



IMPACT OF LEAN MANAGEMENT IMPLEMENTATION ON ORGANIZATIONAL OPERATIONAL PERFORMANCE IN INDIA A STUDY

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ABSTRACT

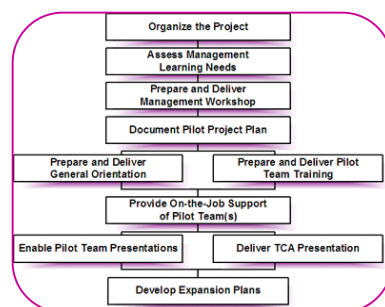
Lean management system is not a new term, it is a very old term but popularized in recent times. It is a systematic approach that focuses on identifying and eliminating waste through continuous improvement and flows in the product at the pull of the customer in pursuit of perfection. The research intends to build up the accord between various operational change techniques, to address the connection between the operational attributes (lean) and operational performance of the association. Variables from which the extraction of the outcomes has been established include operational performance, daily schedule adherence, repeat production and flow oriented layout. The positive association is being established amongst the operational performance and the daily schedule adherence, flow oriented layout and the repeat production. It is suggested to the supply chain management that they must entail their production team for having repetition in their work and become efficient in their production. They must be reached to their optimization level, where they have to extract less waste and have high level of the production.

KEYWORDS: Lean management, Operational performance, daily schedule adherence, repeat production, flow oriented layout, repeat production.

INTRODUCTION :

Implementation of the lean strategy has indicated many difficulties in the improvement of the productivity. Lean strategy believes in eliminating all the aspects that are not used to add value in the production system, for the attainment of excellent product and service. Many of the companies put their focus on developing the lean strategy at their floor levels and try to avail competitive advantage on at that level. This has not yet resulted in relying over the integrative approach [Dávid, Krisztina 2013]. Lean revolution has been seen in the foreign companies and the concept of lean production is very new to the companies of India.

It has been reported by the researchers that lean strategy has resulted in the reduction of human efforts up to 50%. It has also tended to reduce the efforts involved in the tool investment, manufacturing space and the product development. Due to the efforts of the lean strategy, the quality has been improved by 200 to 500%. Lean production is the multi-dimensional approach that includes the variety of the management practices that has focus on the supplier management, quality and the reducing waste. Such mechanism is known as just in time inventory management. JIT term is originated from the concept of buying without holding the parts and components to be delivered at the time of the production. The key



element of the development for the lean production with JIT has been seen in many companies. The concept has been started becoming broadened with the postponement of the unnecessary buying of the resources, until they require. The lean production must require the rapid flow of the goods and information along with the value chain [Peter et al. 2012].

The flow management is deemed to get focus over the reduction of the coordination and the management cost. For instance, this includes the using of the small lots, small production runs and reducing the coordination efforts by started dealing with the less numbers of suppliers [Sanjay 2011].

For coping up with the increasing competitiveness in the industry, manufacturing companies are attempting for the improvement of their operations, by addressing the specific needs of the business. There are numerous path of operational improvement and depending upon the individual need of the business, company applies their strategy. The lean, just in time and the agile are the most common operational improvement in today's time. Managers of the companies have found these strategies as the specific solution to the problem, rather than just a step in improving the manufacturing [Peter et al. 2012].

According to the Sanjay [2011] a company must be able to apply these strategies for the improvement of the programs and fulfillment of the gaps between the market needs and the manufacturing capabilities of the business. They must be cosine and clear in what they are intended to attain with the improvement in the operational strategy. Managers must also be familiar with the steps taken for the improvement of the operations so that they can realize that what is required to be applied and what outcome is required to be attained with the applied improvement. Howsoever, it is still gauged that the present literature is unclear about different operational improvement strategies and their particular differences (Mattias, Jan 2009). So in this current research project, the researcher has established an aim to develop the relationship between different operational characteristics strategies and the operational performance.

