

Lean Companies Employed Assembly Workers Train with New Approches

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Abstract: LM has proven itself the production system that enhances shop floor efficiency. Furthermore, the current environment for production firms is accelerating the pace at which LM is implemented. The manufacture of lean is not easy to introduce. It is constant and complex activity. Assembly workers in production processes are the core of lean manufacturing activity. Training is known as vehicle to aid the implementation process. While the importance of training is known so far, there are only a few options for organizing effective training. The results of the survey of questions conducted inside UK manufacturing companies are examined. This article illustrates the definition of lean production and worker requirements in lean environment.

Keywords: Lean manufacturing, Training; Shop Floor efficiency.

1. Introduction

Manufacturing companies from all over the world face intensified competition. Companies must adapt rapidly and without decreasing profitability or even rising profitability to the increasing demand and market demand of customers. Several different development strategies have been applied as a response to the production problems in academia and practice[1-4]. LM, which is the Lean production sector, has been one of the biggest problems for manufacturers since Toyota's TPS, which is the Toyota production system, has increased its performance magnificently [5-8]. Training in the workforce plays a crucial role in developing a lean environment. As LM has many different strategies and philosophies in its complex structure, highly trained and motivated staff are needed[9-11]. Many manufacturing companies claim that organizational culture and the lack of strategic knowledge are barriers to implementing LM[12][13]. The production companies based in the UK have acknowledged the importance of training workers to boost performance; quality of work and employee versatility, but the UK companies cut their training budgets because they consider the training to be an expense not an investment. [14-16].

2. Various Kind of Waste Elimination with Help of Lean Manufacturing

It is possible to trace Lean's concept back to 1903 when Henry Ford first designed the car. Professional craftsmen and fitters built each part and every car by hand, each one at a time, under the initial manufacturing method of Ford. Based on the skilled craftsmen[17-19], mass production was difficult. Ford 1) provided a more accurate measurement unit for the manufacture of parts to achieve mass production, 2) simplified the car layout, 3) minimized workload volumes and 4) set up an assembly line. This production process, called the continuing flow production process, has accomplished the mass fabrication of the cheap Model TPS [20-22]. The continuous manufacturing flow inspired the Toyota method of development. However, the removal of waste from continuous production and adaptation to the culture and market size of Japan came to an end with an improved manufacturing system that reduces the cost of production while improving quality [23-26]. The creation framework is now remembered by the TPS. LM's growth theory was increasingly led by TPS. TPS gradually led to LM's theory of development. LM is a set of techniques aimed at defining and eliminating all forms of waste — seven 'wastes' — or 'Muda' in Japan — are recognized — 1) overproduction waste, 2) waste of waiting for machines or operators, 3) waste in transport, 4) waste of processing itself, 5) Inventory waste, 6) waste of movement of operators and 7) waste of making defective products [27-30].

3. Requirement of Workers in Lean Manufacturing

1. Flexibility and Multi-skilled

In recent manufacturing environments, versatility has gained significant attention. The organizational structures and processes have become static and hierarchical with regard to flexibility and responsiveness as the business requirements shift toward low production volumes and high variety. Many businesses understand that professional employees are one of the toughest strategic capabilities. [4] Workers must be able to adjust themselves to the complexity of sudden changes in workplaces, consumer orders, creation of goods and the rapid speed of technological development and sustain the same output level without stopping production or decreasing efficiency [28-33]. The flexibility required in lean environment can be only achieved through developing multi-skilled workers. Not only are workers responsible for the production tasks, but also are workers required to inspect the quality themselves (self-inspection) and maintain the machineries [34].

2. Team Work and Flexibility

LM is therefore considered foundation of LM absolutely focused on the teamwork. Each worker must be able to perform all other tasks in the community when it comes to multi-trained people (cross-training). The goal of cross-training is to enhance employee flexibility and the efficiency of shop floors [5]. The group members should execute the activities in their group in a team working under lean production, discuss, and agree to improve the process. Working with teams offers the ability to interact with other staff in the group – the Kaizen circle. It also motivates and encourages staff to fight with other groups. The driving force behind a team, i.e. team leaders, is another controversial topic in the teamwork. The team leaders are responsible for process management, teamwork distribution and tempo setting, as well as training and complaints resolution. The team leader, who can speak without pre-judicialness, is for the shop floor workers the nearest and most trustworthy person. [6] [7] the trust and social relationship between the employees cannot only be accomplished by supervising the team. Consequently, the leadership is a pivotal skill in shop floor under lean production and it is more crucial in US or Europe due to individualism culture at work place than Japan.

3. High Motivation

Skilled and engaged staff led to realistic LM philosophies, such as a just inventory in time, small baton manufacture, quick die adjustments, quality self inspection and a mixed product flow. Lean manufacturing is delicate. [8] In other words, the whole LM idea would collapse if employees refuse to pay attention and to solve problems. The progress of LM adoption depends entirely on workers' ability to work together. LM is a journey that lasts. No company can work perfectly and deliver faultless LM. In Toyota, managers tell the workers 'what to do' but not 'how to do' in order to let the workers think the best way to do the job of their own accord. [9] Consequently, the workers are required to be highly motivated and managers and team leaders are required to at least eliminate the sources which de-motivate the workers.

