

# **The Role of Productivity Improvement Tools and Techniques in the Textile Sector during Manufacturing**

**Hussain Bux Marri and Ghulam Yasin Shaikh**  
**Department of Industrial Engineering and Management**  
**Mehran University of Engineering and Technology**  
**Jamshoro -76062- Sindh, Pakistan**

## **Abstract**

Globally, the manufacturing industries have incredible contribution in the global economic growth and it has wide recognition in the area of poverty alleviation. The manufacturing sector is also considered as one of the significant economic contributor in the Asian sub-continent since last 1900 century. This study focuses on the leading industrial unit of metropolitan city of Karachi which is considered to be a HUB of manufacturing industries and the indigenous manufacturing of Hyderabad. The work study and work measurements tools generally provides the better output results and facilitates to the user to augment their performance during the manufacturing operations. The research work highlights the implementation of work study and motion study for productivity improvement methods during the manufacturing process. The designed framework was implemented in the manufacturing units for the achievement of study objectives. The report also shows that during the manufacturing operations where the applications of work study have been used, and it was found that proper implementation of work study applications can provide more productivity and quality production.

## **Keywords**

Time and motion study, Productivity, Indigenous Manufacturing

## **1. Introduction**

Over the last several years, manufacturing industries have been great source of employment to the society throughout the developing and development economics and the out put of these manufacturing industries have rendered quality products to end-users too. In every manufacturing organization, the application of various technologies developed and designed by the engineers also improved the integration of various components such as, people relation, facility design, work study and methods study tool to made dramatic changes in production. According to Azadivar,F and Wang,J (2000) in traditional manufacturing system the focused was reducing the transportation cost but currently these needs are changed from cost to the productivity . The modern manufacturing system also because primary tool for proper capacity utilization, Adequate location and appropriate layout.

## **2. Application of Motion and Time study**

The application of motions and time study are widely used not only manufacturing but in health science too see Pizziferri,L et al (2004); and, are mainly concerned with the manpower involved in the manufacturing units and every aspect of life for the e the performance of machines/human performance during the production in terms of increasing productivity and reducing the cost of products.

## **3. History of Time and Motion Study**

It is well known fact that in manufacturing business, the time and motion study started its journey in 1881 and kept on continue its innovation under by the Frederick. w. Taylor with the aim to minimize the time factor and enhance productivity. Benefits of motion and Time study:

1. It helps, increase, production & productivity
2. It can reduce indirect and direct costs
3. It offers improvements in working condition
4. It helps in reducing the fatigue or danger
5. Proper utilization of costs & controls

6. It results in better work place layout with minimum movement of workers and machines.

#### **4. Focus of Research**

This research work focuses on the manufacturing industries based in the indigenous units of Karachi and Hyderabad. The applications of work study are applied, during the study various tools and techniques were employed to evaluate the human performance.

##### **Micro motion study**

The main purpose of micro motion study was to calculate the overall human activity and these activities are further divided in to the small movements.

#### **5. Time Study Plan**

During the study, time study plan was developed in order to audit all manufacturing activities and it was further classified in the flowing manner. The analysis of the operations required to produce an article in a factory, with the aim of increasing efficiency. Each operation is studied minutely and analyzed in order to eliminate unnecessary motions and thus reduce production time and raise output, which increases productivity. The first effort at time study was made by Fredrick Winslow Taylor in the 1880s in his book Scientific Management in order to create a management standard for evaluating individual employee productivity. Early in the 20<sup>th</sup> century, Frank B. Gilbreth developed a more systematic and sophisticated method of motion study for industry, taking into account the limits of human physical and mental capacity and the importance of a good physical environment. Ghosh. A, Craig, C. (1984) states that facility location is the source of improvement in performance improvement but it also supports future competition.

- (i) Time Period Study.
- (ii) Activities / Programs study.
- (iii) Process reimbursable activity

##### **How it Works in manufacturing sector**

Observe processes performed at your workplace by your staff and record the time spent in each. Do not go into lengthy details; simply stick into significant ones. Do this for at least a week so you have a clear idea of what consumes how much time. Try not to judge any action during the course of your investigation; concentrate only on who, what, when and how.

##### **Facility layout**

Every manufacturing unit regardless of their output needs proper allocation of the space so as to meet the overall objectives of the company. The proper designing of facility location also provides significant output to the user to improve their performance. For the efficiency enhancement of all the components of manufacturing units, the organization should re evaluate the main component's of the factory such as , transportation of goods, storage of input and and out put products and process of time all resources as suggested by Seliger,G. According to Vazir,A.and Laporate G, (2004, states that adequate facility layout addresses various issues related to the manufactured products and its placement, this was further supported by ReVelle, C., (1987).

##### **Get employees involved**

You don't want your people to get the wrong idea. It will only breed tension and nervousness. Inform them about why you are performing the experiment and assure them that there will be no job losses. This is the best way to ensure an honest response from them. According to Schaufeli,; et al (2007), there is strong need to develop the employee relationship with the demand of the job.

##### **Break down the job into elements**

Break the job down into short tasks with 'break points' in between.

##### **Prepare process charts**

A picture demonstrates a worth of thousand words. Interpretation of these observations into a flowchart reflects what you intend to offer. Starting with what, jot down when, where by whom and how much time is consumed till the end of the process.

## Analyze

Take a good look at your diagram and analyze it in light of objectives.