Implementation of the lean strategy has indicated many difficulties in the improvement of the productivity. Lean strategy believes in eliminating all the aspects that are not used to add value in the production system, for the attainment of excellent product and service. Many of the companies put their focus on developing the lean strategy at their floor levels and try to avail competitive advantage on at that level. This has not yet resulted in relying over the integrative approach [Dávid, Krisztina 2013]. Lean revolution has been seen in the foreign companies and the concept of lean production is very new to the companies of India.

Hence the aim is to analyze that how companies of India have adopted the concept of the lean production and how they have managed to improve their production, by implementing the lean production in their companies.

LITERATURE REVIEW

Daily schedule adhere and operational performance

Parana and Sekar [2013] have worked on six sigma and explored the outcome studding over the literature review. The topic has been studied with the purpose of investigating over the issues which improve the implementation of lean system in an organization. The factors that are added for the inclusion of the assessment are lean production, small and medium enterprises, daily adhere, operational performance and lean manufacturing For the studied topic, the methodological approach is adopted by the researcher is quantitative in nature they make the modal which concluded their result. Results indicated to derive the outcomes as the lean anchorage in the LSS process consider as the weak but there is significant relationship between them.

Jamshed [2003] have worked over the topic of total management of quality over the production level or productivity. The topic has been studied with the purpose of investigating over the factors or determinants of quality management which increase the productivity. The factors that are added for the inclusion of the assessment are productivity, returns, factor of quality management, daily adherence, and operational performance. For the studied topic, the methodological approach is adopted by the researcher

is the case study which highlights the application of quality management over the production level. Results indicated to derive the outcomes as the effective utilization of resources in production need the proper quality management.

Lokman and Lanita [2014] have worked over the topic of role of performance and the manufacturing strategy. The topic has been studied with the purpose of investigating over the competition in market concerning with the mass information technology. The factors that are added for the inclusion of the assessment are growth, competition, daily adhere, operational performance and manufacturing strategy. For the studied topic, the methodological approach is adopted by researcher is conducting interviews of 92 general manager of reputed organization of Australia and apply the test to reach over the results. Results indicated to derive the outcomes as the JIT practice in market competition have significant relationship over the financial performance of company moreover the managers use information system which increases the growth of organizations.

Mattias and Jan [2009] have worked over the topic of the lean and the agile manufacturing: external and the internal drivers and the performance outcomes. The topic has been studied with the purpose of investigating external and the internal factors. The factors that are added for the inclusion of the assessment are lean production, flexibility, cost, quality, agile production, lean management, daily schedule adherence and the operations of the management. For the studied topic, the methodological approach is adopted as structural equation modeling. The model is developed for the assessment of the performance in the seven countries. Results indicated to derive the outcomes as the agile and the lean manufacturing is different in terms of the outcomes and the drivers. Competitive intensity of the industry has been decreased due to the internal and the external drivers in the agile manufacturing. The indication given by the researchers is to add more numbers of industries and the countries for the assessment of the topic.

Flow oriented layout and operational performance

Jan and Per [2013] have worked over the topic of the measuring the evidence for the lean by reviewing of the international peer reviewed by journal articles. The topic has been studied with the purpose of investigating the lean through reviewing the researches. The factors that are added for the inclusion of the assessment are lean production, lean levels, research work, flow orientation, operational performance and tool box lean. For the studied topic, the methodological approach is adopted as regression analysis. Results indicated to derive the outcomes as the clear definition of the lean has been explained in supply chain, yet more definitions are required. The indication given by the researchers is to add other aspects as well.

Todd and et al. [2011] have worked over the topic of the measuring the learning to become lean. The topic has been studied with the purpose of investigating influence of the external information sources in the lean improvements. The factors that are added for the inclusion of the assessment are lean production, flow orientation, operational performance, manufacturing industries, and management information. For the studied topic, the methodological approach is adopted by surveys and the partial square method. Results indicated to derive the outcomes as the commitment and the lean sources have relationship information sources. The indication given by the researchers is to add values in the research for future.

