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Decisions and Information in a Business Process with a Supply Chain

Ki-Seok Choi
Department of Industrial & Management Engineering,
Hankuk University of Foreign Studies, Yongin, 17035, Korea.

Abstract

A supply chain consists of several business activities usually conducted by individual business units. Although they may make business decisions separately, all the participants in the supply chain heavily rely on how the overall supply chain works. Poor performance of the supply chain results in poor performance of every participant's business. It is because the supply chain should provide information necessary for the decisions in each activity. We browse what decisions to be made in the supply chain management and discuss why they are important in today's business environment.

Keywords: Supply Chain Management, Quick Response, Customer Service Level

1. INTRODUCTION

These days it is speed what really counts in business competitions. In about a day, you can reach most of the parts in the world. It is not just about transportation. The high-speed Internet allows you to access information quickly and easily at any time. The well-developed transportation network and communication network provide various convenient services for people's daily life. A decade ago, not only it took several days to send and receive parcels, but also, we had to visit the post office in person. Now we can deliver anything to my home within a few days and it is very convenient to order the product. We only need to search the Internet for the product we want to purchase and make payment. It becomes very convenient and quick to buy things.

People change when the environment changes. The age of speed makes people's minds too hasty. We do not write the letters anymore. Many people had good feelings and memories in handwritten letters, but now they look too slow. Courier companies advertise same-day or next-day delivery. Shipping tracking is now an essential feature of Internet shopping malls. The order must arrive at least the next day and the customers want to know where their orders are every minute. If they cannot, the customers would turn away.

The trend of quick response to acquire and hold customers has brought much attention to the supply chain management. A company without a fast supply chain is left behind in the business competition with others who manage their supply chain appropriately. There are many decisions to make through the whole business process. In this paper, we discuss what kind of decisions needs to be made in a typical business process and why it is essential to have well-managed supply chains.

2. CUSTOMER SERVICE LEVEL

Some say, ″Customer is king.″ What good is it if customers do not want your product even though it is the best one? You must provide what the customer wants. Only then you can survive the competition. As we have already discussed, what customers want is quick response. "The product is great, but the shipping is too slow." This feedback has a negative impact on sales as much as the feedback complaining about the quality of the product. To satisfy customers, in other words, to increase customer service level, you need to reduce the delivery time.

A high level of customer service will make customers purchase the product again, bring a better reputation, and attract many other customers. On the other hand, the longer the time taken to ship, the lower the level of service the customer feels. If you ship late, the customer will not place orders again and the reputation will get worse. Here the seller's worries begin. If he ships the orders immediately, the seller will have no problem. To do so, the seller must always have the product ready to ship. But, is it possible?

- How can we measure customer service level?

- How much is the appropriate level of service?

3. INVENTORY

In general, a seller always maintains a certain level of inventory. Inventory is what the seller has before he gets the actual orders from the customers. If you have a lot of inventory, you can ship the product immediately when a customer places an order. That is, the level of customer service is high. On the other hand, if there is less inventory or there is no product to ship when a customer makes an order, the level of customer service gets lowered.

Sellers cannot always have enough inventory to provide ultimate level of customer service. Because inventory is money. Inventory is the stocks bought from the manufacturer in advance to sell to customers in the future. Having enough stocks costs a lot which can be collected only after the stocks are sold. Moreover, if he has a lot of stocks unsold, the seller will suffer a great deal of damage. Therefore, as for the seller, the less stock is the better. However, as we have seen before, less inventory means less customer service level. It would be desirable for him not to have any inventory at all if the seller can satisfy the customer orders without it. But in most cases, it is not possible.

If so, what is the appropriate level of inventory? The appropriate level of inventory depends on the customer order quantity. For the product with a lot of customer orders the seller should have a lot of inventory to keep. On the other hand, for a product with few customer orders, the seller might keep a little inventory. What if the seller knows in advance how much the customer will order? Obviously, the seller only needs to stock as much as the customer order. Then, the level of customer service is raised and at the same time the unnecessary inventory is eliminated. But how does the seller know when and how much the customer will order?

- How can the seller determine the right amount of inventory?

- When and how much should the seller replenish the stocks to minimize the cost?

4. FORECASTING

How good is it to know exactly what the future will be like? If you know it will not rain, you do not need to worry about whether to take an umbrella or not. What if you know today that the stock market will rise tomorrow? Many people are interested in what will happen in the future and want to know in advance. One of the things that sellers are interested in and want to know ahead of time is customer demand. High-demand products, that is, the products selling in volume, must be stocked in advance. On the other hand, for low-demand products the sellers can reduce losses due to unsold inventory by lowering inventory levels.

