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Non-Productive Activities & Effectiveness of the Methods to Minimize them on the Sewing Floor: A Case Study of the Sri Lankan Apparel Industry

Kothalawala KDPM* and Pallegedara A

Department of Industrial Management, Faculty of Applied Sciences, Wayamba University of Sri Lanka
*prabhavik@yahoo.com

ABSTRACT

Sri Lankan apparel industry is well known as a high quality apparel manufacturer for leading brands. This research was carried out as a case study on the Sri Lankan apparel industry with the objective of identifying the non-productive activities performed by team members and finding the effectiveness of the proposed solutions to minimize the non-productive activities. For this study, one of the leading apparel manufacturers in Sri Lanka was selected and a quantitative approach was taken to identify the nature and the gravity of relationship between non-productive activities and the productivity. In order to identify the types of non-productive activities and the relationship between non-productive activities and the output of whole population, 32 modules which had the same style, same number of team members, same experience level and same average age were selected randomly. According to the descriptive analysis, many team members performed considerable amount of non-productive activities such as talking, walking and reworking during their working hours. Further, two modules of treatment and control groups were selected randomly to check the effectiveness of proposed methods. For the only treatment group, measures were taken to reduce non-productive activities. The independent sample t test shows that there is a significant difference between the mean output of the treatment group and the control group. The result is justified by the line graph which had a higher growth rate in output of treatment group whereas there was a lower output growth rate in the control group. Creating a lean manufacturing culture, optimum use of "Andon e-Kanban" system, implementation of good house keeping, standardization of the processes and establishment of build in quality are some of the suggested solutions to minimize non-productive activities. Further, developing effective communication and understanding between the production department and the planning department as well as with the supporting department would be effective in smoothing the production process and hence minimizing the non-productive activities.

KEYWORDS: Apparel industry, Non-productive activities, Productivity, Treatment & control modules

1 INTRODUCTION

Sri Lankan apparel export industry plays a significant role in Sri Lankan socio-economic culture. The apparel industry of Sri Lanka employs about 15% of the country's workforce, accounting for about half of the country's total exports, and Sri Lanka is among the top apparel-producing countries in the world relative to its population (Davies, 2015).

Sri Lanka is also the only outsourced apparel manufacturing country in Asia which has ratified all 27 International Labor Organization (ILO) conventions ("Textile & Garments", 2016)

This research is about identifying root causes that affect efficiency level of sewing modules in the selected company. Currently the particular company has a difference between the actual efficiency level and the expected level. By analyzing observations root causes were identified and further effectiveness of the proposed solutions were tested. The main objective of this study is to identify the non-productive activities in apparel production floor and the methods to

eliminate those non-productive activities. Further, it is focused to design a standard process to eliminate non-productive activities. The cost of salary is the largest expense in apparel industry. Therefore, it is essential to make sure that the human capital is giving their best contribution to the organization with compared to the remuneration package they get. This research is an effort to identify the ways to get the best contribution from workers to the sewing floor.

2 LITERATURE REVIEW

Productivity is the ratio between output of wealth and input of resources of production. Output means the quantity produced and inputs are the various resources employed (Islam, 2013). Chuter (1988) has defined annual labour turnover, absenteeism, methods effectiveness, average factory performance, repairs returned to operatives, rejects, machine delay idle, machine delay other work, unmeasured work, repairs, waiting time, balancing losses and work study as the factors affecting the low productivity in apparel manufacturing sector. Further, Triebs and Kumbhakar (2013) have studied the level of technical changes and level of management practice, input use intensity (capital, electricity and transport), technology adoption, human capital intensity, concentration, and exports (Banda & Verdugo, 2011), unbalanced panel data (Mouelhi & Goaïed, 2003) .

There are some ongoing factors which contribute to the low efficiency in apparel manufacturing. Namely bottle neck operations (Timilsina, 2012), work in progress (Ratnayake, Lanarolle, Perera, & Marsh, 2009) and inappropriate layout design (Sarkar, 2015).

According to the Timilsina (2012) bottleneck is an activity which delays the performance of a system and reduces overall efficiency of the process.

Work in progress (WIP) is defined as the material that has entered the production process but is not yet a finished product ("Work In Progress (WIP) Definition Investopedia", 2003). Therefore WIP refers to all materials and partly finished products that are at various stages of the production process. Some operations use WIP between production steps in order to meet peak demand or volatile demand patterns ("Lean Manufacturing concept - work in progress (WIP)", 2009).

