International Journal of Engineering Research and General Science Volume 3, Issue 2, March-April, 2015
ISSN 2091-2730

SUCCESSFUL LEAN IMPLEMENTATION: THE SYSTEMATIC AND SIMULTANEOUS CONSIDERATION OF SOFT AND HARD LEAN PRACTICES

Youssef Larteb*, Abdellah Haddout**, Mariam Benhadou***

PHD Student, Team rheology and industrial plastics processing, ENSEM, Casablanca, Morocco

Professor, Team rheology and industrial plastics processing, ENSEM, Casablanca, Morocco

Professor, Team rheology and industrial plastics processing, ENSEM, Casablanca, Morocco

Keywords: Survey, Lean Manufacturing, success factors, Multinational, Morocco.

Abstract: Lean Manufacturing (LM) is a collective term for production practices aimed at increasing value creation and reducing waste in all forms. Although manufacturing facilities worldwide use hard lean practices, negligence of soft lean practices may widely moderate the expected results from the LM implementation. Thus, LM's success comes from both practices that they must be applied simultaneously and systematically. Using LM background, this paper aims to contribute to evaluate the maturity of both soft and hard lean manufacturing practices based on the feedback of LM projects implementation in various multinationals based in Morocco. The results revealed that the fundamentals hard lean practices are more extensively used than soft lean practices. Examining the soft lean practices implementation investigated through five logical clusters of relevant LM fundamentals, the study results depict that employee development and communication systems are less embraced and considered. Investigating what makes LM successful in a Moroccan context, top management engagement, allocation of time and resources for improvement projects, strong management's leadership, and employees' development program are voted to be the top four success factors. Through the critical lean practices and factors of success, the results of this study are used to identify directions for proposing solutions for LM implementation in the Moroccan SMEs.

Introduction

LM is an integrated and interdependent system involving many elements: the tools, the philosophy and management [48]. LM is underlined by a philosophy of continual productivity and quality improvement in the pursuit of excellence in all phases of the industrial cycle [74]. Referring to the Toyota Production System (TPS), manufacturing firms have been trying to duplicate this manufacturing system for over two decades, often under different names, e.g. total enterprise manufacturing, and world-class manufacturing. However, LM deployment, like every other organizational strategies and managerial actions, can lead to failure than to success. In fact, despite the acute awareness of LM and its purported benefits, its implementation has been relatively slow and in an ad hoc fashion [31] and several companies failed to achieve a superior performance through LM [48]. Likewise, only few manufactures have managed to imitate Toyota successfully, even though the company has been extraordinarily open about its practices. Given that largest multinationals as large organizations are generally considered to be leaders and with more success chances in LM implementation, an investigation of the status of lean practices implementation, success factors and pitfalls on the lean pathway in these companies proves very important. Thus, the main objective of this study is to explore the status of lean practices in multinational facilities based in Morocco. The status aims to discover is the implementation success, problems/barriers, and the assumption of specifics success factors role.

The remainder of this article is organized as follows: First, we present an overview of the literature and related theory of LM. Next, we describe the data, sample, and measures in Section 3. Results are analyzed in the same Section. We conclude in Section 4 and highlight future work.

Literature review

Lean Manufacturing

LM is interpreted as a managerial system that integrates specific practices and techniques to reduce internal and external process variability, also called "Muda", recognized as the principal source of production problems [11]. Especially, LM practices are internal tools for creating a streamlined, high quality system that produces finished products at the pace of customer demand with little or no waste [68]. LM is expected to reduce manufacturing costs continuously through better quality, lower inventory, and shorter lead times. Achieving these results requires an even production flow of small lot size incorporating schedule stability, product quality, short setup times, preventive maintenance, and efficient process layout [38].

Unfortunately, there is no major consensus about a set of LM techniques in the literature reviews. [64] state that there are over 100 lean tools available in the literature reviews and there is no way systematically to link manufacturing organization problems and the possible tools to eradicate these problems. This is not very surprising because these literature reviews are based mainly on case studies, mathematical models and conceptual studies in LM [43]. For example, [68] identify twenty two LM practices and categorized them into four clusters that are: 1) Just-in-Time, 2) Total Quality Management, 3) Total Preventive Management, and 4) Human resource. For [53], there are twenty LM practices that are frequently mentioned in literatures and categorized them into six bundles associated with: 1) Just-in-time, 2) Continuous improvement, 3) Quality, 4) Eliminating of waste, 5) People management, 6) and Visual management. Some other researches also categorized the lean tools and techniques according to the area of implementation such as internally and externally oriented lean practices. For example, [63] divided the lean practices into six areas which are: 1) Process and equipment, 2) Manufacturing, 3) Planning and control human resources, 4) product Design, 5) Supplier relationship, 6) and Customer relationship. For [56], companies should lead to LM implementation in five dimensions that are: 1) Elimination of waste, 2) Continuous improvement, 3) Continuous flow and Pull-driven systems, 4) Multifunctional teams, 5) Information systems. More, in their research about implementation of LM in small sized enterprises, [58], elaborate a list of thirty seven suitable and recommendable methods and instruments to implement LM and divided them into 5 major clusters: 1) Machinery and equipment, 2) Material flow and layout, 3) Organization and staff, 4) Production planning and control, and 5) Quality. Thus, there is a wide range of LM practices available to companies for quality and efficiency improvement. Even so, the selection of appropriate lean tools for manufacturing improvement, together with their applicability, incorporation and acceptance within operations remains the major problem for any company [37].

Nevertheless, among the interesting approaches in the study of LM implementation, are those who classify the LM as a multidimensional concept that classify practices as hard or soft. Soft practices emphasize the organizational and human side in operations, quality, and performance management. On the other hand, the hard practices concern more the methodological and technical side of the LM as preventive maintenance, cellular manufacturing, continuous flow, reduced lot sizes, quick changeover times, and kanban [76]. According to [11], and in line with previous studies, technical and analytical tools introduced to a firm to improve production systems represent hard practices while practices related to principles, managerial concepts, people, and relations are soft.

Unfortunately, despite authors empirically showed that the hard part of the LM implementation is a strong predictor of manufacturing performance improvements, soft practices are crucial for achieving superior performance through LM [11]. More, the efficacy of hard practices is especially magnified when they are coherently accompanied by intangible and soft practices linked to human resource management (HRM), performance management, management leadership and support, and customer and supplier involvement. Thus, the successful use of LM practices requires more than use of hard practices (hard side), and to be able to transform the entire organization into a lean organization, the soft practices (soft side) must be implemented at all company levels [50]. In other words, as LM is an integrated socio-technical system, success comes from these two sides being applied simultaneously and systematically.

