Lean Office in a Manufacturing Company

Federica Costa(✉), Bassel Kassem(✉), and Alberto Portioli Staudacher(✉)

Politecnico di Milano, via lambruschini 4,b, Milan, Italy
{federica.costa, bassel.kassem, alberto.portioli}@polimi.it

Abstract. Since its inception with Toyota, the lean approach has been a growing point of interest in various industries and organizations worldwide. However, the focus of attention, in terms of its application in the literature, has remained constant in improving the performance of production processes compared to improving that of offices. Instilling Lean as a strategic vision requires not only a focus on production but also other areas of the focal firm. This paper showcases a success story in a manufacturing company that has decided to opt for a lean office continuous improvement project through A3 problem solving tool to compenetrate the strategic vision of Lean Culture and to develop one first step for the creation of synergy with its production processes.

Keywords: Lean office · Lean culture · Continuous improvement

1 Introduction

Globalization has put increasing importance on adaptability as effect of environmental complexity and dynamism. The increase of competition generated requires companies to focus on the development of competitive advantage [1]. In this direction, The Toyota Production System (TPS), originated by Toyota Motor Corporation as a set of concepts, practices, and tools focused on identifying and reducing wastes, has proved to bring several benefits changing the way production is organized and managed [2, 3]. Later on, TPS was referred to as Lean Production, after the work published by Womack, Jones, and Roos [4].

Lean practices became recognized to gain a competitive advantage, causing the spread of the principles from manufacturing [5–8] to services [9] to supply chain [10] into companies' culture [11] even in companies willing to start their digital journey [12, 13]. Nonetheless, the application and studies of lean on offices (Lean Office) are a recent theme demonstrated by the small number of articles on the subject [3]. Lean Office relies on implementing lean manufacturing principles in offices and administrative processes to streamline information flow by reducing total cycle time [14].

Many manufacturing companies that strive to implement lean culture start focusing on the shopfloor appealing to the sense that it hides wastes. Nonetheless, waste is not exclusive to manufacturing processes, but it is also present in administrative areas and must not be forgotten. To have a true lean transformation and synergy through the company, the lean principles must be applied to all the operations in the organization, not only restricted to the shopfloor [3, 15, 16].

Published by Springer Nature Switzerland AG 2021
D. J. Powell et al. (Eds.): ELEC 2021, IFIP AICT 610, pp. 351–356, 2021.
https://doi.org/10.1007/978-3-030-92934-3_36

The objective of this paper carried out through an empirical activity was to put in evidence the application of Lean Office in a manufacturing company that has started its lean transformation in 2000. The importance of this study relies on how a company with experience in the use of lean can still get advantages from applying the principles in administrative activities that work in alignment with the operational areas.

2 The Company

The company ABC, with several facilities all over the world, is a leader in developing and manufacturing products and services for primary and secondary distribution of natural gas. At the turn of the 20th and 21st century, the company undertook a radical change of strategy to face a financial crisis. This particular change of strategy led to the start implementation of the lean methodology. As of today, the company invests in training its employees about the lean culture by the hands of the Kaizen Promotion Office (KPO). KPO is dedicated full time to continuous improvement, organizing one Kaizen Week per month, in which they address specific problems involving the employees and a Japanese sensei. The present paper addresses a project carried out in one of the plants of the company, based in Milan. The plant counts around 400 employees and produces several equipment for the gas industry. Please note that abbreviations of the various rooms, locations and departments have been used with no referring to the original names for privacy reasons.

3 Research Methodology

This paper relies on the A3 problem-solving tool which has been used as a way for transforming organizations and starting their lean journey [17, 18]. It has been used by various cases in the literature [6, 7, 9].

3.1 Problem Background and Breakdown

The plant is expected to grow in the next years due to higher demand, thanks to the substitution of the old generation of gas meters. This growth of production will generate an increase in personnel. The effect will be perceived in the internal demand of support materials managed by the "Centro di Servizio" (CS). In the CS, the workload on the current four employees will increase: leading to a necessity for increasing efficiency in the support materials management system. The highest impact of the increasing demand will be an increase of the average inventory levels of four categories of materials (clothing, visual tools, personal protective equipment, and stationery), reduction of the service level, particularly lower on-time deliveries and higher customer lead time.

Four categories of products have been identified: Clothing, Visual Tools, Personal Protective Equipment (mainly Working Gloves and Safety Shoes), and Stationery, all managed by CS (Table 1).