Dharmasri and Vathsala [2012] have worked over the topic of perception related to right decision making with the support of organization. The topic has been studied with the purpose of investigating the job satisfaction and lean production in Srilanka. The factors that are added for the inclusion of the assessment are employee behavior, flow orientation, operational performance, job satisfaction, lean production and decision making. For the studied topic, the methodological approach is adopted by researcher is quantitative in nature in which they collected the data of 616 employees of different organizations and for concluding the result they applied regression analysis. Results indicated to derive the outcomes as the three is the significant impact over the decision making of employees and organizational

support. Moreover the relationship between lean production and job satisfaction is significant.

Repetitive production and operational performance

Peter et al. [2012] have worked over the topic of the lean and working environment by reviewing literature. The topic has been studied with the purpose of investigating the newly introduced concept for the wellbeing of the environment. The factors that are added for the inclusion of the assessment are lean production, employee's involvement, research work, lean production, repeat production, operational performance, health, manual workers and implementation. For the studied topic, the methodological approach is adopted as regression analysis, by conducting 11 different studies. Results indicated to derive the outcomes as the negative association is sustained among the employee's health and employee's performance from the lean production. The indication given by the researchers is to add other than the manufacturing industry.

Sanjay [2011] have worked over the topic of the measuring the Leanness of the organization. The topic has been studied with the purpose of investigating the lean and its success due to effective value chain and accounting. The factors that are added for the inclusion of the assessment are manufacturing system, culture, lean strategy, repeat production, operational performance, and auditing. For the studied topic, the methodological approach is adopted as regression analysis. For the studied topic, the methodological approach is adopted as audit is required for the lean vision. The indication given by the researchers is to add other than manufacturing industry.

Jagdeep and Harwinder [2012] have worked over the topic of continuous improvement in the production lean. The topic has been studied with the purpose of investigating the review of future implementation. The factors that are added for the inclusion of the assessment are manufacturing process, repeat production, operational performance, production management, management techniques and continuous improvement. For the studied topic, the methodological approach is adopted by the researcher is analyzing over the previous literature papers. Results indicated to derive the outcomes as the continuous improvement program is very beneficial for the growth of manufacturing process.

Ki-Hoon and In [2011] have worked over the topic of environmental practice and carbon footprint. The topic has been studied with the purpose of investigating the environmental practice in the company Hyundai motors co. The factors that are added for the inclusion of the assessment are employee performance, repeat production, operational performance, strategies and policies. For the studied topic, the methodological approach is adopted by the researcher is the case study analysis moreover the qualitative approach has been used to conduct the interviews of employee of Korean based company. Results indicated to derive the outcomes as the carbon management have significant impact over the management of supply chain.

Veera and et al. [2011] have worked over the topic of performance management in the area of supply chain management. The topic has been studied with the purpose of investigating the performance of supply chain in the electronic industry of Malaysia. The factors that are added for the inclusion of the assessment are supply chain management, performance management, repeat production, operational performance, and growth of the organization. For the studied topic, the methodological approach is adopted by the researchers is quantitative in nature for getting the results the researcher gathered the data of 125 electronic companies and applied the structure modal equation to conclude the findings. Results indicated to derive the outcomes as the supply chain management have significant impact over the profitability of firms.*Conceptual framework*

Conceptual framework

Under the branch of the supply chain, the concept of lean and the just in time production has been prevailing. The latest development and the theoretical settings suggested by [Peter, et al. 2012] have enabled the companies to apply and implicate the new concept and thereby enable to get in to the win-win situation. The theory suggested by [Sanjay 2011] is based over optimization and efficient

production. The key element of the development for the lean production with JIT has been seen in many companies. The concept has been started becoming broadened with the postponement of the unnecessary buying of the resources, until they require. The flow management is deemed to get focus over the reduction of the coordination and the management cost, [Dávid, Krisztina 2013]. Lean revolution has been seen in the foreign companies and the concept of lean production is very new to the India companies. Therefore, considering the available literature, a conceptual framework is made which will be followed in this study. It is shown in Figure 1.