Lean manufacturing, risks and success factors

If lean practices have been shown to improve performance and drive efficiency [5], existence of specific factors in all plants successfully implemented LM has been shown too. Unfortunately, although certain success factors are suggested by different authors and many scholars have attempted to formalize the critical factors for successful LM implementation, there is actually no consensus on what the main success factors are in the literature reviews [57]. For example, according to [32], the success of LM implementation

depends on seven critical factors that are: 1) personalized demarche, 2) top management commitment, 3) allocation of resources, 4) strong communication, 5) structural methodology, 6) multifunctional teams, and 7) continuous performance measurement. For [50], the success of LM implementation depends on four critical factors: 1) leadership and management, 2) finance, 3) skills and expertise, and 4) supportive organizational culture. Too, [53] depicts that LM implementation success depends on four critical factors: 1) personalized demarche, 2) top management commitment, 3) problem solving culture, and 4) the team work. Also, [26] argument that there are four key factors for success in the implementation of a lean effort: 1) Preparation and motivation of people, 2) roles in the change process, 3) methodologies for change, and 4) environment for change. Likewise, in his research on the relationships between firm's practices and performance, [11] confirms that plants successfully implement LM are characterized by a specific organizational profile and extensively adopt soft LM practices. Consequently, it is the integration of soft practices and development of a lean culture, which in a positive case facilitates the achievement of LM promises regarding organizational benefits and customer satisfaction.

Research design and data analysis

Research design, sample selection, and analysis approach

The empirical research took place beginning of 2015. The data was captured through a survey covering various multinationals based in Morocco whose production processes related to automotive and aeronautic manufacturing. In absence of an official database related to multinationals based in morocco, the sample selection is completely random. Even so, we have selected the largest multinationals as large organizations are generally considered to be leaders and with more success chances in LM implementation [68], [10], [25], [58]. A questionnaire was developed and sent via electronic and regular mails. Emails, phone and direct contact were utilized in effort of collecting information. The survey questionnaire items were developed based on LM background. The survey questionnaire was split into the following categories with several or more questions in each category to determine:

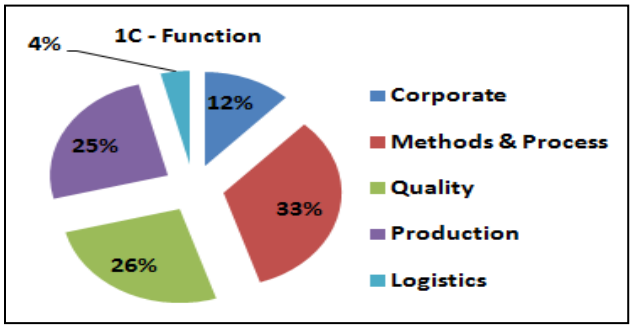
Adoption of lean hard practices,

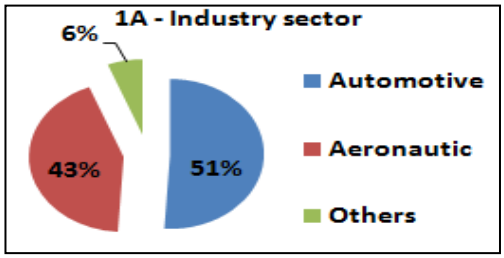
Integration of lean soft practices,

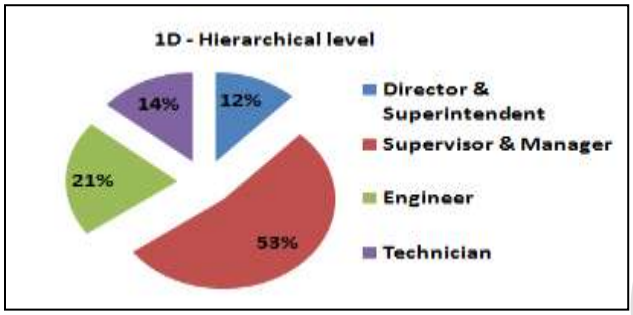
Critical success factors for sustainable lean implementation in a Moroccan context.

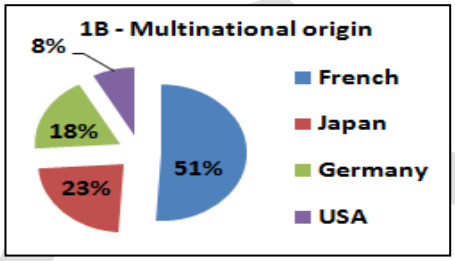
Data analysis & results

In total, 52 questionnaires have been returned, of which none had to be discarded because of insufficient data, with 32% as response rate. Graphs (1A, 1B, 1C, 1D) provide an overview of the responses by sector, by multinational origin, by function, and by hierarchical level of respondents