Table 1. Categories of items

Category	Description
Clothing	Each worker (either employed by the temporary worker agency or by the company) should receive a subset of the clothing at the entrance in the company and the full set after one month. Nonetheless, the policy is not followed, and clothes are given once the team leaders of the different departments make the request on CS Portal
Visuals	The team leaders of the different departments make the request on CS Portal, CS workers print the request and deliver the quantity required
Personal Protective Equipment (PPE) heading	Each worker that enters the company must receive PPE depending on the tasks to be performed in the company. the team leaders of the different departments make the request on CS Portal, CS workers print the request, prepare the order and deliver the quantity required. Considering working gloves, CS stock point is managed with ROP (reorder point) model and Kanban, once the ROP is reached, the Kanban is detached, and CS workers make the order to the supplier. For the safety shoes, CS worker orders the shoes based on experience
Stationary materials	They are managed through a ROP model with Kanban (the Kanban states the reorder point and the quantity of reordering for each item). Internal customers make the request on CS Portal, CS workers print the request, prepare the order, and deliver the quantity required

3.2 Target Definition

Prioritization on the categories of products has been performed with parameters (Annual expenditure, actual space occupied, and operational importance) in agreement with the company. The analysis led to focus on two out of four groups. In this sense the targets were defined for "Clothing" and "PPE", as follows:

- Clothing: must-have target, reduction of 50% of Average inventory Level AIL [m^3], corresponding to 4.25 equivalent closets (to free the RSU Room, that should not be used to stock closets). Nice-to-have target, reduction of 65% of AIL [m^3].
- Working Gloves: must-have target, reduction of 50% of AIL [€] (to eliminate one of the two stock points). Nice-to-have target, reduction of 65% of AIL [€].
- Safety Shoes: must-have target, reduction of 25% of AIL [€] (considering the already existing and effective management system adopted by CS). Nice-to-have target, reduction of 40% of AIL [€] (to stock all safety shoes in one closet rather than 2, increasing saturation).

3.3 Root Cause Analysis

In the analysis of root causes, the Five Whys technique has been used for all the three types of products chosen. Uncovering multiple root causes, the method was repeated asking a different sequence of questions each time and involving many figures in the company for each level of the analysis. The root causes are presented for each type of product with the corresponding possible countermeasures.

4 Results

From potential countermeasures proposed in Table 2, five of these have been implemented (*) and the other 2 have been accepted to be implemented by CS workers in the future (**). Besides the quantitative improvements following showed, the satisfaction of the customer was expressed at the end of the project.

- Clothing: A reduction of 53% of the AIL [m^3] has been achieved, and according to an estimation, once the new supplier will start to work, a reduction of 65% of the AIL will be reached.
- Working Gloves: A reduction of 50% of the AIL [€] has been achieved.
- Safety Shoes: A reduction of 43% of the AIL [€] has been achieved. All safety shoes are now stocked in one closet.

Table 2. Countermeasures and tackled root causes

Cat.	*/**	Countermeasure	Root cause tackled
Clothing	**	New management system using Periodic Review Model	- CS is not aware of the actual quantity and type of clothing - CS is not aware of the future demand - Team leaders are not responsible for managing to clothe
	**	New shipment agreement with the supplier	- The company is changing supplier - Supplier accepts only huge orders
	*	Revision of the clothing policy	- Clothing policy establishes the consumption of clothes
		Creation of a dedicated room with a dedicated resource for managing to clothe	- CSS is not aware of the actual quantity and type of clothing - Team leaders are not responsible for managing to clothe
Safety shoes	*	New management system using Kanban	- Reorder procedure is not up to date - Avoid out of stock
	*	New communication procedure between HR and CS	- CS receives the info from Randstad only the day before - Avoid out of stock
		New shipment agreement with the supplier	- Avoid out of stock
Working gloves	*	Reorganization of the stock point both in CS and Mechanical Department	- There are 2 independent stock points (CS and Mech Dept)
	*	Improvement of the visibility between CS and Mechanical Department	- CS is not aware of the stock point in Mech Dept

Additionally, follow-up actions were suggested as for the tackled categories of material (PPE and Clothing), they are mainly monitoring actions. In particular for clothing, CSS will have to monitor the evolution of the new shipment agreement with the supplier. For the other categories (stationery materials and visual tools), CS, in collaboration with KPO office, will have to further address the analysis.

5 Conclusion

Even considering the lean presence in the company's operations for 20 years, the lean office approach revealed to be essential to address and tackle the effects of a future increase of demand on the management of support materials. Thanks to this satisfactory project, the company has gained awareness of the impact of production changes on areas as the CS, aiming to improve the synergy. Through the lean office approach, and adopting the A3 methodology, CS was able to reduce their numbers of inventory levels. Additionally, thanks to this experience, the company is now more concerned about the lean office. Indeed, the pleasing results within the CS allow the workers to be more worried about the importance of their work in the whole organization and the positive impact that they can achieve with lean thinking, generating workers with higher commitment and motivation for their job.

