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Analysis of Risks and Bottlenecks of a Poly Bag Manufacturing Factory -A Case Study

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Abstract

The material prices of poly bags skyrocket to new heights and forecasters see no end to this trend. Also legal restrictions are imposed on some types of polythene products. In this situation, any entrepreneur engaging in the poly bag manufacturing process faces significant challenges. Therefore, a case study of an analysis of risks and bottlenecks of a poly bag manufacturing factory was carried out for the purpose of modeling and simulation of a poly bag manufacturing factory to improve the productivity to face the underlying challenges. This paper presents the analysis methods, and the results of the analysis are also discussed.

1. Introduction

A case study of an analysis of risks and bottlenecks of a poly bag manufacturing factory was carried out in view of modeling and simulation of a poly bag manufacturing factory to improve the productivity and performance of it. For this purpose, a poly bag manufacturing factory was selected (<http://www.thermosl.com/>). It was a member of a large group of factories (<http://www.bamholdings.com>). In fact, it was integrated forwardly with other member factories.

Various types of polyethylene and polypropylene are basically used as raw materials for the poly bag manufacturing and subsequently undergo some other processes such as printing, sealing, cutting, quality checking and packing. Film extrusion plays a major role in manufacturing poly bag products that are indispensable in day-to-day life. Film extrusion is largely deployed to manufacture poly bags in a continuous flow. Figure 1 shows a simplified schematic diagram of film extrusion process (Thomas *et al.*, 2005, <http://plastics.turkavkaz.ru>, <http://www.freepatentsonline.com>).

The selected factory is manufacturing ten types of poly bags namely top seal bags, bottom seal bags, straight hanger bags, angular hanger bags, envelope bags, pillow case type bags, perforated bags, bags with ventilation holes, opaqued bags and gusseted bags from two different production lines. Simplified production process flow diagram of the factory is shown in Fig. 2 (<http://www.thermosl.com>). This paper presents the methods of analysis of risks and bottlenecks. The results of the analysis are also discussed.

2. Methods of Analysis

In the analysis of risks and bottlenecks of the selected poly bag manufacturing factory, several analysis methods can be applied. In this study, three methods were mainly applied to find and analyze the risks and bottlenecks of the factory. One method was analyzer defined method and the others were bottleneck analysis (Wang, 1998) and SWOT analysis (<http://en.wikipedia.org>, Harvard Business School,

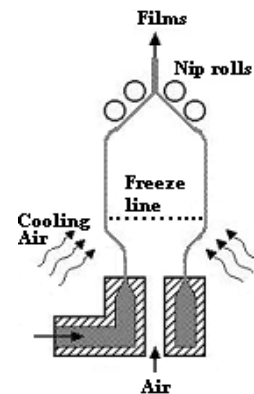


Fig. 1. Simplified film extrusion process

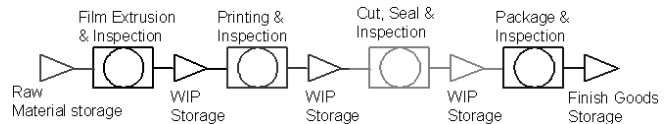


Fig. 2. Simplified production process flow diagram

2008). Analyzer defined method was risk analysis. Bottleneck analysis and SWOT analysis were also used in this case. The layout of the factory and the bag manufacturing process were visually inspected and the required data (demand, production, timing and other) were gathered. Few discussions were taken place with top management, factory manager and few experienced labours. Then the analyses were carried out. In the bottleneck analysis all the bottlenecks of the process that the company experienced and the drawback of the factory were supposed to be found. All the elements (places where actions take place) of the process was inspected and all the tell-tail signs of bottlenecks (poor response time, too long queue, insufficient resources, too slow actions, low capacity of machines etc) were investigated. Then reasons of tell-tails signs were investigated. The reasons found from the investigation were the bottlenecks of the process. The problems that limit the production and business activities of the factory were the risk of the factory. If there was nothing

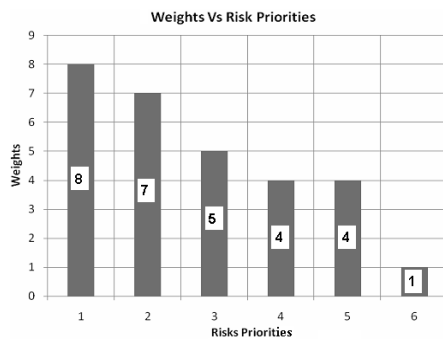


Fig. 3. Risk histogram

to be done to reduce a bottleneck, the reasons of that bottleneck also become a risk. By investigating the problems that limit the activities of the factory and unsolvable bottlenecks, the risks of the factory could be identified.