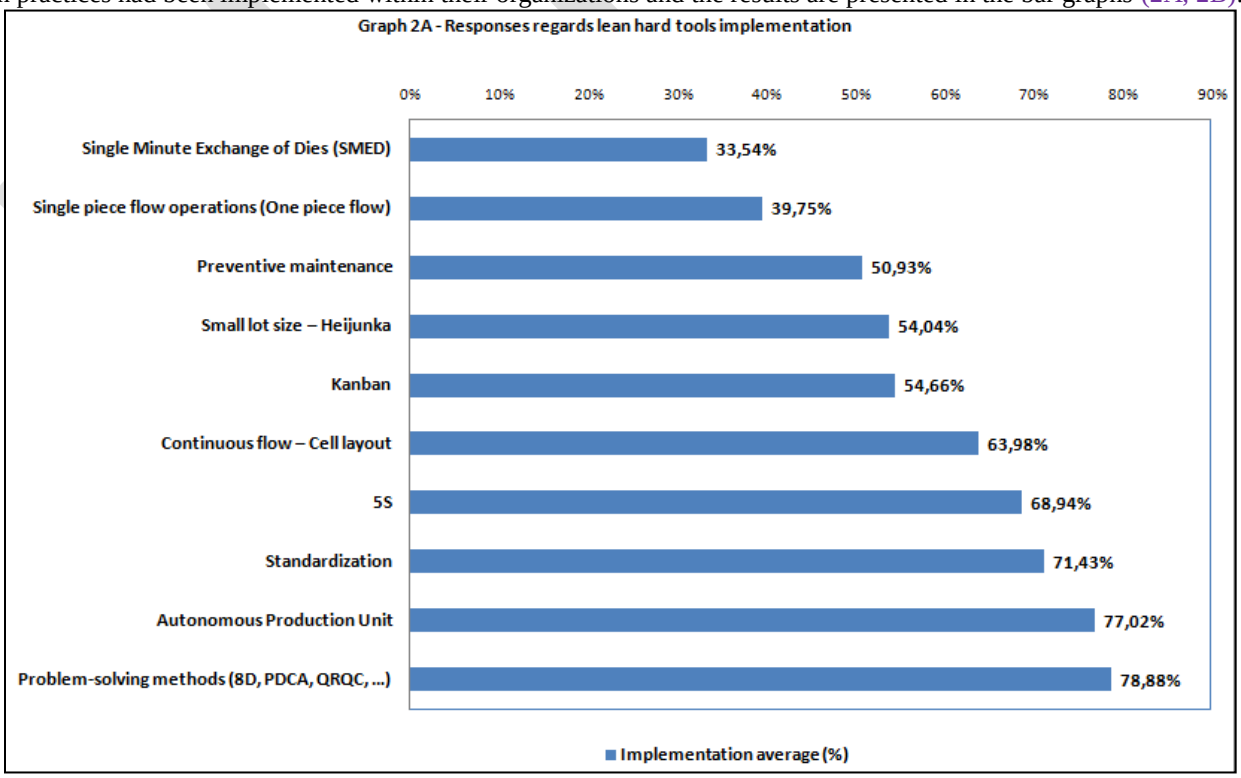


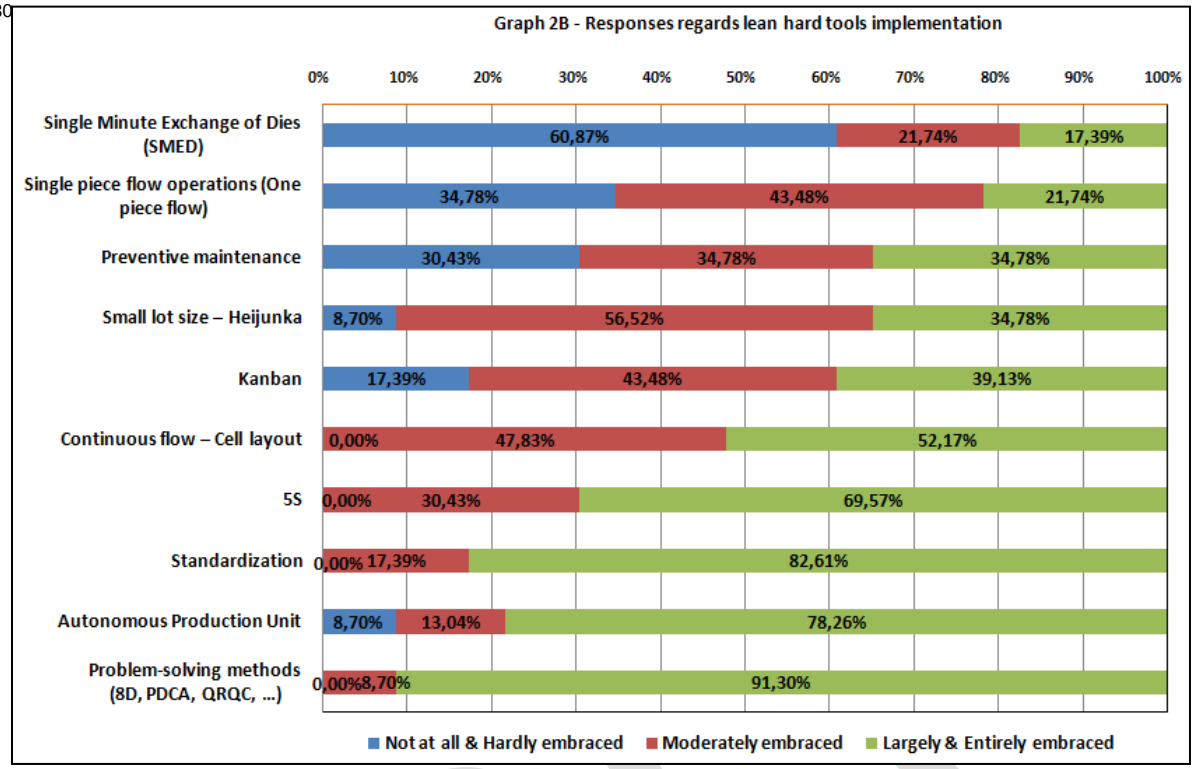




The responses are fairly evenly divided over the targeted sectors, the automotive sector make up exactly half of the responses (51%). The majority of the respondents to the survey were upper or middle management who were likely to have a good overview of LM practices maturity because of their daily involvement in production and planning processes. Regarding functions and hierarchical level, manager level make up half of the responses (53%), and 21% are engineer. Finally, 51% of factories are French, 23% Japanese, 18% German, and 8% American.

First we analyzed the usage of lean hard practices. The questions were created on the basis of the literature review [68], [45], [24], [11], [10], [72], [53], [66], [40], [75], [48]. A comparison of number of empirical studies on LM leads to the identification of 10 practices that are frequently cited as hard lean practices. Unsurprisingly, the entire organizations were investigated, the fundamentals hard lean practices had been implemented within their organizations and the results are presented in the bar graphs (2A, 2B).

