes in lean manufacturing	Authors
Changes in process	Application of the full set of lean tools, multi-skilled worker	[15, 16]
Changes in function, co-ordination and control	Teamwork building, cross-functional movement, network relationship with suppliers and customers, information transparency, participative management, teamwork rewarding	[16-19]
Changes in values and human behaviour	teamwork, open communication and information sharing, continuous improvement culture, knowledge learning and sharing,	[16-18]
Changes in power within the organisation	Decentralised responsibilities, autonomous leadership,	[20]

The aim of this paper is to examine how to change an ordinary manufacturing system to a lean manufacturing firm. The paper also presented a practical organisational change framework in lean manufacturing implementation by combining the findings from literature and multiple case studies conducted. The key steps for successful lean transition are assessing readiness for change, leadership and direction, change agent system, effective communication, workers empowerment, and anchoring the change by system and controls.

2. Research Method

This study used qualitative research method involving multiple case studies of three Malaysian automotive component manufacturing firms. These three companies were selected based on their willingness to participate and experience in implementing lean initiatives. Therefore the results from these case studies do not represent the actual overall situation of Malaysian automotive industry.

The authors prepared the data collection by first contacted each company to be studied to gain their cooperation, explained the purpose of the study, and record the key contact information. A semi-structured interview guide was developed upon a common case study protocol inferred from the review of literature, and quantitative survey done prior to the case study. The interview protocol was developed to probe the organisational change elements that influence the lean implementation process in Malaysian automotive companies. To improve the research reliability, the same interview protocol was used to different interviewees for triangulation purposes. The need for triangulation arises from the ethical need to confirm the validity of the data obtained.

The interview subjects are questioned with regard to their actual experiences. For consistency in the data and its interpretation, the interview structure was provided. The interviews were conducted for approximately two hours for each respondent. They involved key personnel in the company that directly involved in implementation of lean manufacturing. Table 3 summarised the respondent and company background of the case study involved. The interview data were analysed using NVivo 8 program. The themes discovered in the analysis mirrored the study questions. The themes occurred through coding in the program and they include change readiness, leadership and management support, effective communication, review system, team development, change agent system and workers' empowerment.

Table 3: Summary of The Case Companies' Respondent

	Company A	Company B	Company C
Position	Manager – TQM Department	Manager – Manufacturing & Production Department	Manager – Production Control & Lean Production System
Tenure at position (years)	18	5	9

A plant tour was requested to all companies visited. During the tour, the lean activities involved were showed and explained in detail. Whenever possible, the observation was made on the organisational change elements that occurred in the transition to lean manufacturing system. The information gathered was written down in a log book with the summary from the interviews. The purpose of these observations was primarily to verify the information collected from interviews

3. Result and Discussion

The analysis of the case companies yielded interesting results. As can be seen, the three companies have different experiences compared to each other. Table 2 presents the summary of the case companies' background involved in the study.

Table 4: Summary of the Case Companies' Background

	Company A	Company B	Company C
Type of product	Electronics	Metal	Electrical
Company age (years)	27	11	31
Company ownership	Foreign	Local	Joint Venture
Company size	Large (>150 employee)	Large (>150 employee)	Large (>150 employee)
Lean effort	1996 (1 st attempt), 2002 (2 nd attempt)	2004 (1 st attempt), 2007 (2 nd attempt)	Aug 2009
Lean status	Lean firm	In transition	Beginner

The three companies involved in the study are categorised as automotive industry but manufactured different automotive components. Company A and C can be classified as old companies as they were established more than 20 years compared to Company B, which is only 11 years of incorporation. Company A is owned by a Japanese corporation headquarter in Japan, whilst Company B is locally owned. Company C is a joint venture company with a Japanese company. All the three companies are grouped as large companies with the number of employees more than 150. Regarding lean manufacturing implementation, Company A and B had been unsuccessful in the first lean

attempt. However, for Company A, after some changes made in the second lean attempt since 2002, the company is successful in implementing lean manufacturing. Whereas, for Company B, since reenergize its lean attempt in 2007 with the assistance of one government agency, the company has shown some progress in its lean implementation. On the other hand, Company C had just started its journey to lean. As a beginner and first timer, Company C faced lots of problems and crises but determined to the pursuit of lean firm.

