Applying System Dynamics Approach to the Fast Fashion Supply Chain: Case Study of an SME in Indonesia

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ABSTRACT

The fashion industry is the biggest contributor among the 14 creative industries in Indonesia. Nowadays many apparel companies are shifting toward the vertical integration. Since speed is everything to be successful in the apparel industry, fast fashion retailers must quickly respond to the market demand. This papers aims to develop a model of the supply chain of a small and medium scale enterprise (SME) of an apparel company in Indonesia and to propose a decision support system using System Dynamics (SD) and helps the management to identify the best business strategy. Simulated scenarios can help the management to identify the most appropriate policy to be applied in the future. Case study method was used in this research where data were collected from a typical fast fashion firm in Indonesia that produces its own wares ranging from raw materials to be ready-to-wear clothes, has three stores, a warehouse and is running online sales system. We analyses the result of many simulations in a fashion company from an operational point of view and from them we derive suggestions about the future business strategy in a small and medium fashion company in Indonesia.

Keywords: system dynamics, fast fashion, supply chain management, SME, Indonesia

1. Introduction

During this time, Indonesia was only became a home for original equipment manufacturer (OEM) for branded products from another countries such as Zara, Gap, Esprit, Uniqlo and so on. Fashion industry in Indonesia basically has the potential evolved essentially very well. Since Indonesia has potential of natural and human resources, it could produce qualified products fashion.

Ironically, none of the original Indonesia brand garments are sold in Factory Outlets

(FO). Therefore the domestic apparel firms must quickly improve themselves to face this challenge. Learn from the fast fashion industries that has been successful can be a reference and basis for improvisation. Their success is no incident. The typical fast fashion brands gain their success is strong supply chain management, scarce value creation, low costs on promotions and flexible brand positioning strategy (Zhenxiang and Lijie, 2011).

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One thing that cannot be denied is the fashion world is highly perishable, influenced by the latest thing seen on the catwalk or on the back of a celebrity. Firms should improving quality, creating unique design, and also applying a proper supply chain to their business strategy.
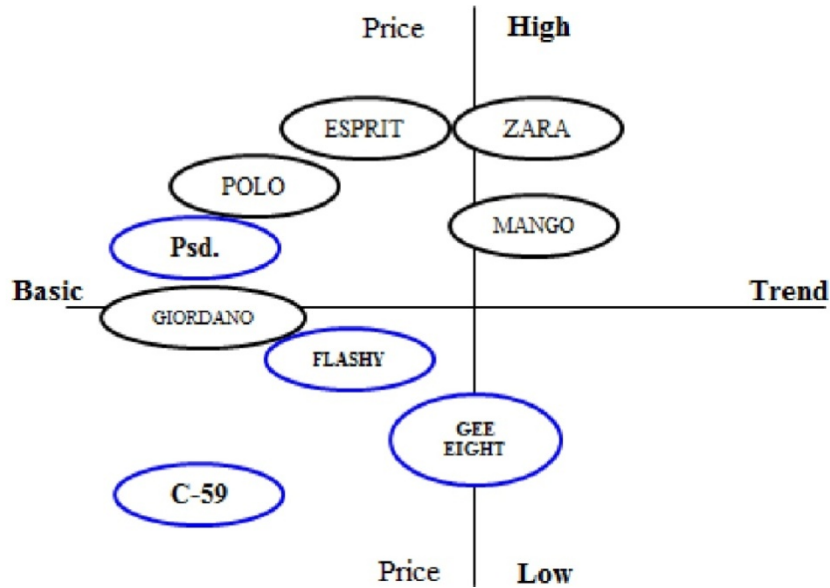

Fig. 1. Domestic Products Position in Indonesia.

Fast fashion is a contemporarily term used by fashion retailers to acknowledge that designs move from catwalk to the store in the fastest time to capture current trends in the market (Zhenxiang and Lijie, 2011). Fast fashion has developed from a product-driven concept based on a manufacturing model referred to as "quick response", it also represent about creating new, fresh product while also drawing consumers back to the retail experience for consecutive visits. Quick Response (QR) was a phrase coined in 1985 by Alan Hunter and moved to a market based model of "fast fashion" in the late 1990s and first part of the 21st century (Hines & Bruce, 2007).