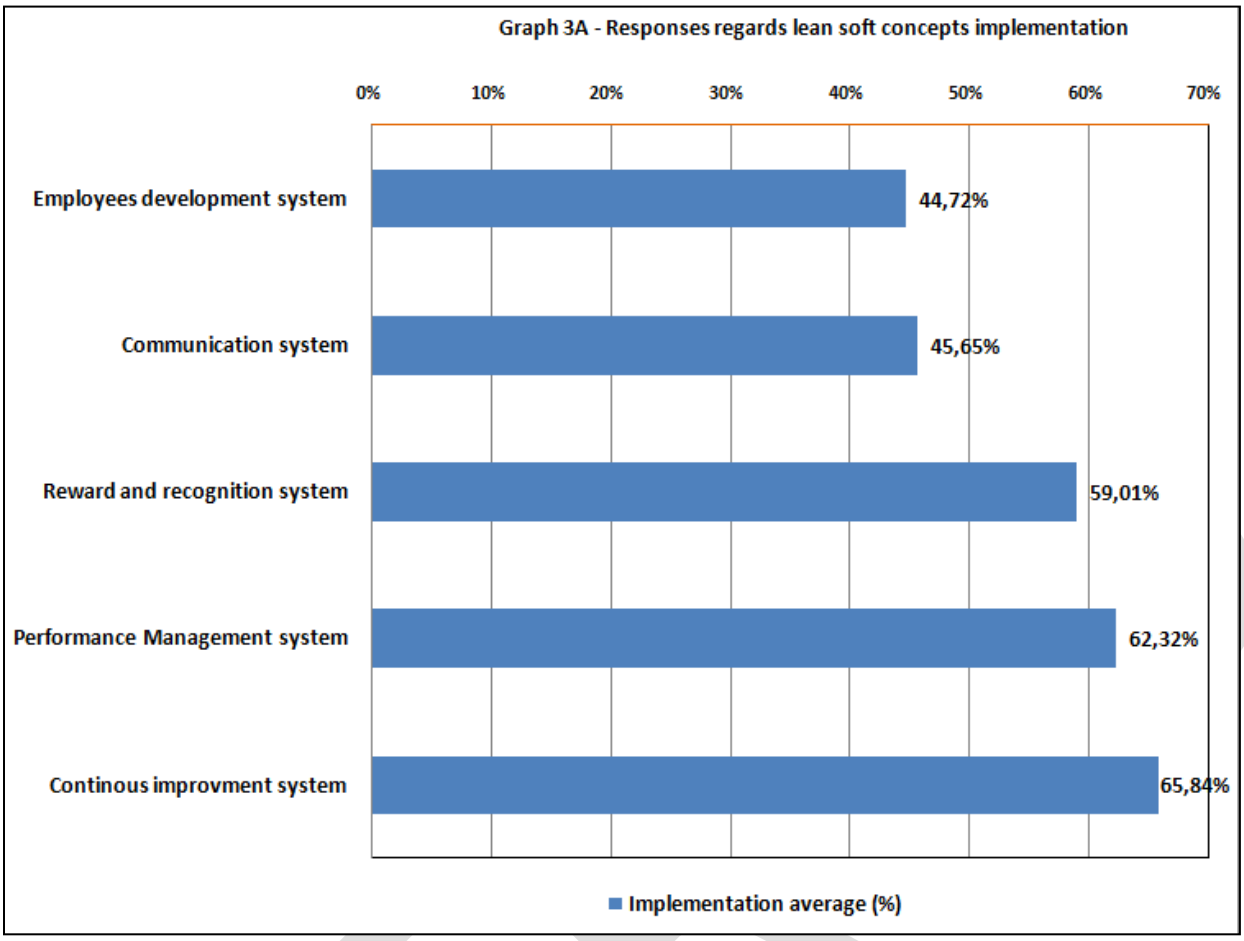


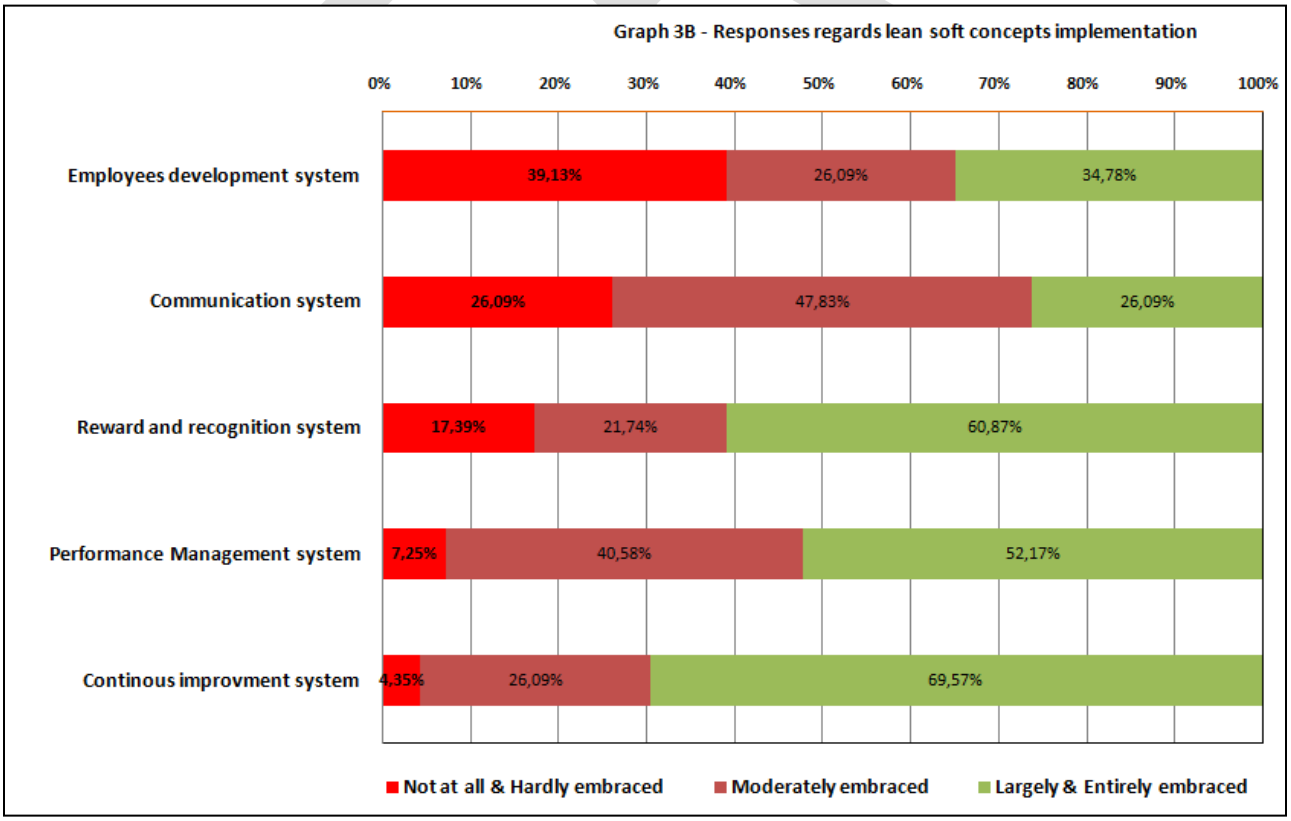


The top tools which are slightly used are the SMED (33.54%), and the one piece flow (39.75%). SMED is one of the most initiatives for set-up reduction time have been associated with Shigeo Shingo's "Single Minute Exchange of Die" methodology [30]. The application of Shingo's methodology usually results into two main benefits: increasing manufacturing capacity and improving the equipment flexibility [13]. Improvement projects based on SMED involve the process identification and changeover analysis as well as the training of the improvement team. Training and motivation can be considered as the major drivers in successfully SMED projects [34]. Such training can facilitate success when it is provided to both the SMED team and the shop floor staff involved with the implementation. This training can reduce staff hesitation and fears arising from misunderstanding.

One piece flow refers to the concept of moving one workpiece at a time between operations within a workcell. One piece flow has many benefits. It encourages work balance, better quality and a host of internal improvements. Unfortunately, the explanation for the finding of low respect of one piece flow in our study is that LM and quality approaches require a fundamentally different philosophy of thinking than the traditional mass production approach. This result can be considered a consequence of difficulty for managers to discern the lean philosophy and to assimilate the benefits of one piece flow implementation. If the leaders don't understand and believe in one piece flow enough to take the time to remove resistance in shop floor through training and strong communication, just-in-time is less likely to be embraced and the miraculous gains in performance through LM are less likely to be reached.

Next, usually using descriptive statistics, we analyzed the lean soft elements integrated in the management processes within the various companies investigated. Twelve specific questions were formulated on the basis of the literature review to investigate about lean soft elements status [68], [27], [20], [7], [72], [58], [18], [52], [32], [75], [48], [49], [61], [24], [22], [23], [57]. These elements were grouped into five logical clusters of significant lean soft fundamentals that are "Communication", "Employee development system", "Continuous improvement system", "Valorization & rewards system", and "Performance management system".