In order to create the foundation for lean manufacturing to take hold, a significant organisational change must occur within the organisation. This raises key questions: How the company change to lean manufacturing system? How organisational change factors assist these companies to lean manufacturing system smoothly? In order to establish the organisational change framework that support the smooth transition to lean manufacturing system, a cross case analysis was performed upon data obtained from each of the case companies. The findings were discussed based on Kotter's 8 Change Model. Table 5 summarizes the case studies and show the organisational change elements within the Kotter's Change Model during lean transition.

Table 5: Summary of the case studies results

Change Process step	Company A	Company B	Company C
Increase urgency for change	+	+	+
Built a team for the change	+	+	+
Construct the vision	+	+/-	+/-
Communicate	+	+/- (only to selective level)	+/- (only to selective level)
Empower	+	+/-	+
Create short-term wins	+	+/-	+
Be persistent	+	+/-	+/-
Make the change permanent	+	+/-	+/-

Notes: + High; +/- Middle; - Low

The cross-comparison among the case studies shows that all the case companies in certain extent follow Kotter's 8-step model in managing the change during lean transition. Apparently, Company A has much more positive experience than Company B and Company C. All the case companies indicate a readiness to change by establishing the urgency for change especially among management levels. The management of the companies managed to convince the employees by spending time in lean promotion. Thus, the workers are ready to accept the new changes. All the case companies developed a team in order to spread the motivation for change and ensure the translation of lean principles can be understood by all people in the company. This view is further supported by the study done by Tracey and Flinchbaugh [21] that suggests in order to assist the lean transformation, organisations should devise a change agent system, which could be lean steering committee, lean promotion office, or direct leadership model. All respondent companies claimed that their top management are very supportive to the lean manufacturing implementation especially in Company A. The role of leadership and management is critical in the conversion to lean. During the transition to lean manufacturing system, the manager should give clear directions and detail activities to respective departments.

Successful implementation of lean manufacturing requires announcing, explaining and preparing people for change and the effects of the impending change especially in the early stage to become lean [22, 23]. Company A has managed to ensure the lean manufacturing concept is conveyed to the entire company. They disseminate the lean information and get feedback from Monday morning meeting or Asaichi meeting for manufacturing department, weekly management meeting between middle management and operators, bulletin boards, monthly newsletter and frequent meeting with union. However, for Company B and C, the lean communication process is only revolved among managerial level and supervisors. The next step is workers empowerment. Appropriate training on concept and basic principles, and reasons of lean could give greater level of understanding of lean and encourage motivation and innovation in the work culture and employees attitudes. Among all the three respondent companies, Company A has a well developed lean training program compared to Company B and C. This reward system is important in motivating employees to the new changes and sustains it. Generating short-term wins is crucial. Company A and C had conducted some initial lean projects which was conducted by the lean team. The purpose of these projects was to show some visible achievement of lean implementation in order to gain support and motivation to the lean team,

management and also operators. When the change management process has been successful, the company typically absorbs the change. To sustain the changes made, persistence is very important. Sustainability can be done by consolidating gains and producing more change. Especially in Company A, monthly follow up meetings and frequent practical training on lean tools and practices were performed. In addition, all the case companies also have a rewarding system scheme but only concentrated on kaizen activities. This scheme could motivate the workers to engage and contribute ideas in lean activities. To anchor the change within the organisation, workers involvements in lean activities as a team is important to create the sense of ownership.

4. Conclusion and Future Research

Based on the insights that have been identified through the cross-case comparison discussed in previous sections, the Organisational Change Framework in lean manufacturing implementation has been developed. The framework is adapted from Kotter's Eight-steps model. The organisational change framework is developed by using the model proposed by Oakland and Tanner [24]. The proposed change framework has two interacting cycles: readiness for change, and implementing change as shown in Figure 1.