In the risk analysis, the risks affecting the manufacturing and the business of the factory were identified and they were prioritized according to their effects to the factory. Then the weights were given from scale of 10 according to the priority of risks. The risk histogram was drawn from the weight values of risks to indicate the effects of risk. SWOT analysis was carried out and SWOT chart was drawn to indicate the strengths, weaknesses, opportunities and threats of the factory.

3. Results and Discussions

The results of the bottleneck analysis are improper line balancing of two production lines, lack of inventory control especially in work in progress (WIP), idling of production lines and improper process layout of the production lines. The identified drawbacks of the factory are high lead time, higher wastage, drawbacks related to productivity and lack of record maintenance.

The identified risks for the manufacturing process and the business of the factory are increasing material prices, legal restrictions implemented for some types of poly bags, environmental issues, price competition, increase of alternative product and customers switch to alternatives. Their estimated weight values are 8, 7, 5, 4, 4 and 1, respectively. The results of risk analysis are shown in risk histogram of Fig. 3. Due to the environmental issues government has imposed legal constraints for some types of poly bags. Risks of alternatives are from the alternative products such as paper bags, fabric bags, metal film bags, plant leaves bags and wooden packages.

In the SWOT analysis, the strength such as forward integration with member companies, availability of regular buyer base, relatively consistent number of buyers, well trained highly motivated team, regular skill development, T&D programs and workshops and international quality systems certification of ISO 9002 are identified. Identified main weaknesses of the company are improper line balancing, lack of inventory control, idling of production line, lack of record maintenance, relatively low productivity, higher lead time and higher wastage. Opportunities and threats are from external origins. The opportunities for the factory are identified as; technical adv-

| | HELPFUL to achieving objectives | HARMFUL to achieving objectives |
|-----------------|---|--|
| INTERNAL ORIGIN | <p>STRENGTHS</p> <ul style="list-style-type: none"> Forward integration with member companies Availability of regular buyer base Relatively consistent number of buyers Well trained highly motivated team Regular skill development, T&D programs and workshops International Quality Systems Certification of ISO 9002 | <p>WEAKNESSES</p> <ul style="list-style-type: none"> Improper line balancing Lack of inventory control Idling of production line Lack of record maintain Relatively low productivity Higher lead time Higher wastage |
| EXTERNAL ORIGIN | <p>OPPORTUNITIES</p> <ul style="list-style-type: none"> Technical advancement of poly bag manufacturing process Technology development of degradable poly bags products Boom in apparel manufacturing up left high demand for accessorized poly bag industry | <p>THREATS</p> <ul style="list-style-type: none"> Legal restrictions implemented for some types of poly bag products Environmental issues Fluctuation of raw material prices Low price offered by the competitors (Price competition) |

Fig. 4. SWOT chart

-ancement of poly bag manufacturing process, technology development of degradable poly bags products and boom in apparel manufacturing process, and high demand for accessorized poly bag industry. The SWOT chart is shown in Fig. 4. The threats from external environment to the company are legal restrictions implemented for some types of poly bag products, environmental issues, fluctuation of raw material prices and low price offered by the competitors (price competition).

In addition, some technical problems such as thickness controlling of films, higher machine setting time (mainly in printing section) and etc. are the other challenges faced by the factory.

4. Conclusion

This paper presented a case study of an analysis of risk and bottlenecks of a poly bag manufacturing factory. One of the suggestions to overcome identified risks and bottlenecks is application of proper inventory control method (especially for the WIP) to improve the inventory control of the factory. In addition, proper production planning and line balancing eliminate the bottlenecks of the factory. Furthermore, the factory should be maximally used its strengths such as forward integration and availability of ISO 9002 to improve its production and business.

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