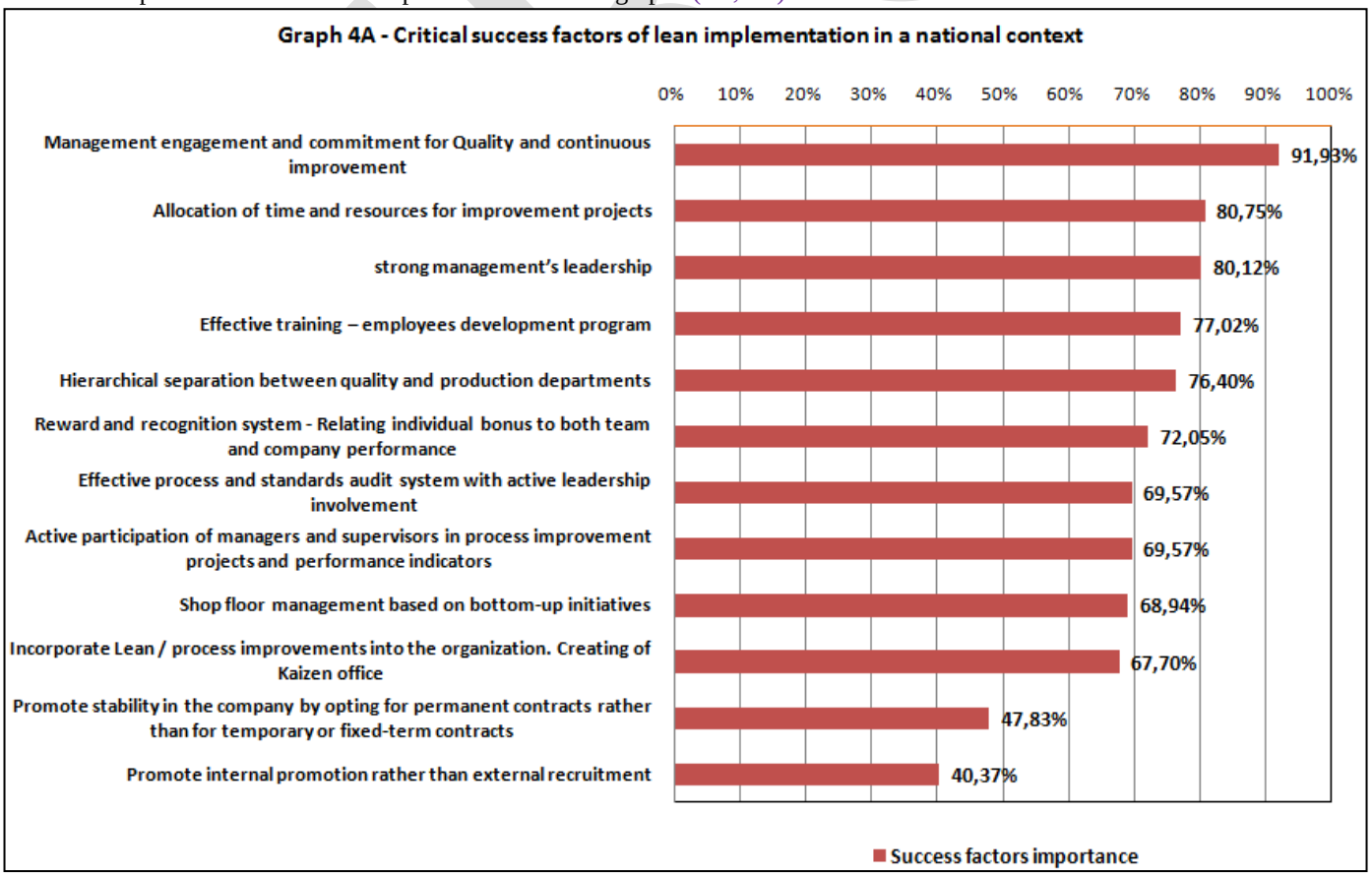

Graph 3A - Responses regards lean soft concepts implementation
0%
10%
20%
30%
40%
50%
60%
70%
Employees development system
44,72%
Communication system
45,65%
Reward and recognition system
59,01%
Performance Management system
62,32%
Continous improvment system
65,84%
Implementation average (%)

