

# CHAPTER 6

## CONCLUSION AND RECOMMENDATION

### 6.1 Conclusion

In jewelry industry, production mostly concerns with labour intensive. Production time consumed in manufacturing process is difficult to specify exactly. In addition, nature of jewelry product involves with variety of product design. Production contains complication of management and control. As consequences, delivery satisfaction problem is faced.

In this thesis, a reduction in delivery delay has been focused on. A jewelry factory which faces with delivery satisfaction problem is used as a case study factory. The cause of the delivery delay problem has come from many aspects. In this thesis process flow within manufacturing is scoped to be concentrated on. However, this study covers not only the process flow itself but also other factors related with the process flow. The related factors consist of internal and external factor. The internal factors are the process flow itself, document flow, and material handling. These have interrelated on each other, changing one could impact operational performance of another one. These has to be analyse along together in order to understand the impacts of each factor which has on others. Within the process flow itself, two cases of flow, normal production flow and rework flow, are taken into consideration. Normal production flow is the usual order of flow required in manufacturing product. Rework flow is the uncertain flow that has critical effects on the overall process flow. For the external factor, production planning is considered.

To achieve the reduction delivery delay cause objective, many concepts are adopted. Work study concept is utilised on analysing the process flow. That comes out with emerging of improvement area that is coordinator role. Many non value-added jobs are performed at coordinator shop. Therefore, some unnecessary functions of coordinator as center of distributing job, quality inspection, checking conformance of order including counting quantity, managing rework, etc., are eliminated and replaced by improving on

other two factors' operation. As result of the improvement on coordinator function, rework flow is automatically changed in improved direction following the change of normal production process flow.

After implement the improvement, responsibility of coordinator is reduced whereas it performance efficiency is provided at higher level. The process flow is shorter in which that allow process to move faster. The complicate of process flow is diminished. Rework flow rate found is lower. Process flow itself becomes more systematic.

Existing material handling method is analysed. Two types of material handling tool are used. One is box used in transferring wax object whereas the other is tray used in transferring metal object through the processes. After analysing, tray material handling tool is cancelled. In stead of that, basket filling with sponge is introduced to replace. Hole with specific number of hole is made in the sponge for specific capacity of the basket. Consequently, counting job is simplified by utilising visual counting. Time consumed from counting process is diminished. Furthermore, similarity product for each basket discipline is conducted so that some repeat inspection process such as checking size is replaced. This inspection is performed only one within the whole process flow. Time saving from this process is gained. In addition, there is separate basket for rework job. Discipline related with rework that rework job has first priority and must be operated first in order to conform the concept of keeping to process one order and finishing at a time, is utilised. That result in reduction of complicated of rework flow and provides effective flow of normal production and rework.

Information flow management concept is applied for developing document flow system. Effective document system must support flow of process. Thus document flow system is adapted along with the process flow improvement. After analysing, the existing system is found that difficulty in tracking process flow information is provided, no overall information is available, Furthermore, serving existing process flow is not effective. Therefore, some traditional documents are eliminated whereas some are adapted to match with the new improved process flow. New documents such basket control document, rework document, are also introduced to serve the changed process flow and new material handling method, basket system.

The developed document flow system results in decrease of document quantity. It also increases availability of overall information within process flow. In addition, ease for tracking problem is allowed from the new document system.

For production planing factor, it is analysed and found that unknown status of each shop about time to start manufacture job that still allow the entire production process to finish order on time, is the problem affected process flow and delivery performance. Thus Gantt Chart and Critical Path Method (CPM) concepts are developed on the external factor, production planning. Under these concepts, Monthly pre-production plan is provided in terms of overall and each shop. Then they are distributed to each shop and related staff. The introduced plan does not aim at advance stage of conformance the plan. It purposes to be as reminder for each shop. The production dates for each shop that still allows the final shop to finish its work are informed in the plan. Pull system should is employed in parallel with the information received from the plan. Pulling job from the previous process is attempted when the informed date reaches. After introducing the pre-production plan the unknown status of each shop is eliminated. Realising of their own status in manufacturing is achieved.

In evaluation result, obstacle is faced. There are many limitations in measurement, mentioned in next section, causing by nature of product and the factory business process. Thus result is provided in two forms: objective and subjective result. In objective aspect, the process flow is shorter. Non-productive and transportation activities are cut down. The document flow and system serves the production process to flow faster. Systematic operation within production is gained. Managing and controlling become more effective. In quantitative result, process flow improvement has been proved by the manufacturing flow efficiency and rework rate. 14.4% and 47.4% of manufacturing flow efficiency and rework rate improvement is gained. When consider delivery performance, delivery satisfaction has been increased. From partial measurement, delay of delivery decreases around 66.6%. Lagging due date rate decreases from 0.5 to 0.2. On the other hand, early delivery improvement is also obtained that is the increase from 0.1 to 0.3 leading due date rate. Objective seems to be reached. However, result evaluation of meeting thesis objective can not be directly proved. Therefore, subject result is generated in order to support objective fulfillment. By interviewing related staffs, the result comes out in the same positive direction. Easier and faster process flow is received from the

improvements. Urge in processing is reduced. Complain from customer is lower. Greater delivery satisfaction is received. Finally, it could be concluded that the objective of this study to reduce delivery delay is fulfilled partially.

### **6.1.1 Limitation**

The limitations involve with this study are as following:

1. **Time.** There is time limitation for study. Data collection for analysing and evaluating the result requires longer period of time. The more available data, the more effective improvement and reliable result.
2. **Evaluation.** Evaluation improvement result is limited. In terms of result comparison, evaluation can not be provided due to the reason of jewelry product nature. One order consists of variety of product model. The order in each month has different. Number of order per month does not fix. Design of product is time-sensitive. Majority of model ordered has been changed. One order consists of different model and

## **6.2 Recommendation for Future Study**

For the continuation of the further study is a good case. The recommendations for future study are represented as following:

1. Analysis in technical term of work flow process within each productive shop should be studied. Productivity improvement can be a result achieved from this attempt.
2. Time standard measurement should be applied in order to construct availability of standard information which will benefit in many aspects of further utilisation such as in setting production plan, calculation of manufacturing cost, etc.
3. Scheduling and planning system of production should be adopted instead of using experience. Effective production control and management can be gained. In addition, manufacturing system will become more systematic.