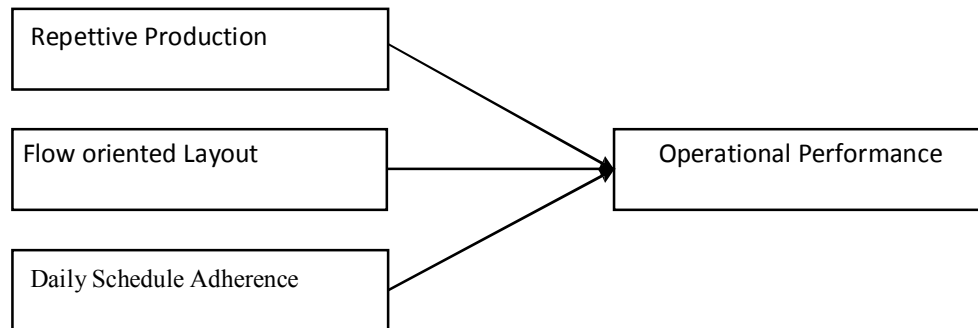


Fig. 1. Conceptual Framework Rys. 1. Koncepcja pracy

Hence based on the literature and proposed conceptual framework, four hypotheses were developed given as follows:

H1: Daily schedule adherence has a positive relationship with operation performance

H2: Flow oriented layout has a positive relationship with operational performance

H3: Repetitive Production has a positive relationship with operational performance

RESEARCH METHODOLOGY

Design of the research is correlation, and is quantitative in nature since quantitative approach is good in the case to attain the objectivity in the result and to remain save from the incorporation of biased attitude, for the gauging of the outcome. Manufacturing sector of India was targeted for research since this sector justified the conceptual linkage from the theory. Total 300 respondents were participated in this research. Convenient sampling was used to select the organizations. Supply chain managers of the manufacturing firms are the respondents.

A structured survey questionnaire was used for data collection. All items are on a five point Likert Scale ranging from 1 "Strongly Disagree" to 5 "Strongly Agree". This questionnaire was developed by adapting scales and dimensions for the dependent and independent variables. Based upon the research model presented in figure 1 following econometric equation was developed and examine through multiple regressions analysis.

$$OP = \alpha + \beta_1 DSA + \beta_2 RP + \beta_3 FOL + e$$

Here OP represent operational performance, DSA represent the daily schedule adherence, RP is the repeat production, FOL is the flow oriented layout and e is representing the error term. The model was evaluated to measure the relationship and association among the lean strategy and the operational performance.

FINDINGS AND DISCUSSION

This section explains the relevancy of the outcomes with the designed objectives of the research. The assessment of the data is being done through factor analysis, Pearson's correlation matrix and multiple regression analysis. The data for this research has been collected through self-administered survey. To measure the reliability of the adopted questionnaire Cronbach's Alpha test was used to ensure that the values are greater than 0.6 [Sekaran 2005]. Cronbach's Alpha test confirmed that all variables are well above the standard level (see table 1).

Table 1a. KMO and Bartlett's Test
Tabela 1a. KMO i test Bartletta

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.881	
Bartlett's Test of Sphericity	Approx. Chi-Square	1438.777
	Df	153
	Sig.	.000

All three variables were examined and presented separately for validity test along with operational performance. The Kaiser-Meyor- Olkon (KMO) and Bartlett's test of sphericity was used to examine the validity of the questionnaire in pilot testing. The results of each variable are presented in table 1a.

The KMO test and Bartlett's test of sphericity explained the appropriate results for further data analysis as KMO test has the higher value than .5 and Bartlett's test of sphericity has the significance value of < .05. Hence, in light of the results presented in table1a, of each variable, prove valid and thus found appropriate for the research.

The analysis of Factor classified in four groups and these factors explained 68.254% out of total variation. Table 1b shows the item number which were loaded in the four respective factors.