4. AN Experimental Analysis

For several organizations, training is carried out in various ways and methods. Each worker must have attended at least one training session before they began their job and concentrated on the assembly operators. Every organization has its own characteristics and training methods, because there is no correct or wrong response to the training program. This empirical research is an inquiry into the training of assembly operators in actual working circumstances in various UK fabricators. The outcome will help review training programs in organizations and the challenges they face. This empirical study was performed by mail. The survey consisted of 50 questions to choose single and/or multiple answers, open answers, and questions to choose rank by perception level. The questions based on training in general, LM and LM. Out of 250, the UK's manufacturers answered 23: six major businesses, seven medium-sized businesses and 13 small businesses. The data have been analyzed using SPSS 10.0 software statistical kit (Statistical Package for the Social Science). SPSS is a robust and versatile framework for statistical analysis. It enables to use the data to generate tabulated reports, charts, and plots of distributions and conduct complex statistical analyses. In addition to the usage of SPSS 10.0, a cross-tabulation analysis was conducted wherever appropriate. A cross tabulation analysis facilitates the multiple distributions of two or more variables simultaneously, therefore it enables to interpret the relation between two or more questions more visibly. In this section, some remarkable responses and overall findings are addressed.

4.1 Remarkable Result

4.1.1 Team Working in Shop Floor

Question: Do you encourage team working in shop floor?

In response, 23 companies (100 per cent) encouraged shop floor teams, as Figure 1 shows. As previously mentioned, LM therefore depends entirely on the teamwork as the foundation of LM. The findings show that businesses that use LM follow the right line and those that do not use LM have great potential to use LM as well.

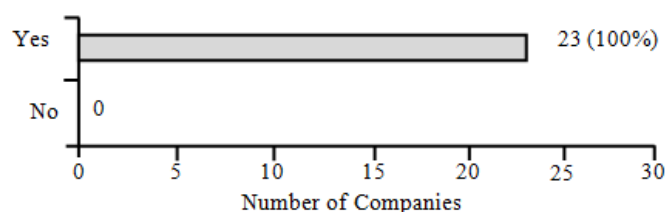


Figure 1. Team Working in Shop Floor

4.1.2 Importance of LM/Consideration themselves as LM

Question 1: How important do you think LM for your production?

Question 2: Do you consider your manufacturing system as Lean Manufacturing?

Of the 23 respondents 57% (13) responded that LM was "Very significant," and 17%(4) replied that LM was "Extremely significant," while only 9%(2) replied that LM was "Not very important." LM was obviously becoming a major issue for UK manufacturers. In Table 1 a cross-tabulation test is shown between LM sense and LM itself.

Interestingly, while LM was preferred by 74% (17), 43%(10) decided not to consider production as LM to be extremely significant. It is interesting to note that LM is very important (17%). The explanation is that the basic concepts of LM are lacking in knowledge and comprehension and can be discussed them. The analysis result reveals that there is an urgent need for assistance to LM implementation.

4.1.3 How close to LM/Importance of LM

Question 1: How close do you think your production system is to being LM?

Question 2: How important do you think LM for your production?

No organization was there that considered LM was perfectly attained to their output. 52 percent (12) replied that their manufacturing systems are very far from LM. Table 2 shows the result of cross-tabulation analysis between importances of LM and how close to LM on

Table 1. Significance of LM/Consideration Themselves as LM

		Importance of LM						total
		Extremely	Very	Quite	A little	Not al all	Not sure	
LM	Yes	2 (8%)	5 (23%)	-	1 (4%)	-	-	8 (35%)
	Halfway	1 (4.5%)	2 (9.5%)	-	-	-	-	3 (13%)
	No	1 (4.5%)	6 (25%)	1 (4%)	2 (9%)	2 (9%)	-	12 (52%)
Total		4 (16%)	13 (59%)	1 (4%)	3 (13%)	2 (9%)	-	23 (100%)

Table 2. Importance of LM/How Close to LM

		Importance of LM						total
		Extremely	Very	Quite	A little	Not al all	Not sure	
How close to LM	Perfectly	-	-	-	-	-	-	-
	Very close	-	1 (5%)	-	-	-	-	1 (5%)
	Quite close	3 (14%)	5 (23%)	-	-	-	-	8 (37%)
	Far	-	7 (29%)	-	3 (12.5%)	2 (9.5%)	-	12 (51%)
	Very far	1 (5%)	-	-	-	-	-	1 (5%)
	Not sure	-	-	1 (4%)	-	-	-	1 (4%)
Total		4 (19%)	13 (57%)	1 (4%)	3 (12%)	2 (9.5%)	-	23 (100%)

Each company. It is found that, and it is significant to note that 30 percent (7) companies find LM to be "very important" for their manufacturing environment, while evaluating their production system as "far" from LM. This finding can be interpreted as implying that businesses either do not know the appropriate approach on the process of implementing LM or. Either way this result suggests that strategically, effectively and efficiently adapting LM needs a guideline.

