1 CONCLUSION AND AVENUES FOR FUTURE RESEARCH

1.1 Contribution of the Study

In the current competitive market, the sourcing decision of a firm greatly affects the performance of the firm because it directly contributes to the value creation process of the firm. As uncertainty is always inherent in the supply chain, be it from the demand side, or from the supply side, therefore, it is important for the decision makers to consider both aspects of uncertainty while making the sourcing decision. Also, as time has progressed, the availability and accessibility of information has become greater, increasing the number of choices for the source of the resources and reducing the effort required to access those sources. Therefore, while taking the decision for the sourcing policy, the decision makers should also consider the availability of multiple sources and choose those sources which comply with the objectives of the firm.

In this study, a mathematical model is presented to identify the optimal sourcing strategy for a retail firm when both demand and supply is stochastic and the option of sourcing to multiple suppliers is available. The suppliers are characterized by the cost quoted by them and their yield distributions. To comply with reality, it was assumed that there exists a back-up supplier with a higher cost. The model was first developed in the context of single period and later extended to the context of multiple periods.

The contribution of this study to the existing body of literature is manifold. Firstly, this study gives a comprehensive model for the realistic scenario when both demand and supply uncertainty is present, multiple supplier option is available and back-up supplier is available for emergency. Secondly, the single period model will help a decision maker in deciding the optimal sourcing
policy when the product in consideration is perishable, i.e. one cannot store it for using it in the next period. However, for non-perishable products, which attributes to a larger chunk of retail products, a single period model will not be realistic as the firm always plans for a longer time horizon rather than only one period. Therefore, for this context, the multi-period solution will provide the decision maker with a tool which helps them taking the best possible sourcing policy decision for the firm.

Thirdly, the model presented in this study is easily generalizable for the context of different players in a supply chain. Although this study was done solely in the context of retail scenario, one can easily extend the model for other players in the supply chain by doing some minor tweaking in the model. For example, this model can be extended to manufacturing scenario by adding a manufacturing cost term (which is manufacturing cost per unit multiplied by the amount of supply received) to the expression of total profit function of the firm.

Also, existing literature suggests that in the context of inventory planning for a longer time horizon in presence of uncertainty (demand uncertainty, supply uncertainty or both), safety stock plays a major role in improving the performance of the firm. Although the model described in this study did not explicitly consider the amount of safety stock to be held to maximize the profit, it can be noted that the emergency back-up supplier in the model can act as a substitute for safety stock in the given context. The difference between safety stock and emergency back-up supplier is that in case of emergency back-up supplier the stock is being held in the premises of the supplier and the firm is paying some premium to the supplier for this service. Therefore, by doing some minor adjustments in the model, it can easily accommodate the idea of safety stock and find the optimum level of safety stock to be maintained to maximize the profit.
Thus the model presented in this study depicts a fair approximation of reality to help the managers in deciding the optimal sourcing policy for both perishable and non-perishable products.

1.2 Limitations of the Study

Like any other research, this study also has some limitations. These limitations also provide the avenues for further research. Firstly, this study is done for the context of single product in a retail firm. However, in reality, a retail firm has to consider multiple products during making the decisions. These multiple products can either be supplied by a single supplier or by different suppliers. The dynamics associated with this problem can be studied if one can extend the problem for multiple-product context.

Secondly, the lead times of the suppliers are assumed to be same, and hence without loss of generality, the lead times of the suppliers are taken to be equal to zero for the analysis. However, in reality, the lead times of different suppliers may be different. Also, the lead times taken by different suppliers may not be deterministic in nature, but be stochastic following some probability distribution. Therefore, this study can be extended considering the dynamics of lead times of the suppliers in the problem.

Thirdly, to analytically find a closed form of the solution to the problems described in this study, the demand of the product is assumed to be uniformly distributed. The study can be extended for different distributions of demand. Also, for the multi-period problem the demand for one period is assumed to be stationary and independent of the demands in other periods. Therefore, this study can be extended for the scenarios where demand distribution of one period is dependent on other period. Also, it can be extended for the products for which the demands include some
seasonality. For multiple-product scenario, this study can be extended for a situation where demand for one product affects the demand for other product.

Also, in a multi-period inventory planning problem, the time between two successive orders (i.e. length of one period) is one of the decisions taken by the decision maker. In this study, length of a period was not considered as a decision variable. Therefore, a more comprehensive model for the multi-period problem can be built by extending this study including the time between two successive orders to be a decision variable.

This study is done in a retail context. However, it can be extended for the manufacturing context for studying the ordering and production problem for a firm when both demand and supply are uncertain and the firm can choose from a pool of multiple suppliers with different costs and yield distributions.