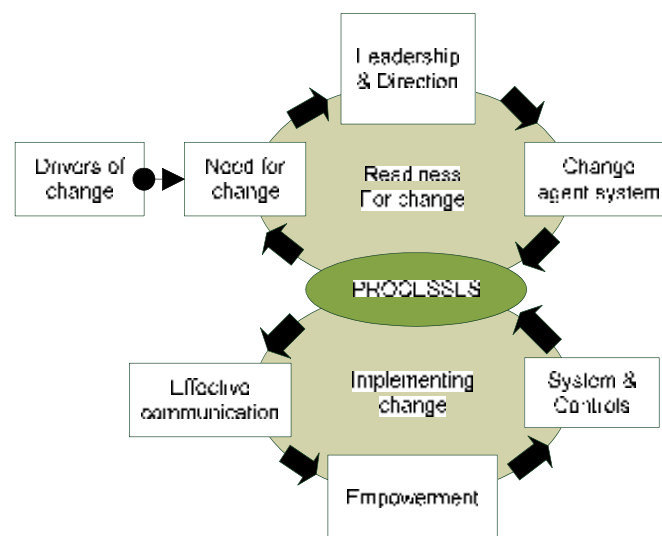


Figure 1: Organisational Change Framework in Lean Manufacturing Implementation

The pressure to change to lean manufacturing system needs to be first identified. The reasons could be of domestic or international market pressures for competitive products that drive the change. For the change to take hold and success, the organisation and the people who work in that organisation must be ready for the transformation. Failure to assess in organisational and individual changes may results spending of significant time, energy and hard work. The Readiness for Change can be addressed by identifying and understanding the need for change, having clear and consistent leadership and direction, and creating a strong change agent team as shown in Figure 1. It is important that those who lead the change projects should have the skills, competencies and aptitude to implement lean manufacturing. Following clarity on readiness for change, the first step of the organisation should be to take up and implement the lean tools and techniques or Processes. Since lean manufacturing is known as a system, the tools and techniques of this system cannot be adopted in isolation. All the techniques in lean manufacturing are developed is to support the implementation of lean principles and overall organisation's strategy.

The implementation of change is very crucial in lean manufacturing. The implementation of change must be aligned with the operational issues, so that people in the organisation can understand how they will affect and what must be done to address the challenges in the organisation [24]. Effective Communication, Workers Empowerment, System and Control are the essential sources for lean success. By information transparency, knowledge sharing, continuous learning and continual evaluation of lean effort will ensure the smooth transition from traditional management philosophy to lean principles. The ability to quantify the effort and progress towards lean should enable more successful and longer lasting change.

The findings from the case study also show that organisational change should be seen as a dynamic process. Lean manufacturing system is regarded as intended direction, rather than a steady state. Lean process does not answer to a specific problem rather it deals with all problems in the organisation. Lean manufacturing represents a unique culture that grows and improves with time. For the transformation towards lean system, people should have a better understanding about lean and also need to be aware about the change management principles. For successful organisational change towards lean organisation, the critical factors are strong leadership, capable team, and effective communication.

Several limitations exist in this study. First, the organisational change framework was developed from observation done in three automotive manufacturing firms. Second, the interviews were only done with the top management from each company, which may bias the observation. Therefore, generalisation is thus limited, but the study does contribute to the organisational change management in lean organisations. Further research will concentrate on conducting surveys to validate the organisational change framework developed. The framework will hopefully be useful and applicable within the context of Malaysian automotive industry.