4.1.4 Workers' Understanding of LM

Question: Do you think your assembly workers have good understanding of LM? There were 22 valid answers. It was the higher than the author's expectation that 64% (14) answered that workers fail to have better comprehension about the LM.

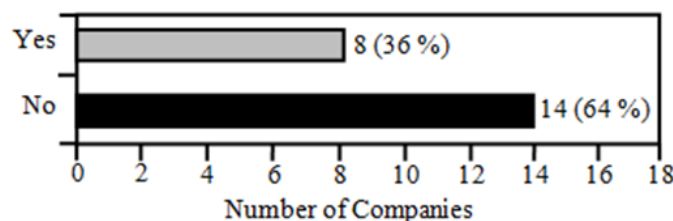


Figure 2. Workers' Understanding of LM

4.1.5 Existence of LM Training Programmed

Question: Do you have a LM training programmer for assembly workers?

There are 22 valid answers. 55% (12) responded that they do have a separate LM training programme. It is a high percentage but again, this result inconsistent with previous analysis (4.1.3 and 4.1.4). If there is a LM training programme, why workers fail to have a fine comprehension about LM? If there is a LM training programme, why they have not come very close to LM? The gap was probably caused from the poor strategy of LM training programme.

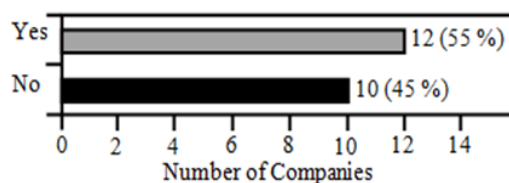


Figure 3. Existence of LM Training Programme

4.2 Overall Findings

Positive Results

- The share of companies in the workshop was 100% based on a team approach. The success of LM is dependent on team work; thus, teamwork is the pivot of LM. The result was considered reasonably successful for this reason in terms of LM implementation processes. It says that businesses take the right steps or have a good potential to facilitate the inclusion of LM practices in their production processes.
- The number of companies with a written training curriculum (74 per cent) is positive as well as negative. The number, on the other hand, can be noticeably very low since the training written protocol is the basic component of the training behaviour. This figure reflects the strong support of the companies for education. Furthermore, four companies were disappointingly unable to provide a training curriculum for the future.
- The essence of the appraisal process is an important part; thus, it is rare to propose that an evaluation process for the author concerned determines the quality of the training program. The appraisal program is an important component of a training plan and a means of evaluating the progress of the training programme. According to the positive viewpoint, the proportion of businesses with an estimation method (57%) is reasonably high, whereas 43% without evaluation processes from the negative perspective.
- The percentage of companies (9%) that LM is considered "Not at all significant" is considered very small and positive. It is because 91% of businesses think that LM is important to a certain degree. Moreover, a higher number can be noticed by the percentage of 74 percent that responded "Highly Important" or "Very Important" and the LM is expected to be more interesting by businesses.

Negative Results

- The large percentage of organizations using the built-to-order assembly method and the mixed assembly line model supports both a value of LM practices and need for strategic planning.
- The percentage of companies (57%) that recognize that they have a few issues with their system of existing training is considered to be relatively small. One of LM's basic principles is "keep discovering a problem and constantly improving it." The author believes, according to LM theory that no program of the ideal-training is there. While it appears to be a faultless one, there is still a void that needs to be changed. Consequently, an author believed that 43 percent companies which replied to have no issues with the training program had not realized the problems yet. Amid the issues found by the respondents, the author has given more consideration than others to the subsequent statements as the crucial issues to be addressed:
 - Unstructured curriculum of preparation
 - Inadequate document on training
 - No analysis or assessment process
 - Based more on performance instead of training itself
 - On-the-job only training
 - Workers find it hard to pick up new LM ideas
 - Regrettably, it had been discovered that critical skills (leadership, team building and decision-making) were not trained in more than half of the organizations to support LM service.

- Despite the high percentage of companies (91 percent) that find LM relevant, it is considered that the percentage of companies (55 percent) that have an LM training program is relatively low. It is disappointing that the training was not given a high weight of importance for LM operations in nearly half of the companies. LM has demonstrated some interesting advantages within the new dynamic manufacturing climate. LM has been given the proper consideration by most companies; but, the questionnaire exposed that they have not yet adopted the accurate approach.

4. Conclusion

This paper seeks to highlight LM issues, particularly with respect to training assembly workers in the UK. 250 UK manufacturing companies performed an observational analysis. The study indicated positive as well as negative outcomes. In total, the companies recognized the value of LM; however, in the implementation of instruction, the majority of the companies involved in the survey did not follow a correct approach. By organizing a comprehensive and well-coordinated training model, negative results can be strengthened or initiated. Finding out an enhanced LM training structure to enhance the performance and profitability of Lean systems is important.

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