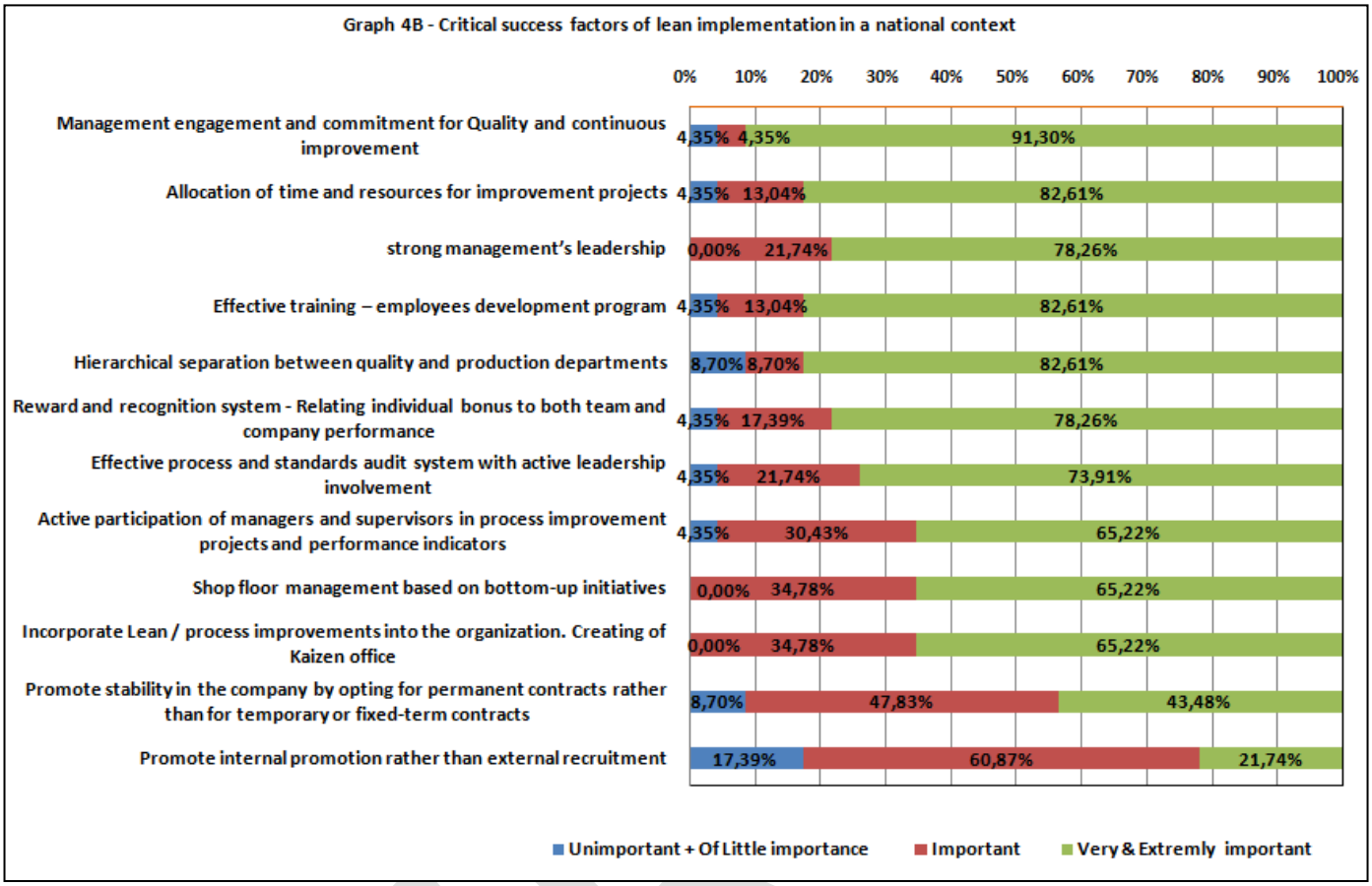

Graph 3B - Responses regards lean soft concepts implementation
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Employees development system
39,13%
26,09%
34,78%
Communication system
26,09%
47,83%
26,09%
Reward and recognition system
17,39%
21,74%
60,87%
Performance Management system
7,25%
40,58%
52,17%
Continous improvment system
4,35%
26,09%
69,57%
Not at all & Hardly embraced
Moderately embraced
Largely & Entirely embraced

Pleasantly, the various organizations surveyed revealed interesting information regards the lean soft practices implementation. Graphs (3A, 3B) depict the existence both of a continuous improvement system (66.84%) and performance management system (62.32%). Equally significant, was the presence of a reward system (59.01%) which linked exclusively with management considering and implementing workers 'proposals. This finding sheds light on prior research into the role of rewards and economic incentives as facilitating and inhibiting factors in the success process of LM [57]. Conversely, the study depicts a poor implementation of employee development system (44.72%). Unfortunately, the qualification of employees is a fundamental task in LM. It enables workers to participate in the continuous improvement and the continuous development of processes must go along with a continuous development of people [22], [50]. Skill of workforce and in-house expertise for instance, soft skills and technical skills plays an important role in the successful adoption of lean manufacturing [25]. Unlike to [51], specific solutions to inspire organizational innovation and also continuous improvement is not to hire people with divers skills, talents, and scientific background, sometimes outside of the company's industry, to help the company challenge the status quo and bring different frames of reference toward a problem, but is to make effort on improving worker's competence and skill levels in order to increase their versatility and, in the final instance, to achieve a greater level of flexibility and adaptability in the organization [49]. The previous finding of low utilization of SMED (33.54%) in our case study, since it requires specific training, support what is stated in the prior literature and our finding about how important training is for people to better assimilate and learn the first lean tools.

Furthermore, our results show a significant negative strength of communication (45.65%). Unfortunately, a structured communication procedure can improve worker involvement, provide the workers with greater accountability and give them a greater feeling of ownership of performance achievement. Continuous information feedback can also give a rapid response to any departure from objectives set and the bases for continuous improvement [71]. According to [52], communication seems to be the key to successful lean changes and to increase the possibility of the lean implementation success. Furthermore, it is important for employees to be exposed to greater communication and the role of communication can be seen as a "qualifier" criterion.

The last important result was regarding the critical success factors – what makes LM successful in a Moroccan context? The respondents gave scores based on the five point Likert scale on twelve critical success factors for the success and, or failure of LM based on their experience. The results are presented in the bar graphs (4A, 4B).





One factor that scored very high overall was the top management engagement and commitment (91.93%). Allocation of time and resources for improvement projects was found to be the following critical success factor (80.75%). Likewise, a strong management's leadership was founded to be a critical success factor (80.12%). This result is aligned with previous empirical lean success factors research, which has consistently reported a positive relationship between management attitudes and LM outcomes [26], [8], [19], [37], [75], [25], [48], [49], [33], [29], [61], [22], [23], [57], [18], [35], [32], [52]. Yet, one of the more interesting set of success factors was continuous training (77.02%) and hierarchical separation between quality and production departments. However, the study results remain that internal promotion (40.37%) and job security (47.83%) were not rated as among the most vital factors for the success of LM. Areas in which the author happen to disagree with majority of the participants. In fact, an effective internal mobility policy develops employees' willingness to change, reduces adaptation costs and allows for corporate uncertainty in a rapidly changing environment [59]. It can be seen as a genuine strategy of flexibility relying on internal resources as opposed to depending on the external job market. Also, involving employees in making decisions related to their professional career will be favorable and lead to enforcing the feeling of confidence both in the business and its manager [54]. Even, in lean implementations it is important to provide job security [26], [49], [75] and privilege internal promotion rather than external recruitment [49]. As a basic of LM philosophy, there is no doubt that internal promotion and stability dimension are the single most important elements for success and the benefits of internal mobility are obvious for both organization and employees.

Conclusions, recommendations and future research

This study provided insight into the maturity of LM practices by exploring their status in various multinationals located in Morocco. Again, our main objective was threefold: (1) to identify the usage of lean hard tools and techniques; (2) to evaluate the integration of lean soft fundamentals in facilities management systems; (3) to determine challenges and success factors for implementation of LM in a national context.

To summarize it can be concluded that the survey findings fit with existing theory. The relevant lean hard tools are practically used like problem-solving methods, production flow, 5S, and standardization. Examining the lean soft practices implementation investigated through five logical clusters of relevant lean management fundamentals, our study results depict that employee development and communication systems are less embraced and considered. Pleasantly performance management, reward and continuous improvement systems are largely implemented and considered.

Finally, we have investigated what makes LM successful in a Moroccan context. The study results support all critical aspects taken from the literature and on average have at least been voted by the respondents to be important for successful lean implementation. Seeing that the top four success factors are top management engagement and commitment, allocation of time and resources for improvement projects, strong management's leadership, and employees' development program it becomes very clear that the research supports recent literature. Surprisingly, if job security and internal promotion are critical for successful lean implementation, the respondents however have rated this aspect on the last rank of the importance scale. Looking at this aspect the survey data don't supports the reading findings.

An avenue for further investigation is to expand the study to include additional industrial sectors. Finally, it is believed that more future studies are needed in order to develop and provide methodology and tools to ensure LM deployment success in a national context.

REFERENCES:

[1] Acosta, C., Jorge Leon, V., Conrad, C., Gonzalez, R., Malave, O.C., 2004. Case study on culture and the implementation of Manufacturing Strategy in Mexico. Journal of Manfucaturing Systems 23 (3) 204-214.

[2] Ahmad, M.F., Zakuan, N., Jusoh, A., Takala, J., 2012. Relationship of TQM and Business Performance with Mediators of SPC, Lean Production and TPM. Procedia - Social and Behavioral Sciences 65, 186 – 191.