Reference

- [1] Farris, J. A., Aken, E. M. V., Doolen, T. L., and Worley, J., "Critical success factors for human resources outcomes in Kaizen event: An empirical study," *International Journal of Production Economics*, vol. 117, pp. 42-65, 2009.
- [2] Liker, J. K. and Hoseus, M., *Toyota Culture: the heart and soul of the Toyota Way*. New York: McGraw-Hill, 2008.
- [3] Crute, V., Ward, Y., Brown, S., and Graves, A., "Implementing lean in aerospace - challenging the assumptions and understanding the challenges," *Technovation*, vol. 23, pp. 917-928, 2003.
- [4] Balle, M., "Lean attitude - Lean application often fail to deliver the expected benefits but could the missing link for successful implementations be attitude?," *Manufacturing Engineer*, vol. 84, pp. 14-19, 2005.
- [5] Sawhney, R. and Chason, S., "Human behavior based exploratory model for successful implementation of lean enterprise in industry," in *Performance Improvement Quarterly*, vol. 18, 2005, pp. 76-96.
- [6] Smeds, R., "Managing change towards lean enterprises," *International Journal of Operation & Production Management*, vol. 14, pp. 66-82, 1994.
- [7] Ahlstrom, P., "Sequences in the implementation of lean production," *European Management Journal*, vol. 16, pp. 327-334, 1998.
- [8] Karlsson, C. and Ahlstrom, P., "Assessing changes towards lean production.," *International Journal of Operation & Production Management*, vol. 16, pp. 24-41, 1996.
- [9] Liker, J. K., *The Toyota Way: 14 management principles from the world's greatest manufacturer*. New York: McGraw-Hill, 2004.
- [10] Ahlstrom, P. and Karlsson, C., "Change processes towards lean production: the role of the management accounting system," *International Journal of Operation & Production Management*, vol. 16, pp. 42-56, 1996.
- [11] Narang, R. V., "Some issues to consider in lean production," *2008 First International Conference on Emerging Trends in Engineering and Technology*, pp. 749-753, 2008.
- [12] Sidorko, P. E., "Transforming library and higher education support services: can change models help?," *Library Management*, vol. 29, pp. 307-318, 2008.
- [13] Kotter, J. P., *Leading Change*. Boston: Harvard Business School Press, 1996.
- [14] Cao, G., Clarke, S., and Lehaney, B., "A systematic view of organisational change and TQM," *The TQM Magazine*, vol. 12, pp. 186-193, 2000.
- [15] James, T., "Wholeness as well leanness," in *IET Manufacturing Engineer*, 2006, pp. 14-17.
- [16] Stewart, D., "Change management in lean implementation," in *Lean Manufacturing: A plant floor guide*, J. Allen, C. Robinson, and D. Stewart, Eds. Michigan: Society of Manufacturing Engineers, 2001, pp. 157-172.
- [17] Real, R., Pralus, M., Pillet, M., and Guizzi, L., "A study of supporting programs for small and medium enterprises: a first stage going to "lean"," in *IEEE IEEM*, 2007, pp. 515-519.
- [18] Motwani, J., "A business process change framework for examining lean manufacturing: a case study," *Industrial Management & Data Systems*, vol. 103, pp. 339-346, 2003.
- [19] Scherrer-Rathje, M., Boyle, T. A., and Deflorin, P., "Lean, take two! Reflections from the second attempt at lean implementation," *Business Horizon*, vol. 52, pp. 79-88, 2009.
- [20] Bamber, L. and Dale, B. G., "Lean production: a study of application in a traditional manufacturing environment," *Production Planning & Control*, vol. 11, pp. 291-298, 2000.

- [21] Tracey, M. T. and Flinchbaugh, J. (2006). HR's role in the lean organizational journey. *WorldatWork Journal* [Online]. 4th quarter 2006, Available: www.worldatwork.org/waw/worldatworkjournal/html/journal-4thQ06.html
- [22] Worley, J. M. and Doolen, T. L., "The role of communication and management support in a lean manufacturing implementation," *Management Decision*, vol. 44, pp. 228-245, 2006.
- [23] Puvanasvaran, P., Megat, H., Hong, T. S., and Muhamad, M. R., "The roles of communication process for an effective lean manufacturing implementation," *Journal of Industrial Engineering and Management*, vol. 2, pp. 128-152, 2009.
- [24] Oakland, J. S. and Tanner, S. J., "A new framework for managing change," *The TQM Magazine*, vol. 19, pp. 572-589, 2007.