The workstation layout defines from where an operator picks up work (garment components) and where she will dispose stitched garment (Sarkar, 2016). A scientific layout is defined as the minimum reach for picking up and dispose of components. All components and tools (trimmers) must be kept within operator's reach. The purpose of designing a good workstation layout is to minimize the material handling time as much as possible. Thus it reduces operation cycle time. Secondary benefit of good workstation layout is operators can work at same pace without fatigue. When designing a workstation layout it is essential to consider ergonomics (Sarkar, 2015).

Cellular layout divides the manufacturing facilities small groups called cells which will be exclusively utilized for specific task (Nicoletti et al., 1998). Lean Manufacturing and Cellular Manufacturing offer many advantages in material handling, inventory, quality, scheduling, personnel and customer satisfaction. Work cells derive these advantages from their small size and process integration. They also fit the human penchant for working in small groups (Samuel 2007).

3 METHODOLOGY

Based on the literature review and author observations, the relevant variables were identified. The dependent variable was line output and independent variable was non-productive activities.

Initially, relationship between output & non-productive activities was identified. Further analysis was carried out to identify the impact of most frequent non-productive activities towards the output. Then control &

treatment modules were selected. Identified solutions were established within the treatment module. To identify the effectiveness of the proposed methods independent sample t test was used.

4 RESULTS AND DISCUSSION

It was proved that there was a strong negative relationship between the line output & the non-productive activities.

Several non-productive activities performed by the team members were identified.

According to the activity sampling results most frequent ones were walking, talking, rework, personal issues and thread breaking. Among them walking, rework and personal issues had an acceptable relationship with the output.

According to the advanced activity sampling results, gossiping, issues related to garment, poor work quality, machinery issues and to get motivated are the reasons behind talking. Similarly to pick or hand over parts, to rework to do/done, to get equipment, to talk, to instruct and personal reasons were identified as the factors behind walking.

Solutions were suggested and they were implemented in the treatment module. Proper layout design which minimized walking, good house maintenance, team member training & awareness sessions, implementation of automation units and wearing of face masks were practiced within the treatment module. Further, it was taken in to account that the both treatment & control modules had the same style, number of team members and the same average levels of experience and age.

According to the independent sample t test results, there was a significant difference between the mean outputs of treatment module and the control module. Further, according to the figure 1 it was clear that the mean of the treatment module was higher than the mean of the control module.

Further, developing effective communication and understanding between the production department and the planning department as well as with the supporting department would be effective in smoothing the production process and hence minimizing the non-productive activities.