[3] Ahrens, T., 2006. Lean production: Successful implementation of organizational change in operations instead of short term cost reduction efforts. Lean Alliance, 1-87.

[4] ÅHLSTROM, P., 1998. Sequences in the Implementation of Lean Production. European Management Journal 16 (3) 327-334.*

[5] Agarwal, R., Green, R., Brown, J.P., Tan, H., Randhawa, K., 2013. Determinants of quality management practices: An empirical study of New Zealand manufacturing firms. Int. J. Production Economics 142, 130-145.

[6] Andriulo.S, Gnoni.G.M., 2014. Measuring the effectiveness of a near-miss management system: An application in an automotive firm supplier. Reliability Engineering and System Safety 132, 154-162.

[7] Azadegan, A., Patel, C.P., Zangoueinezhad, A., Linderman, K., 2013. The effect of environmental complexity and environmental dynamism on lean practices. Journal of Operations Management 31, 193-212.

[8] Bakas, O., 2011. Challenges and success factors for implementation of Lean Manufacturing in European SMES. Norwegian University of Science and Technology, Trondheim, Norway, MITIP.

[9] Bergenwall, L.A., Chen, C., White, E.R., 2012. TPS's process design in America automotive plants and its effects on the triple bottom line and sustainability. Int. J. Production Economics 140, 347-384.

[10] Bhasin, S., 2012. Performance of Lean in large organizations. Journal of Manfucaturing Systems 31, 349-357.

[11] Bortolotti, T., Boscari, S., Danese, P., 2014. Successful Lean implementation: Organizational culture and soft lean practices. Int. J. Production Economics, http://dx.doi.org/10.1016/j.ijpe.2014.10.013i.

[12] Browning, R.T., Heath, .D.R., 2009. Reconceptualizing the effects of lean production costs with evidence from the F-22 program. Journal of Operations Management 27, 23-44.

[13] Coimbra, E. A., 2009. Total Flow Management: Achieving Excellence with Kaizen and Lean Supply Chains. Kaizen Institute.

[14] Colledani, M., Tolio, T., Fischer, A., Lung, B., Lanza, G., Schmitt, R., Vancza, J., 2014. Design and management of manufacturing systems for production quality. CIRP Annals – Manufacturing technology 63, 773-796.

[15] Crute, V., Ward, Y., Brown, S., Graves, A., 2003. Implementing Lean in aerospace – challenging the assumptions and understanding the challenges. Technovation 23, 917-928.

[16] Cuatrecasas, A.L., 2002. Design of a rapid response and high efficiency service by lean production principles: Methodology and evaluation of variability of performance. Int.J. Production Economics 80, 169-183.

[17] De hann, J., Naus, F., Overboom, M., 2012. Creative tension in a lean work environment: Implications for logistic firms and workers. Int.J. Production Economics 137, 157-164.

[18] De Leeuw, S., Van den Berg, P.J., 2011. Improving operational performance by influencing shopfloor behavior via performance management practices. Journal of Operations Management 29, 224-235.

[19] De Menezes, M.L, Wood, S., Gelade, G., 2010. The integration of human resource and operation management practices and its link with performance: A longitudinal latent class study. Journal of Operations Management 28, 455-471.

[20] Demeter, K., Matyusz, Z., 2011. The impact of lean practices on inventory turnover. Int. J.Production Economics 133, 154–163.

[21] De Treville, S., Antonakis, J., 2006. Could lean production job design be intrinsically motivating? Contextual, configurational, and levels-of-analysis issues. Journal of Operations Management 24, 99-123.

[22] Dombrowski, U., Mielke, T., 2013. Lean Leadership – fundamental principles and their application. Procedia CIRP 7, 569 -574.

[23] Dombrowski, U., Mielke, T., 2014. Lean Leadership - 15 Rules for a sustainable Lean Implementation. Procedia CIRP 17, 565 - 570.

[24] Doolen, L.T, Hacker, E.M., 2005. A Review of Lean Assessment in Organizations: An Exploratory Study of Lean Practices by Electronics Manufacturers. Journal of Manufacturing system 24 (1) 55-67.

[25] Dora, M., Kumarb, M., Van Goubergena, D., Molnara, A., Gellyncka, X., 2013. Operational performance and critical success factors of lean manufacturing in European food processing SMEs. Trends in Food Science & Technology 31, 156-164.

[26] Duque, M.F.D., Cadavid, R.L., 2007. Lean manufacturing measurement: The relationship between lean activities and lean metrics. Estudios Gerenciales 23 (105) 69-83.

[27] Elnadi, M., Shehab, E., 2014. A Conceptual Model for Evaluating Product-Service Systems Leanness in UK Manufacturing Companies. Procedia CIRP 22, 281 – 286.

[28] Evans, R.J., Lindsay, R.J., 2005. The Management and Control of Quality. 6th edition South-Western College Publication, Cincinnati, OH.

[29] Farris, A.J., Van Aken, M.E., Doolen, L.T., Worley, J., 2009. Critical success factors for human resource outcomes in Kaizen events: An empirical study. Int. J. Production Economics 117, 42-65.

[30] Ferradás, P.G., Salonitis, K., 2013. Improving changeover time: a tailored SMED approach for welding cells. Procedia CIRP 7, 598 – 603.

[31] Fullerton, R. R.; McWatters, C. S. (2002). The role of performance measures and incentive systems in relation to the degree of JIT implementation. Accounting, Organizations and Society 27 (8) 711-735.

[32] Garnier, D., 2010. La Value Stream Mapping : un outil de représentation des procédés et de réflexion pour l'amélioration lean appliqué à l'industrie pharmaceutique. Mémoire de thèse doctorat.

[33] Garza, A.L., 2005. Integrating Lean Principals in Automotive Product Development: Breaking Down Barriers in Culture and Process. Master's thesis at the Massachusetts Institute of Technology.

[34] Gest G., Culley, S.J., McIntosh, R.I., Mileham, A.R., Owen, G.W., 1995. Review of fast tool change systems. Computer Integrated Manufacturing Systems 8, 205-210.

[35] Glover, J.W., Farris, A.J., Van Aken, M.E., Doolen, L.T., 2011. Critical success factors for the sustainability of kaizen event human resource outcomes: An empirical study. Int.J. Production Economics 132, 197-213.

[36] Handel, J.M., 2014. Theories of lean management: An empirical evaluation. Social science research 44, 86-102.

[37] Herron, C., Braiden, P.M., 2006. A methodology for developing sustainable quantifiable productivity improvement in manufacturing companies. International Journal of Production Economics 55 (3) 223-240.

[38] Herron, C., Hicks, C., 2008. The transfer of selected lean manufacturing techniques from Japanese automotive manufacturing into general manufacturing (UK) through change agents. Robotics and Computer - Integrated Manufacturing 24, 524-531.