No one can know exactly what will happen ahead of time. However, anyone interested in the stock market will make predictions. It will go up tomorrow because it came down today, the upward trend will continue until the end of this year and then it will start to decline, and so on. There are several ways to make predictions. Predictors can use experience, forecast multiple factors that are related to stock prices, or statistically analyze past stock price data to predict future stock prices. These techniques are also used by sellers to forecast customer demands. Sellers can predict when and how much product will be sold from past sales data. In particular, the sales department staffs who directly contact customers and receive orders can make demand forecast effectively. Historical sales data can also be analyzed by statistical techniques to predict future demands. For example, it is reasonable to expect that demand will increase in the future if past sales volume has been steadily increasing. In addition, it can be predicted that demand will increase in summer this year if the products were sold a lot in July and August every year.

Demand forecasts are made to adjust inventory levels to the expected sales volume, but in most cases the actual demand varies from the forecast. Sometimes customers order more than expected and the other times they order less. Forecast hardly matches the actual demand. If it goes wrong, why do they make forecast in the first place?

- What methods are used to forecast demands?

- How to measure the accuracy, or error, of forecast?

5. PLANNING

Sellers get supplied from the wholesaler or directly from the manufacturer. The wholesaler receives the product again from the manufacturer. It takes a certain amount of time for the manufacturer to produce the product. Considering this production time, the seller must request the production of the product in advance so that the product can be supplied at the desired time. If the seller receives the customer order and then requests the manufacturer to produce, the delivery will be delayed by at least as much as the production time. Therefore, the desirable scenario is as follows; the seller predicts the customer order before receiving the customer orders and requests the manufacturer to supply the product, and the manufacturer receives the demand forecast information from the seller and plans when to produce the products.

While the demand forecast information of the seller plays an important role in establishing the production plan, the demand forecast does not become the production plan directly. The manufacturer has his own circumstances to consider. A typical example of such circumstances is production capacity. To manufacture products, resources such as production facilities and labor force are needed, and they are usually limited. In other words, the maximum amount that can be produced for a certain period is restricted. If the demand forecast is higher than the limited production capacity, a plan must be made to start the production earlier. For example, if there are 500 demand forecasts in June and the monthly production capacity is only 300, it is not possible to produce all the demands in June. The manufacturer needs to plan to produce at least 200 earlier than June.

It is very important to check production performance to make sure that production would be executed according to the plan. This is because, in many cases, there are differences between the plan and the performance. The main reason for this is that something happens that was not predicted during the planning. Example are the failure of production facilities and longer production times than expected. If there is a difference between the plan and the performance, the plan will be revised to supply the product to the seller as originally planned. In addition, when the demand forecast changes, or an urgent order occurs, the production plan often should be changed.

- What to consider when planning production?

- When and how much to produce to meet the orders?

6. SUPPLIER RELATIONSHIP

To produce products according to the plan, it is necessary to have the resources necessary for production such as materials, equipment, and manpower. If the resources are insufficient, the production cannot be performed as planned and, in turn, the supply of the products is delayed resulting in the dissatisfied customers, which finally affects the enterprise adversely. It is an important part of corporate management to ensure that the necessary resources are available in a timely manner.

Among the resources required for production, most of the materials are supplied from outside. To produce products, the manufacturer purchases raw materials, parts and semi-finished products from outside suppliers. As the complexity of final products increases, the cooperation between the manufacturer and the suppliers becomes more and more important. The manufacturer, now a buyer, wants to receive good quality materials at lower prices in a timely manner, and the supplier wants to sell more at a higher price. Here, conflicts of interest arise on both sides. The buyer would prefer to purchase as much as needed when necessary. As we have seen before, inventory incurs cost. The manufacturer can save much cost if he purchases only what will be used for production when the production takes place. However, supplying what needed when necessary is a difficult requirement to meet on the supplier′s side. Generally, production quantity is subject to change because it depends on the uncertain demands from customers. If the quantity of material orders suddenly increases, the supplier needs more resources such as facilities and manpower. On the other hand, if the order quantity is reduced, the utilization of those resources will be lowered, which will damage the supplier′s profit. In terms of price, the buyer wants to purchase at a lower price while the supplier wants to sell at a price to guarantee a proper profit. Price is a key criterion when a buyer chooses a supplier, and the buyer sometimes selects multiple suppliers to induce price competition. The more suppliers, the greater the price competition and, in turn, the greater the buyer's power. On the other hand, if there are few suppliers, those suppliers tend to have greater bargaining power than buyers.

From a long-term perspective, it is desirable that the transactions benefit both suppliers and buyers. Excessive price cuts will deteriorate the supplier's management status, leading to quality and delivery issues, which will adversely affect buyers. It is necessary for the supplier to ensure proper profit so that high quality materials can be supplied stably. Even if the supplier has the pricing power, the excessive price increase likely leads to a reduction in demands from the manufacturer. The manufacturer might consider using alternative materials and seeking other suppling sources. As a result, excessive price cuts or hikes may bring a profit improvement of buyers or suppliers in the short term, but it probably results in a revenue reduction from the business relationship in the long-term term. The relationship between the supplier and the manufacturer is preferably a win-win one considering mutual benefits.