## Process of designing friendly work method

New product always undergoes from various processes and considerations to be capable for end\_users. It is sometimes great opportunities for the designers to come up with best methods, this requires experiences that provides new opportunities from improvements

### 7. Steps Taken During Method Study in Manufacturing Study

- **Select:** The operation → Methods people
- **Record:** Data of activities ( Motion ) No of participates
- **Examine:** Evaluation → of data systems
- **Development:** New methods that improve output
- **Installation:** install best recommended methods
- **Maintenance:** System methods

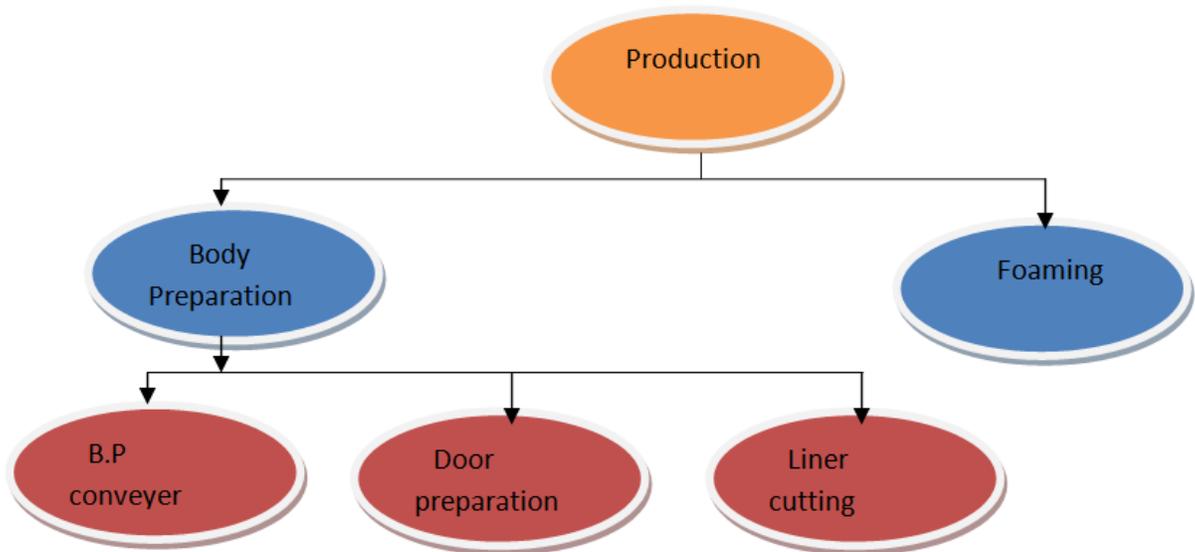


Figure 1: Framework proposed and implemented in industries.

The framework as mentioned in Figure 1, was implemented in the two manufacturing units and compared the problems occurred during the process. The overall implementation of framework was implemented with the assistance of the employees involved during the manufacturing cycle as

## Conclusions and suggestions

This study was carried out in multi manufacturing environments so as to understand and evaluate the overall progress of employees on one hand and the performance of the man-machine systems on the other. The chart was only used in one of the assembly based environment. The source of getting involved in this project was the group of final year students who undertook the assignment and finished the task under the supervision of their teachers. During the study various tools of time and motion study methods were employed for the results and these results were further compared with the other manufacturing /assembly based companies, which results the following observations.

- (1) It was advised to the concerned department that the proper shift arrangement should be overlapped as barrel of injection molding machine used to become cold during shift change.
- (2) It was proposed that worker should be restricted not to leave the machine until other workers replace him.

- (3) Worker should be provided all the facilities so that he could perform his responsibilities and authorities in a appropriate manner.
- (4) The machine operations may be monitored according to the prescribed manuals.
- (5) Tools and working operating components should be arranged according to time and motion study principles so that fatigue and stress may be minimized.
- (6) The machines should be flexible enough to move from one place to an other easily
- (7) The chain of worker should be arranged in order to provide easy flow of work.
- (8) Chain of command should monitor all the manufacturing activities in order to avoid any inconvenience.
- (9) Video cameras should be installed in order to monitor their manufacturing activities.
- (10) The rewards should be offered to all the workers for their better performance annually

## References

1. Azadivar, F. and Wang, J. (2000) "Facility layout optimization using simulation and generation algorithms", *International Journal of Production research*, Vol. 42, No 01
2. Ghosh, A. and Craig, C. (1984) "A location Model for facility Planning in competitive environment", *Geographical Analysis*, Vol. 16 No 01.
3. Pizziferri, L. (2006) "Primary care physician time utilization before and after implementation of electronic health records. A Time and Motion Study" *Journal of Biomedical informatics*, Vol. 38, pp. 176-188
4. ReVelle, C., (1987) "Urban public facility location. In: Mills, E. (Ed.)", *Handbook of Regional and Urban Economics*, vol. II.Elsevier, Amsterdam, The Netherlands, pp. 1053–1096.
5. Schaufeli, B. (2006), "The measurement of work engagement with a short questionnaire. A cross National study. Educational and Psychological Measurement, Vol/ 66, No 4, pp. 701-716
6. Tang, Z. (2007), "Workflow in intensive care unit remote monitoring - A Time and Motion Study, *Crit care Med*, Vol. 35. No. pp. 2057-2063.
7. A-Asef, Vaziri and Laporate, G. (2004) "loop based facility planning and Material handling". *European Journal of Operational Research*, Vol.164, pp. 1-11.
8. Seliger, G., Franke, C., Ciupek, M., and Başdere, B. (2004) "Process and facility planning for mobile remanufacturing", *CIRP Annals - Manufacturing Technology*, Vol. 53, No. 1, pp. 9–12.
9. Franke, C., Basdere, B., Ciupek, M. and Seliger, S. (2006) "Remanufacturing of mobile phones – capacity, program and facility adaptation planning", *Omega*, Vol. 34, No. 6, , Pages 562–570.