[39] Holweg, M., 2007. The geanologie of lean production. Journal of operations Management 25, 420-437.

[40] Jabbour, C.J.C., Jabbour, A.B.L.S., Govindan, K., Teixeira, A.A., Freitas, W.R.S., 2013. Environmental management and operational performance in automotive companies in Brazil: the role of human resource management and lean manufacturing. Journal of Cleaner Production 47, 129-140.

[41] Jayaram, J., Ahire, L.S., Dreyfus, P., 2010. Contingency relationships of firm size, TQM duration, unionization, and industry context on TQM implementation – A focus on total effects. Journal of operations Management 28, 345-356.

[42] Jayaram, J., Das, A., Nicolae, M., 2010. Looking beyond the obvious: Unraveling the Toyota production system. Int. J. Production Economics 128, 280-291.

[43] Kaynak, H., 2013. Total Quality Management and Just-in-Time Purchasing: Their Effects on Performance of Firms Operating in the U.S.

[44] Kojima, S., Kaplinsky, R., 2004. The use of lean production index in explaining the transition to global competitiveness: The auto components sector in South Africa. Technovation 24, 199-206.

[45] Kovacheva, V.A., 2010. Challenges in Lean implementation: Successful transformation towards Lean enterprise. Master Thesis.

[46] Kull, J.T., Wacker, G.J., 2010. Quality management effectiveness in Asia: The influence of culture. Journal of Operations Management 28, 233-239.

[47] Kull, J.T., Yan, T., Liu, Z., Wacker, G.J., 2014. The moderation of Lean manufacturing effectiveness by dimensions of national culture: Testing practice-culture congruence hypotheses. Int. J. Production Economics 153, 1-12.

[48] Liker, J., 2004. Le modèle Toyota : 14 principes qui feront la réussite de votre entreprise. Pearson France, Paris.

[49] Liker, J., Ogden, T., 2011. Toyota, un modèle de gestion de crise. Pearson Education France, Paris.

[50] Lila, B., 2012. A survey on implementation of the Lean Manufacturing in Automotive Manufacturers in the Eastern Region of Thailand. International Conference on industrial Technology and Management 49, 43-49.

[51] Lindeke, R.R., Wyrick, A.D., Chen, H., 2009. Creating change and driving innovation in highly automated and lean organization: The Temporal Think Tank (T3). Robotics and Cumputer-Integrated Manufacturing 25, 879-887.

[52] Losonci, D., Demeter, K., Jenei, I., 2011. Factors influencing employee perceptions in lean transformations. Int. J. Production Economics 131, 30-43.

[53] Lyonnet, B., 2010. Amélioration de la performance industrielle – vers un système de production Lean adapté aux entreprises du pôle de compétitivité Arve Industries Haute-Savoie Mont-Blanc. Mémoire de thèse doctorat.

[54] Ochetan, T.M.C., Ochetan, A.D., 2012. The influence of economic and financial crisis on human resources management. Procedia Economics and Finance 3, 769 – 774.

[55] Marquesa, A.F., Alvesa, A.C., Sousaa, J.P., 2013. An approach for integrated design of flexible production systems. Procedia CIRP 7, 586 – 591.

[56] Martinez, A., Perez, M., 2001. Lean Indicators and Manufacturing Strategies. Int. J. Operations & Production Management,

21(11), 1433-1451.

[57] Martinez-Jurado, J.P., Moyano-Fuentesa, J., Jerez-Gômezb, P., 2014. Human resource management in Lean Production adoption and implementation processes: Success factors in the aeronautics industry. BRQ Business Research Quarterly 17, 47-68.

[58] Matt, D.T., Rauch, E., 2013. Implementation of Lean Production in small sized Entreprises. Procedia 12, 420-425.

[59] Mignonac, K., Herrbach, O., 2003. Managing individual career aspirations and corporate needs. A study of software engineers in France. Journal of Engineering and Technology Management 20, 205-230.

[60] Naor, M., Linderman, K., Schroeder, R., 2010. The globalization of operations in Eastern and Western countries: Unpacking the relationship between national and organizational culture and its impact on manufacturing performance. Journal of Operations Management 28, 194-205.

[61] Naor, M., Jones, S.J., Bernardes,S.E., Goldstein, M.S., Schroeder, R., 2014. The culture-effectiveness link in performance in a manufacturing context: A resource-based perspective. Journal of World Business 49, 321-331.

[62] Pamfilie, R., Petcu, J.A., Graghici, M., 2012. The importance of leadership in driving a strategic Lean Six Sigma management. Procedia – Social and Behavioral Sciences 58, 187-196.

[63] Panizzolo, R. 1998. Applying the lessons learned from 27 lean manufacturers. The relevance of relationships management. Int. J. Production Economics 55 (3) 223-240.

[64] Pavnascar, S.J., Gershenson, J.K., Jambekar, A.B., 2003. Classification scheme for lean manufacturing tools. Int. J. Production Research 41 (13), 3075–3090.

[65] Rosemary R. Fullerton a., Kennedy, F.A., Widener, S.K., 2013: Management accounting and control practices in a lean manufacturing environment. Accounting, Organizations and Society 38, 50–71.

[66] Salimi, M., 2013. A Lean Production Framework for Malaysian Automotive and Heavy Machinery Industry. Middle-East Journal of Scientific Research 13 (11), 1544-1550.

[67] Schroeder, G.R, Flynn, B.B., 2001. High Performance Manufacturing: Global Perspectives. Wiley, New York.

[68] Shah, R., Ward, T.P., 2003. Lean manufacturing: context, practice bundles, and performance. Journal of Operations Management 21, 129-149.

[69] Shah, R., Ward, T.P., 2007. Defining and developing measures of lean production. Journal of Operations Management 25, 785-805.

[70] Sherehiy, B., Karwowski, W., 2014. The relationship between work organization and workforce agility in small manufacturing enterprises. Int. J. Industrial Ergonomics 44, 466-473.

[71] Spear, S., Bowen, K.H., 1999. Decoding the DNA of the Toyota production system. Harvard Business Review 77 (5) 96-106.

[72] Staats.R.B, Brunner.J.D, Upton.M.D., 2011. Lean principles, learning, and Knowledge work: Evidence from a software services provider. Journal of Operations Management, 29, 376-390.

[73] Stock.N.G, McFadden.L.K, Gowen III.R.C., 2007. Organizational culture, critical success factors, and the reduction of hospitals errors. Int. J. Production Economics 106, 368-392.

[74] White, R.E., Ruch, W.A., 1990. The composition and scope of JIT. Journal of Operations Management 7 (3&4) 9-18.

[75] Womack, J., Jones, D., 2009. Le système Lean : Penser à l'entreprise au plus juste. Pearson France, Paris.

[76] Zu.X, Robbins.L.T, Fredendall.D.L., 2010. Mapping the critical links between organizational culture and TQM/Six Sigma practices. Int. J. Production Economics 123, 86-106