Table 1b. Rotated Component Matrix Summary
Tabela 1b. Wyniki macierzy składowików

Association of daily schedule adherence, flow oriented layout, repetitive production with operational performance

To test H1 - H3 we employed Pearson's correlation test. The correlation metric is presented in table 2.

	Component			
	DSA	FOL	RP	OP
DSA1				
DSA2	.774			
DSA3	.549			
DSA4	.739			
DSA5	.551			
	.520			
FOL1		.507		
FOL2		.701		
FOL3		.697		
FOL4		.406		
RP1			.650	
RP2			.747	
RP3			.617	
RP4			.412	
OP1				.679
OP2				.632
OP3				.604
OP4				.652
OP5				.674
Cronbach's alpha score	.740	.761	.740	.764

As presented in the table the relationship of daily schedule adherence and flow oriented layout with operational performance is reported at moderate level ($r=.542$; $.535$ respectively), moreover the sig value (0.000) is less than 0.05 which means that the relationship is highly significant. Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 5 iterations.

Table 2. Pearson's Correlation Summary
Tabela 2. Wyniki korelacji Pearso

		DSA	FOL	RPS	OP
Daily Schedule Adherence	Pearson Correlation	1			
	Sig. (2-tailed)				
Flow Oriented Layout	Pearson Correlation	.572**	1		
	Sig. (2-tailed)	.000			
Repetitive Production	Pearson Correlation	.247**	.398**	1	
	Sig. (2-tailed)	.000	.000		
Operational Performance	Pearson Correlation	.542**	.535**	.398**	1
	Sig. (2-tailed)	.000	.000	.000	

However, the relationship of repetitive production with operational performance is reported at low level ($r= 0.398$) moreover, the relationship is also highly significant. Hence, on the bases of results H1 - H3 are accepted.

In the research, analysis is done on different operational strategies to check whether results of operational performance are aligned with the existent literature. The daily schedule adherence is having positive link with the operational performance hence inferred that increase in daily schedule adherence is going to increase the operational performance. Based on the above findings from the analysis, the hypothesis of daily schedule adherence has a positive relationship with operation performance and supports the findings of Carmen et al. (2007).

Moreover, the findings depicted that flow oriented layout has also a positive link with the operational performance and inferred that increase in flow oriented layout increases the operational performance. Our study results supported the previous findings of Richard [2002] as reported earlier. Lastly, the positive linkage of repeat production with operational performance supports the research findings of Peter et al. [2012].

CONCLUSIONS

The conclusion is based over the assessment of operational performance over the daily schedule adherence, flow oriented layout and the repeat production. The positive association is being found amongst the studied variables. The operations of the company are positively linked with the daily schedule adherence. This is quite valid for this study as well, as the companies have to follow their daily schedule and they have to adhere to the schedules developed by their production managers [Sanjay 2013]. The same procedure has to be repeated for all the operational and production days, to have efficient and effective production. Task repetition will automatically enhance the credibility and efficacy of the work. Similar findings have been extracted by making review done in the section of literature review and is explored that daily schedule adherence tend to increase the operational performance. Based over the extracted result, it is suggested to the supply chain management that they must have written and implemented plan for their labor and other personnel. All of the personnel and labor must know their daily tasks and must adhere to

this schedule for the efficient production.

Flow oriented layout has positive association with the operational performance. Since the companies has to follow a synergy of the work. They have to follow the orientation of the layout and work in accordance with that layout. The activities that are required to be done in the first stance must be done in the first stance, or else it will destroy the other work as well. Hence, it is the duty of the labor to follow their flow orientated layouts and work as they supposed to work for the efficient production and enhancing their operational performance. Hence it is suggested to the supply chain management that they must have proper training and guidance to the labor and the production team about the flow oriented layouts, to enable them in knowing that which format they are required to followed for the attainment of the efficient production.