This article contributes to showcasing a real case in which the lean concept is mutually applied in the production and in the offices of a manufacturing company that has been implementing lean for a while. Lean is a culture and not a simple concept, therefore embarking on a lean journey requires not only applying it in the area in which it is born, production [19] but in the entire organization. The spreading of the lean culture entails small continuous improvement projects, focused and aiming at specific targets that would allow measuring the performance and the success of the project. Managers could benefit from this research to effectively understand the simplicity and the usefulness of using A3 methodology as a preliminary step to instilling the lean culture beyond the production areas. Future research will try to further this topic by delineating the struggles and the peculiarities that a manufacturing company already applying lean in its production processes might face in applying lean in its offices as well.

References

1. Azadegan, A., Patel, P.C., Zangoueinezhad, A., Linderman, K.: The effect of environmental complexity and environmental dynamism on lean practices. J. Oper. Manag. **31**, 193–212 (2013). https://doi.org/10.1016/j.jom.2013.03.002
2. Ohno, T.: Toyota production system beyond large -scale production Taiichi Ohno (1979)
3. Sousa, R.M., Dinis-Carvalho, J.: A game for process mapping in office and knowledge work. Prod. Plan. Control **32**, 463–472 (2021). https://doi.org/10.1080/09537287.2020.1742374
4. Womack, J.P., Jones, D.T., Roos, D., Massachusetts Institute of Technology: The Machine That Changed the World: The Story of Lean Production. HarperCollins (1991)

5. Kassem, B., Costa, F., Portioli-Staudacher, A.: JIT implementation in manufacturing: the case of giacomini SPA. In: Rossi, M., Rossini, M., Terzi, S. (eds.) ELEC 2019. LNNS, vol. 122, pp. 273–281. Springer, Cham (2020). https://doi.org/10.1007/978-3-030-41429-0_27
6. Torri, M., Kundu, K., Frecassetti, S.: Rossini M implementation of lean in IT SME company: an Italian case. https://doi.org/10.1108/IJLSS-05-2020-0067
7. Rossini, M., Audino, F., Costa, F., Cifone, F.D., Kundu, K., Portioli-Staudacher, A.: Extending lean frontiers: a kaizen case study in an Italian MTO manufacturing company. Int. J. Adv. Manuf. Technol. **104**(5–8), 1869–1888 (2019). https://doi.org/10.1007/s00170-019-03990-x
8. Kundu, K., Rossini, M., Portioli-Staudacher, A.: Analysing the impact of uncertainty reduction on WLC methods in MTO flow shops. Prod. Manuf. Res. **6**, 328–344 (2018). https://doi.org/10.1080/21693277.2018.1509745
9. Torri, M., Kundu, K., Frecassetti, S., Rossini, M.: Implementation of lean in IT SME company: an Italian case. Int. J. Lean Six Sigma (2021). https://doi.org/10.1108/IJLSS-05-2020-0067
10. Rossini, M., Portioli, A.: Supply chain planning: a quantitative comparison between lean and info-sharing models. Prod. Manuf. Res. **6**, 264–283 (2018). https://doi.org/10.1080/21693277.2018.1509744
11. Rossini, M., Portioli-Staudacher, A., Cifone, F.D., Costa, F., Esposito, F., Kassem, B.: Lean and sustainable continuous improvement: assessment of people potential contribution. In: Rossi, M., Rossini, M., Terzi, S. (eds.) ELEC 2019. LNNS, vol. 122, pp. 283–290. Springer, Cham (2020). https://doi.org/10.1007/978-3-030-41429-0_28
12. Rossini, M., Cifone, F.D., Kassem, B., Costa, F., Portioli-Staudacher, A.: Being lean: how to shape digital transformation in the manufacturing sector. J. Manuf. Technol. Manag. **32**, 239–259 (2021). https://doi.org/10.1108/jmtm-12-2020-0467
13. Costa, F., Portioli-Staudacher, A.: On the way of a factory 4.0: the lean role in a real company project. In: Rossi, M., Rossini, M., Terzi, S. (eds.) ELEC 2019. LNNS, vol. 122, pp. 251–259. Springer, Cham (2020). https://doi.org/10.1007/978-3-030-41429-0_25
14. Wang, J.X.: Lean manufacturing: business bottom-line based (2010)
15. Chiarini, A.: Lean Organization: From the Tools of the Toyota Production System to Lean Office. Springer, Milan (2013). https://doi.org/10.1007/978-88-470-2510-3
16. Productivity Press Development Team: The Lean Office. Productivity Press (2005)
17. Sobek, D.K.: Understanding A3 Thinking. CRC Press (2008)
18. Sobek, D., Jimmerson, C.: A3 reports: tool for organizational transformation. In: 2006 IIE Annual Conference and Exhibition (2006)
19. Womack, J.P., Johnes, D.T., Roos, D.: The machine that changed the world (1990)