Fast fashion is a term refers to affordable basics and disposable trends. It also used to describe the production of clothing collections based on the most recent fashion trends (Dillon, 2012). Fast fashion is a concept whereby retailers orientate their business strategies to reduce the time taken to get fashion product into store, working on a system of in-season buying so product ranges are consistently updated throughout the season (Barnes et al., 2009). This type of fashion is considered seasonal, mostly trend-focused and mass produced.

Zara is the first word that comes to mind when we thinking about fast fashion. The company's history began with a small shop in La Coruna back in 1975, and turned into a global retailer today expanding in tremendous pace. There are several advantages relating to fast fashion. Firstly, consumers perceive that ranges in the shops are changing more regularly. This makes consumers want to visit the stores on more frequent basis, and that speed of refreshing the ranges is very important (Barry, 2004).

Today many of the apparel industries shift towards vertical integration starting do full supply chain flows such as starting from selecting raw materials, dyeing, designing, cutting pattern, sewing, packing and sell to allotted retail shop and ended to the customers. This to meets the dynamic world mainly due to the growing complexity such as demand uncertainty and also trends changing every four to six weeks. Supply chain is crucial issue to integrate from initial design stage through the early raw material and cash flow also information flow between customer and manufacturer (Hines, 2007). It consists of a series of activities that an organization uses to deliver value, either in the form of a product, service, or a combination of both, to its customers (Samaranayake, 2005).

Due to the improve responsiveness of supply chain in the fast fashion the concept of supply chain can be conclude to such as just-in-time (Bruce et al., 2004), agile supply chain (Christopher et al., 2004; Bruce et al., 2004) and quick response strategy (Patil et al., 2010). Supply chain strategies are either based on reducing cost and improving efficiencies and focus on doing things differently to become more effective in serving the customer and creating added value. In other words, not only efficiency goals can be pursued by supply chain management but also the impact can be seen on such product quality, product availability, customization delivery lead time (Brun & Castelli, 2008).

2. The SD Approach

In this study, we considered a system dynamics (SD) model to be appropriate research tools. The purpose use SD is to improving the understanding and identification of the causal relationship in the system. SD was introduced by Jay Forrester in his book, Industrial Dynamics in the early 1960s. In several areas of management research, computer simulators based on SD model are used as a means to explore the subjects' understanding and behaviour in complex situation. SD is a methodology for studying and managing complex feedback system, such as one finds in business and other social systems.

In fact it has been used to address practically every sort of feedback system, problem solving and policy design. The purpose of SD modeling is to improve our understanding of the ways in which an organization's performance is related to its internal structure and operating policies and then to use that understanding to design high leverage policies for success (Sterman, 2000). John D. Sterman defines SD as follows: "System dynamics is a perspective and set of conceptual tools that enable us to understand the structure and dynamics of complex system. System dynamics is also a rigorous modeling method that enables us to build formal computer simulations of complex system and use them to design more effective policies and organizations".

3. The Case Study

The application of the proposed system is illustrated and verified through a case study. A brief description of the case company and data is given, and the proposed model is then estimated and evaluated. The case company is a typical fast fashion firm in Bandung, Indonesia that produces its own wares ranging from raw material to be ready-to-wear clothes, has three stores, a warehouse and running online sales system. This company is the founder of *boudist* or boutique *distro* community. *Boutique* represents the meaning of fashion for female and *distro* symbolize the "do it yourself" community.

This company started since early 2004, has tag line for their product "Hot new and limited product everyday". The target markets of this company were women in range age are 15-30 years. This company had opened branches in Jakarta and Surabaya, but closed at the end of 2010. The company possesses data on production processes, price of product, sales, marketing strategy, product

characteristic, and the number of worker in each section. Due to confidentiality, all of the actual data are concealed.

3.1. Customer as Demand Perspective

Since Bandung is destination of tourist visitor, many of visitors came and go to Bandung. So in potential customer point of view, visitor and population of Bandung have great effect to demand increment. Some of them will shopping in the store (Buying Product) and remain of them will shopping on the street or another stores. The number of customers who buy product can be considered as sales. These numbers can be used by

companies to estimate demand. The ability to buy product is also determined by income per capita of population.

Customers derived from frequent customer and new customer. Intentions to buy are also influenced by intensify the advertising and promotion undertaken by company. And also product attractiveness would be able to attract customers to come to the store. The frequent customer will contribute to WOM effect. After bought product they will tell to their friends about their impression or when they wear the product, their acquaintance will see and asking where they buy the product.
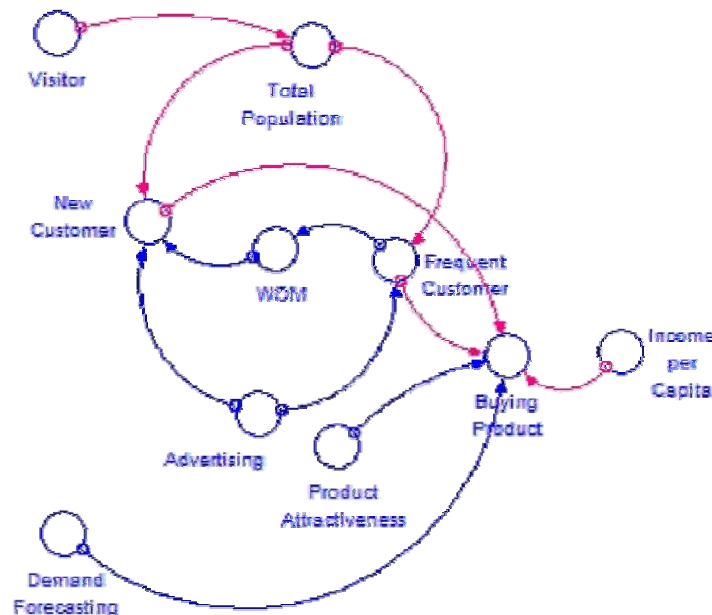

Fig. 2. From Enhancing Customer Buying Product.

3.2. Product Attractiveness

Product attractiveness (in terms of design, quality, product availability, and assortment) is the main stimulus influencing customers to buy product (Brun & Castelli, 2008; Chan, 2011; Rajaram, 2001; Vaagen & Wallace, 2008). A recent study recognizes the importance of assortment rotation in a competitive setting (Caro et al., 2009). For any retailer with

variety-seeking customers, some degree of assortment rotation is desirable, and it pays off significantly to develop capabilities that allow variety to be managed efficiently.

And it needn't just be trendy items that rotate frequently, as happens with Zara and H&M. This also shows the importance of the change itself, rather than specific type of product being replaced. The price factors also

contribute to product attractiveness. It is difficult to say which component of pricing is more important than another. Prices also level where the consumer perceives the price to be fair with value. When customers come in and find out what makes them look younger, thinner, and sexier, they are not as apt to look at the price tag. They know that no matter what the cost, they've found their own best value (Flynn and Foster, 2009).
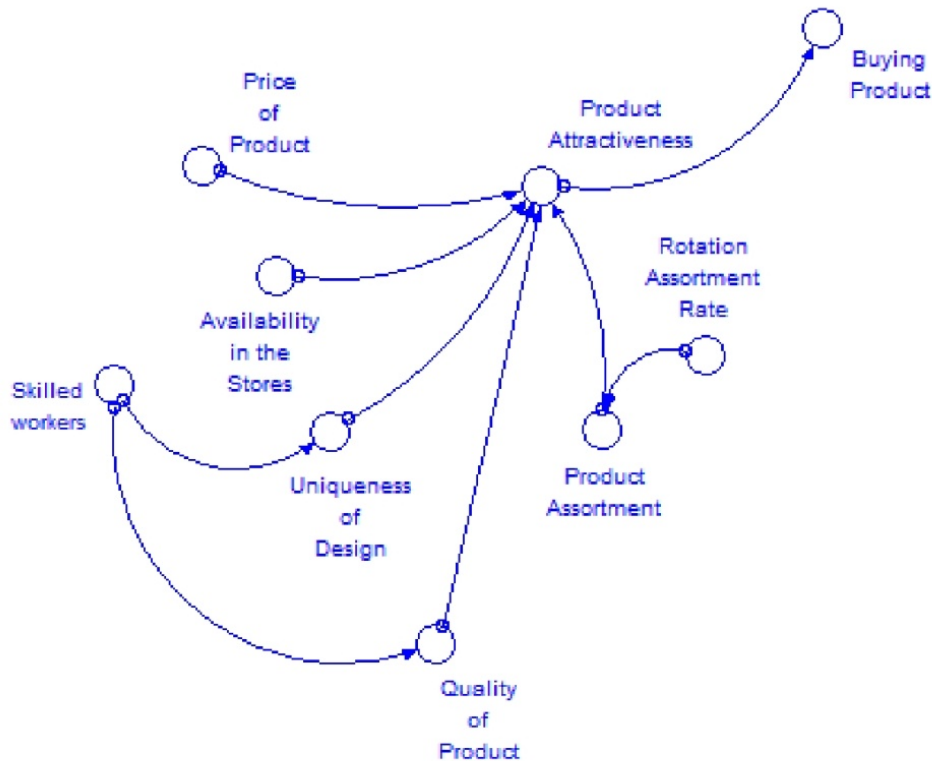
Fig. 3. From Enhancing Product Attractiveness.

3.3. Improving Innovation and Production

Labor is one of vital input for overall production process. Skilled labor will produce high productivity thus merchandise produced have high quality and quantity of production increased. Based on interviews the most difficult part to do is in making pattern (Cutting) and sewing the accordance the pattern. Excessively defective goods produced in the production process. This can be reduced if the company enhancing labor quality (the skill of worker).

Fig. 4. From Enhancing Production Lead Time.

3.4. Total Cost

Total cost is the total cost to run a business, such as raw material costs, fixed costs (building and machines), employee salaries, advertising costs, production costs and training costs. Inflated production cost can also be caused by excessively defective goods. The company should manage the expenses due to the purpose of an organization running a business is to gain optimal wealth. To optimal profit, the company must optimize the operational cost. Any inefficient costs should be eliminated. For example for advertising the company could use the social media to promote their products, make promotion, announcement, and create an events. Total cost can be used as the foundation for management to determine the revenue targets and from this revenue target can specify how many sales targets are to be obtained.

Fig. 5. From Total Cost.

3.5. Causal Relationship

The purpose of an organization is to create more wealth for its owners. This is refers to how to create more profit. A financial measure involves some measurement of the overall profitability of the organization (McGarvey et al., 2001). Based on the goal of an organization running a business, we will illustrate a causal relationship model that provides a framework for developing model to provide decision support to run the business strategies. We analyses the result of many simulations in a fashion company from an operational point of view and from them we derive suggestions about the future business strategy in a small and medium fashion company in Indonesia. This section presents an overview of the causal relationship variables. Red arrow lines indicate the flow of material, the blue lines shows the flow of information between the factors, and the green lines indicate the financial flows in the system.
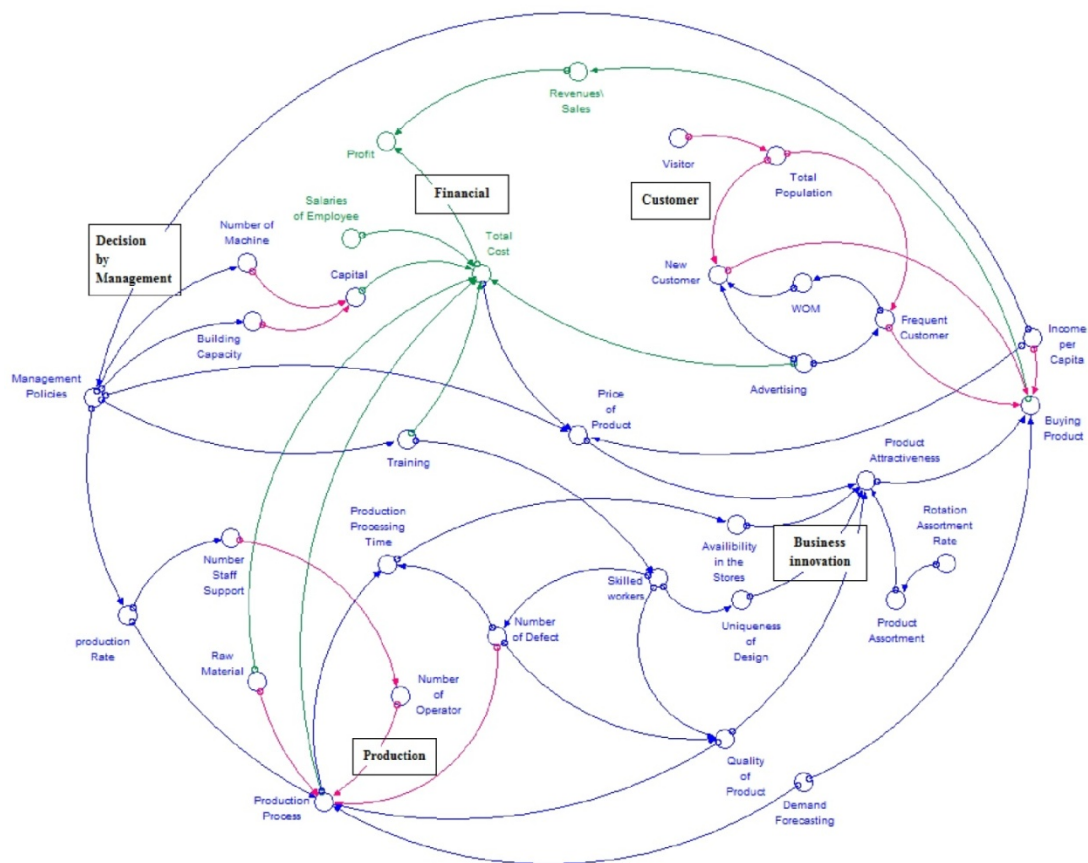

Fig. 6. Causal Relationship General Supply Chain Perspective.

4. The SD Model

Based on causal relationship model, initial input parameters for the proposed model are shown in this table:

Table 1. Parameters Input in the Proposed Model.

Parameter	Definition	Unit
Bandung population	Number of population in Bandung	People
Target population	Number of target market age	People
Target rate	Number of percentage target market	Percentage
Display	Number of cloths in the stores	Item
Display level	Number of new arrival item	Item
Display change	Number of rotation cloths display	/weeks
Workers	Number of operator assigned in production	People
Price	The price of product	Rp
Total cost	Cost of employee salaries	Rp

Fig. 7. System Dynamic Model.

5. Result and Discussion

To gain more profit the company must keep frequent customer and increase new customer (sometimes customer) to purchase the merchandise. The product attractiveness such as affordable price, products variety, and also the quality greatly influence to a sometimes customer to be a frequent customer. Based on interview results can be deduced the purchasing power parity of target market for clothing purchases. Rely on this data; the company can set up the level of clothing prices. The second factor is service quality. Service qualities in this point are shop attractiveness and the staff attractiveness. The shop attractiveness supported by the product assortment, rotation of clothing in a display area, and how company define the amount of clothing with a new design for display at the new arrival area (display level).

Within one month, the average customer to buy or windows shopping into store as much as 1-2 times. This is an indication of management in producing the new design and strategy product replacements in the store are very important. It is intended that customers will finding something new and fresh every time comes into the store. Despite these factor are met, but when the availability of goods (display) in the store are low or empty, this will make the customer go to another store and the store will lose the opportunity to gain sales.

With sales increment it means the management has resources to open a new retail store. With the additional number of shop it will effect on shop level. The time taken to replenish store will be lead if the defect clothes decrease. The defect could be minimizing by increase the skill of worker. With the skilled worker the production processing time can be lead. Worker's skills can be improved with training. The target training also can be defined by unskilled workers and skilled workers. Conduct training is not easy, because the company

have to budgeted substantial funds such as the need to hire a professional. But these factors are trade off when the company want to preserve the value of long-term business (customer lifetime value). In recent years, many companies have focused on how to enter markets and meet customer requirements to boost their market share and profit and pretermit the customer loyalty and generate greater profits in the long term. These highlight the keys factors that ought to be considered in making policy decisions.

6. Conclusions and Future Research

The proposed model focuses on the modelling generally fast fashion supply chain an SME in Indonesia. However this study has limitations that result applications of this study are only eligible to the same scale of fast fashion companies, and due to different situation in every country, the result of this study are only relevant if implemented in the same country. This study only considers the company's point of views such as production process, marketing strategy, and human resources. We also state that for providing insight, we are not optimal defining the individual variables such as variety planning under uncertainty, assortment planning under shelf space constraints and consumer behaviour it could be extended in the future research.

In conclusion, we believe this model provides a useful framework to understand and analyse several factor to make decision policies problem.

7. Acknowledgements

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