The operations of the company are positively linked with the flow oriented layout. Since organizations have to repeat their production to make sure that their customers will be facilitated with same quality products, with every production. However they have to decrease the production time and lead time, without compromising over the quality and this can be done by repeating the production process again and again and becoming efficient. Hence it is suggested to the supply chain management that they must entail their production team for having repetition in their work and become efficient in their production. They must be reached to their optimization level, where they have to extract less waste and have high level of the production.

REFERENCES:

1. Aitken J., Christopher M., Towill D., 2002. *Understanding, implementing and exploiting agility and leanness. International Journal of Logistics: Research and Applications*, 5(1), 59-74.
2. Angel M.S., Manuela P.P., 2001. *Lean indicators and manufacturing strategies. International Journal of Operations & Production Management*, 21(11), 1433 - 1452.
3. Carmen R., Wilson V.V., Betsy L.M., 2007. *Understanding Power and Rules of Thumb for Determining Sample Sizes. Tutorials in Quantitative* 3(2), 43-50.
4. Dávid L., Krisztina D., 2013. *Lean production and business performance: international empirical results. Competitiveness Review*, 23 (3), 218 - 233.
5. Dharmasri W., Vathsala W., 2012. *Effects of perceived organizational support on participation in decision making, affective commitment and job satisfaction in lean production in Sri Lanka. Journal of Manufacturing Technology Management*, 23(2), 157 - 177.
6. Jagdeep S., Harwinder S., 2012. *Continuous improvement approach: state-of-art review and future implications. International Journal of Lean Six Sigma*, 3(2), 88 - 111.
7. Jamshed H. K., 2003. *Impact of total quality management on productivity. The TQM Magazine*, 15(6), 374 - 380.
8. Jan S.A., Per V.F., 2013. *Evidence of lean: a review of international peer-reviewed journal articles. European Business Review*, 25(2), 174 - 205.
9. Ki-Hoon L., In M., 2011. *Measuring a carbon footprint and environmental practice: the case of Hyundai Motors Co. Industrial Management & Data Systems*, 111(6), 961 - 978.
10. Liker, J. (2004), *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer*, McGraw-Hill, ISBN 0071392319.
11. Lokman M., Lanita W., 2014. *Manufacturing strategy and organizational performance: The role of competition and MAS information. Journal of Accounting & Organizational Change*, 10(1), 83 - 115.
12. Mattias H., Jan O., 2009. *Lean and agile manufacturing: external and internal drivers and performance outcomes. International Journal of Operations & Production Management*, 29(10), 976 - 999.
13. Mohamad A.N., Hom D., Ashraf L., Nick B., 2013. *Lean readiness level within Kuwaiti manufacturing industries. International Journal of Lean Six Sigma*, 4(3), 280 - 320.

14. Peter H., Anders B., Per L.J., Pia B., 2012. *Lean and the working environment: A review of the literature. International Journal of Operations & Production Management*, 32(7), 829 - 849.
15. Richard C., 2002. *Is "lean" a universal production system?: Batch production in the automotive industry. International Journal of Operations & Production Management*, 22(10), 1130 - 1147.
16. Sanjay B., 2011. *Measuring the Leanness of an organization. International Journal of Lean Six Sigma*, 2(1), 55 - 74.
17. Sanjay B., 2013. *Analysis of whether Lean is viewed as an ideology by British organizations. Journal of Manufacturing Technology Management*, 24(4), 536 - 554.
18. Todd A.B., Maiké S., Ian S., 2011. *Learning to be lean: the influence of external information sources in lean improvements. Journal of Manufacturing Technology Management*, 22(5), 587 - 603.
19. Veera P.K.S., Abdul R.I.V.G., Chandran G., 2011. *Supply chain management practices in the electronics industry in Malaysia: Consequences for supply chain performance. Benchmarking: An International Journal*, 18(6), 834 - 855.
20. *Business Review*, September-October, pp 96-106.
21. Womack J.P., Jones, D.T. and Roos, D. (1990), *The Machine That Changed the World*, Rawsons Associates, NY.
22. Womack, J.P. and Jones, D.T. (1996), *Lean Thinking*, Simon & Schuster, NY.