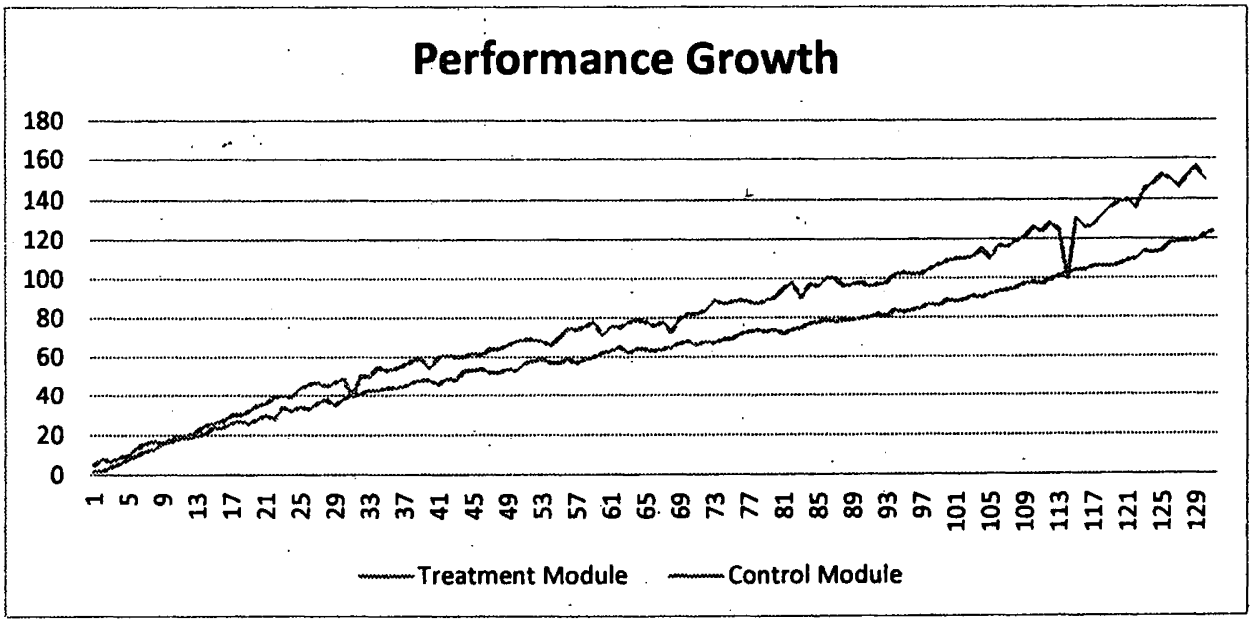

Figure 1: Performance Growth of Treatment & Control Modules

REFERENCES

- Actual Garment Production Cost. (2016). Retrieved April 29, 2016, from http://documents.mx/documents/actual-garment-production-cost-of-a-garments-company.htm
- Ayed - Mouelhi, R. & Goaïed, M. (2003). Efficiency Measure from Dynamic Stochastic Production Frontier: Application to Tunisian Textile, Clothing, and Leather Industries. *Econometric Reviews*, 22(1), 93-111. http://dx.doi.org/10.1081/etc-120017976
- Chuter A.J (1988). *Introduction to Clothing Production Management* .Retrieved from http://textilelearner.blogspot.com
- Davies, K. (2015). *Standardizing English in Sri Lanka's Manufacturing and Retail Industry*. Daily Mirror. Retrieved from: http://www.dailymirror.lk/77717/standardising-english-in-sri-lanka-s-manufacturing-and-retail-industry
- Goaied, M. and Mouelhi, R.B.A. (2000). Efficiency measurements with unbalanced panel data: evidence from Tunisian textile, clothing and lather industries. *Journal of production analysis*, DOI 10.1023/a 1007875009531 dt. 01/05/2000.
- Investopedia. (2003). *Work In Progress (WIP) Definition*. Retrieved 8 March 2016, from http://www.investopedia.com/terms/w/workinprogress.asp
- Islam S (2013). *Concept Concepts of Production & Productivity of Apparel.* Retrieved from http://textilelearner.blogspot.com
- Leanmanufacture.net. (2009). *Lean Manufacturing concept-work in progress (WIP)*. Retrieved 8 March 2016, from http://www.leanmanufacture.net/leanterms
- Nicoletti.S., Nicosi. (1998). *Group Technology with flow shop cells*. Itally: University of Roma.
- Ratnayake, V., Lanarolle, G., Perera, C., & Marsh, J. (2009). Cellular manufacturing model to reduce WIP fluctuation in garment manufacturing. International *Journal of Six Sigma and Competitive Advantage*, 5(4), 340-358.
- Salgado Banda, H. & Bernal Verdugo, L. (2011). Multifactor productivity and its determinants: an empirical analysis for Mexican manufacturing. *Journal Of Productivity Analysis*, 36(3), 293-308. http://dx.doi.org/10.1007/s11123-011-0218-2
- Samuel, P. (2007). *How to manufacture my products* (1st ed., p. 44). Lotus Press.
- Sarkar, P. (2015). *Online Clothing Study*. Retrieved March 8, 2016, from http://www.onlineclothingstudy.com
- Sunday Observer. (2010). *Revive Textile Manufacture.* Retrieved from http://www.sundayobserver.lk/2001/pix/PrintPage.asp?REF=/2010/11/14/fin02.asp
- Textile & Garments. (2016). Srilankaexpo.com. Retrieved 15 June 2016,from http://www.srilankaexpo.com/index.php/products-a-services/industrial-products/garments
- Timilsina, B. (2012). *Removing bottleneck from a manufacturing unit: A case studies to BETKER OY.* Ylivieska-84100: Finland.
- Triebs, T. & Kumbhakar, S. (2013). Productivity with general indices of management and technical change. *Economics Letters*, 120(1), 18-22. http://dx.doi.org/10.1016/j.econlet.2013.03.024