- What criteria to select suppliers?

- What to include in supply contract?

7. SUPPLY CHAIN COORDINATION

As we have seen, there are many different stages of activities involved to sell a product to customers. The customer orders must be received, processed and shipped (Sales). The proper inventory should be managed in the proper place and transported to the required place (Logistics). The manufacturer needs production plans which reflects customer demands as well as the availabilities of production resources (Production), and the necessary materials are to be procured from suppliers (Purchasing). This process is called supply chain. Since it usually involves several companies, it is not easy to manage the supply chain from a global point of view. Individual company makes decisions to maximize its profit, that causes the inefficiency from the viewpoint of the entire supply chain.

One example of a typical inefficiency in the supply chain is the bullwhip effect. Suppose that the seller, one end of the supply chain, predicts the customer demands as much as 100. The seller may order 110 products with a 10% margin (called safe inventory) in case the actual demand would be higher than the forecast. The manufacturer plans to produce 121 in total, including a 10% allowance, considering the 110 orders from the seller and the unexpected orders in the future. Assumed that one piece of material is needed to manufacture one unit of the product, the manufacturer will ask the supplier of the material to deliver 121 pieces of the material. The supplier would produce about 133 materials if he wants to keep a 10% margin in case of purchase increasement from the manufacturer. As a result, when the customer demands of 100 arrive to the supplier through the supply chain, they would increase by about 33% to 133. This so-called bullwhip effect is similar to the way in which a small wiggle at the end of a bullwhip gets bigger as it travels along the whip. Such an effect leads to an inefficiency by generating excessive inventory in the supply chain. As expected by the seller, even if the demand of the customer is increased by 10% to 110, the manufacturer and the supplier will have extra stocks. Moreover, when the demand is less than expected, the extra inventory becomes larger and the inefficiency due to unnecessary inventory get worse across the supply chain.

To prevent this kind of inefficiencies, decisions must be made from the perspective of the entire supply chain. Above all, it is important to make use of all the information necessary and coordinate the decisions along the supply chain. In the example of the bullwhip effect, if the manufacturer knew that the seller had predicted the customer's demand as 100, the manufacturer would not have made a production plan by adding an additional 10% to the 110 to be safe.

- What is the right inventory level across the entire supply chain?

- What information should be shared to improve efficiency?

8. CONCLUSIONS

Nowadays, many people rely on a navigator while driving. Car navigation has many conveniences. First of all, a driver does not have to worry about finding the direction to a strange destination. Even if he knows the direction, the driver still can use it to check if there is a faster way to get there. In addition, more and more smart car navigations have been introduced which guide directions using real-time traffic information. They suggest several routes together; the shortest, the fastest and free ones along with other information. The drivers can obtain information such as where they are along the route from the departure point to the destination, where they expect

traffic congestions, how they can bypass them, and when they are expected to arrive at the destination. It can help the driver avoid getting bored in the traffic jam. Even when stuck in a heavy-traffic zone, it would be less frustrating if the driver knows when he can escape from it. He also can call his friend waiting for him and tell when he is going to arrive.

What the navigation system provides is visibility over the route the driver follows. And the visibility is made possible by the information the navigation system has access to. What if there is such a navigation system in a supply chain? It would be very convenient if the decision maker can get all the relevant information regarding the supply chain at a glance. The decision becomes much easier once he knows when orders have been received, how much inventory exists in each warehouse, how much resources are needed for the production, and when and how much material should be supplied from the supplier. When the customer inquiries about the delivery date, he will be able to answer easily by looking up the information. Consequently, customer satisfaction will go up.

It is the purpose of supply chain management to provide this kind of visibility. It allows the manager to easily obtain the information necessary for decision making and make a quick judgment. The improved agility of the company enables it to quickly adapt to the era of competition. It is possible to reduce inventories and, at the same time, shorten the delivery duration of customer orders. This efficiency of the supply chain is essential for enhancing the competitiveness of an enterprise, especially a global company having a complex supply chain with internationalization networks of sales and production.

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About the Author:

Ki-Seok Choi received B.S. and M.S. degrees in industrial engineering, respectively from Seoul National University, Seoul, Korea, in 1991, and from KAIST, Daejeon, Korea, in 1993, and Ph.D. degree in industrial and systems engineering from Georgia Institute of Technology, Atlanta, GA, in 2003. He is currently a Full Professor at Department of Industrial and Management Engineering, Hankuk University of Foreign Studies, Korea. Previously he worked at Electronics and Telecommunication Research Institute and Samsung Data Systems. His research interests are in supply chain management and quality of services.