

# **SUPPLY CHAIN IMPROVEMENTS AS A SURVIVAL STRATEGY IN REMOTE AND SPARSELY POPULATED DISTRICTS IN THE ARCTIC REGION OF NORWAY**

Eirik Borgen, Heidi Dreyer, Inger A. Sætermo  
Department of Economics and Logistics, SINTEF Industrial Management  
Bo Terje Kalsaas  
Department of Town and Regional Planning, Norwegian University of Science and  
Technology Trondheim, Norway

## **ABSTRACT**

The objective of this paper is to take a closer look at the internal and external logistics methods and distribution channels used by the world's northernmost beer brewery located in the arctic area of Norway. Through an extensive analysis we have studied the supply chain from the brewery production to delivery at the customers. In this study we have uncovered areas with improvement potential all along the supply chain. Facing aggressive marketing from competitors and tougher demands from customers, the brewery has to take out this potential in order to survive in the geographical huge and sparsely populated area which is their "home" market.

**KEYWORDS:** Operations Management, Logistics, Supply Chain Management, Action research, Improvements

## **INTRODUCTION**

Mack's Beer Brewery is located in the city of Tromsø in Troms County of Norway. The brewery's main geographical market is historically connected to customers in the arctic area of Norway. This is still their main market area, but the competition has risen sharply since the cartel protection of beer distribution in Norway was broken in 1988. Two of their biggest competitors; Ringnes and Hansa, has been active the last 10-15 years by buying smaller breweries in order to achieve access to new brands and to expand their markets.

What is also important for the competition Mack has to face, is the restructuring among the grocery shops. National chains, of which four are dominating, control almost the whole grocery market in Norway. Moreover we can observe a tendency that the chains are expanding to the Nordic region and also to other European countries. The national grocery chains integrate wholesale and outlet functions. The chains require price and customer services to be negotiated on national level, later maybe on European level. This leads to increased price competition. And small remote located customers of Mack's

demand the same price and delivery service as larger central located outlets of the same chain. Mack's competitors have moreover the possibility to cross subsidise the remote market areas, which is Mack's "home" market, by sale in the relatively densely populated areas of Norway.

Mack's Beer Brewery has produced Coca-Cola for several years for consumption in their main market area. For Coca-Cola they also have carried out distribution, sale and marketing. Recently this has changed because Coca-Cola will increase their presence and take over sale and marketing. Negotiations have been accomplished of whether Mack's in the future shall produce this popular soft drink on contract basis. Mack's relationship to Coca-Cola might turn to only joint distribution. For Mack's Beer Brewery it is important to be innovative and effective in the field of distribution in order to serve the Coca-Cola market.

Facing these challenges, Mack's has now put focus on improvement activities both within the company and within the supply chain, from brewery to customers. Related to customer service we are in this paper focusing on improvement aspects of delivery guarantee for the brewery's customers. We define delivery service in this case as a set of elements to fulfil the customers needs such as; ability to deliver, delivery time, reliability of supply, security of supply, information exchange, customisation and flexibility. With basis in these elements we have studied Mack's supply chain from production to customers and have identified areas with improvement potential. This paper discusses suggested improvements and how they influence Mack's supply chain.

## **BACKGROUND**

The results reflected in this paper essentially come from studies performed through a project managed by SINTEF Industrial Management in co-operation with Mack's Beer Brewery (Dreyer & Kalsaas 2000). The project is a part of a productivity research programme (P2005) funded by the Norwegian Research Council. The project was initialised by a research group at SINTEF/NTNU, and representatives from Mack's Beer Brewery, which has the status of "case company" in the programme.

## **THEORY**

The focus of the project was the general delivery service in Mack's supply chain. It means that all elements in the production, communication and transports of the supply chain have to be studied in relation to delivery service. Persson and Virum (1995) define delivery service as the customers' comprehension of the quality at the logistic activities. They divide the delivery service into following elements:

- Ability to deliver: The probability that the products are in stock when demanded.
- Delivery time: The time from the order was sent until the goods are received.
- Reliability of supply: Delivery to the right time.
- Security of supply: Delivery of the right product in right quantities and without any damage.
- Information exchange: Between supplier and customer
- Customisation: The possibility to fulfil the customers special requirements
- Flexibility: The possibility to adapt new requirements and assumptions.

The phrase “supply chain” is well known from the literature. Especially Porter (1990) is often given the honour of having developed the definition of the supply chain. The supply chain describes value adding through different stages in the production flow. These stages produce a cumulative effect, which add value to the products through production, distribution and customer satisfaction. These stages are linked together with transport and communication with customers, which adds value through co-ordination and sequencing of operations and physical moving of products (Schary & Skjøtt-Larsen 1995).

Both the supply chain and the delivery service as defined above are cornerstones of the project work.

## **RESEARCH METHODS**

Methodological, the research method are inspired from the tradition of action research (Greenwood & Levin 1998), where the research has an agenda pointing towards social changes and user participation. In this context, the researchers shall not only be observers but will also play an active part in the process of suggest changes in a system. A retrospective approach is used. This means that the research moved from empiricism to theory and back to empiricism (Sayer 1992). The work started with some general empirical knowledge about Mack’s Beer Brewery. Through discussions, interviews and observation, Mack’s Beer Brewery became familiar to the researchers. For the interviews, an interview guide was developed to structure the conversations with the respondents. This guide consists of 6 main items:

1. Incoming logistics
2. Production
3. Outbound logistics
4. