

CHAPTER 7

CONCLUSION AND RECOMMENDATION FOR FURTHER STUDY

7.1 Concluding Remarks

This study successively presented purchasing and inventory control policies of a single dyadic, a single manufacturer and multi-retailers as well as a retailer and multi-manufacturers cases under different controlling policies. The aim of this study is not only to maximize the total profit of supply chain system as well as the overall channel profitability beyond the traditional chain but also to enhance the relationships among members, which allow the chain to achieve the best financial performance. By demonstrating through overall numerical examples, the research fulfils its purpose, which is to demonstrate the proposed algorithm using Genetic Algorithm and suggest the optimal setting of parameters for each member in the chain. It was also found that the different controlling policies have the significant effect on the performance of the supply chain system and the coordinating controlling policy with exchanging incentives from both partners can generate a win/win situation for all members and improve the performance of the entire chain.

Without information sharing under the decentralized controlling policy for a single dyadic supply chain, the manufacturer has to do the forecasting based on its local information and is usually faced with the problem of error production setting. With the continuing development of information technology, information passing between the end customers' demand and the point of sales is more accessible and less costly to upstream members. By introducing the centralized controlling policy, the financial performance of the chain has dramatically improved. However, it fails to improve the financial performance of some members in the chain. In such circumstance, that member may not be happy to join the chain. An incentive scheme is then introduced as a coordinating mechanism between partners in the chain. The results reveal that the one-sided incentive is sufficient to improve the financial performance of all members and the entire chain. However, this policy generates a large gap of the profit increment between both parties (between the manufacturer and the retailer). This would mean one party could produce a greater amount but earn less. However, when the incentives can be exchanged (two-sided incentive), then this profit increment is shown to be quite balancing between both partners and all the members can attain a win/win situation.

Under the single manufacturer and multi-retailers' case, the manufacturer tends to dominate the chain and normally has higher bargaining power over the retailers since the retailers have to rely on its products. Since operating the chain by aiming to maximize one member's profit or solely looking at its own benefit as in the case of the centralized controlling policy under the manufacturer domination, willingness for cooperation is hardly achieved since they may concern about the confidentiality of information and may not see a long-term benefit in sharing information. When the aim is to maximize the profit of the entire chain as in the case of the centralized controlling policy under the entire chain's perspective, it is found that the profit of the whole chain can be increased. However, a slight drop of the manufacturer's profit in this perspective may hinder the manufacturer to go ahead with the plan. Without any compensation, the manufacturer would not be totally happy to join the chain (maximize the entire chain's profit) as the

chain is pretty much dominated by the manufacturer. By exchanging incentives among them, a win/win game for all parties can be achieved. Since all transacting parties are now linked under further improved benefit without the feeling of being taken advantage of, this must be the first step in forming the long-term strategic partnership.

The single retailer and multi-manufacturers' case represents the situation when the retailer has higher bargaining power and is likely to dominate the chain, since the manufacturers have to wait for the retailer's order. When the retailer aims to maximize its own profit as in the case of the centralized controlling policy under the retailer domination, the manufacturers may not fully cooperate since they may gain quite low benefits. However, when the aim is changed to optimize the entire profits of the chain, the profits of the chain and all manufacturers can be improved, but the retailer's profit is reduced. To balance the benefit sharing among members, the similar incentive scheme is introduced and it can also generate a win/win situation for both parties.

By focusing on the bonus incentive, it is noticeable that in the single retailer and multiple-manufacturers' case, the manufacturers are likely to accept the bonus offered by the retailer. In contrast, in the single manufacturer and multi-retailers' case, the bonus incentive is not accepted from all retailers. In fact, the bonus from only one retailer of three retailers is accepted. This is due to the fact that under a single retailer and multi-manufacturers' case, the manufacturers deal only with one retailer. It is reasonable for the manufacturer to accept the bonus and set a higher safety stock level to protect the shortage as well as pay the activated cost to push the on time delivery. However, under a single manufacturer and multi-retailers' case, the manufacturer has to distribute the products to more than one retailer. Even though it is possible for the manufacturer to get the bonus from all retailers by ordering raw materials in a bigger batch and setting a higher safety stock level to cover an effect of uncertainty in demand and lead time, the manufacturer would be faced with problems of holding too much inventory. Therefore, the results from GA suggest the manufacturer not to accept the bonus offered from all retailers, but select to accept the bonus from one retailer who offers the highest profit to the chain.

One of the emerging trends in the supply chain management is the realization that strategic partnerships among the companies in the supply chain are essential for improving the performance and responsiveness of the supply chain. As defined by Apte & Viswanathan (2002), a partnership has been defined as an ongoing relationship between two parties in the supply chain in which the parties agree on objectives, policies and procedures for sharing information, for ordering, and for physical distribution. Coordination among the supply chain partners and systematic procedures would be required for ensuring information accuracy. However, there might not be a willingness among some of the organizations to share the information, since they may be concerned about its confidentiality and may not see a long-term benefit in sharing information. These reservations and disadvantages can be overcome through the use of long-term strategic partnerships among the supply chain partners.

However, under conflicting interests among partners from different companies, such long-term strategic partnerships are not easily implemented. They would take some time and a lot of effort to build. In this study, we have introduced the use of incentives as the first step for building the long-term strategic partnerships. Appropriate coordinating mechanisms, which allow the chain to achieve the best performance (the highest chain profit), have been identified and put into this comparison. One important challenge for the

actors is to build flexibility into the chain. This is really a challenge because the system creation for the coordination of a whole chain can easily lead to inflexibility, and flexibility is very important in a complex business world. Thus, these coordinating mechanisms have been designed to be as flexible as possible to accommodate independency among members in the chain. Such practices would not distort the demand information and this would result in high inventories in the supply chain. This aspect is of importance for the implementation of such mechanisms and is mostly ignored in literature.

Another significant contribution of this study is to identify financial benefits from becoming the chain. However, as shown from our numerical examples, forming a chain is not the end of the story. But it is a matter of how to manage and make all members in the chain happy and willing to cooperate. The study successfully brings in the incentive scheme as a mechanism to link members together and this has proven to improve the chain and individual performances.

As a pilot study, the study fulfills its purpose when the introduction of a coordinating mechanism in term of financial incentive scheme shows to have a significant impact and is a good initial tool for integrating such complex relationship. In addition, our proposed algorithm, including the introduction of Genetic Algorithm (GA) to search for good setting of each system's parameters, is successfully implemented. Although the solutions given by GA may not always be optimal, it has proven to generate reasonably good solutions. This is far better than comparing a system with better parameter settings to another system with poor settings.

7.2 Recommendation for Further Study

There are still several areas in which we feel that this study can be further extended. Some of these topics can be listed as follows:

7.2.1 A Full Network Type of the Supply Chain's Configuration

It would be quite interesting to see the effect of our approach on a full network chain consisting of multi-retailers and multi-manufacturers at the same time.

7.2.2 Back Ordering Permitted

The inventory models in this paper assume that unfulfilled demand is considered as shortage and it becomes loss of sales without backordering. This may not be suitable to some business units where backordering is possible.

7.2.3 Different Types of Demand Distribution and Variation (Stochastic Process)

In addition, all demand patterns are generated based on the normal distribution. Different demand patterns or perhaps with lumpy type of demand may generate different outcomes.

7.2.4 Different Types of Coordinating Mechanisms

Since the incentive schemes are considered as a key mechanism to form the relationship among the individual companies in the chain. Other types of coordinating

mechanisms such as profit sharing or other incentive schemes would make the comparative study more complete and cover wider perspectives.

7.2.5 Sensitivity Analysis on Other Costs and Demand Variance

With a time limitation in the study, only the bonus cost is selected to do the sensitivity analysis. This is also due to the fact that the incentive scheme is the main focus in this study. However, the sensitivity analysis on other costs and the variance of the demand would also affect the final conclusion made from the study.

7.2.6 Other Kinds of Optimization Techniques

In this study, GA is used to set each model's parameters. Even though, the optimal results may not be achieved as the reasons stated earlier, as a comparison, it may be interesting to see the results generated from other kinds of optimization techniques such as simulated annealing, tabu search or practical swam.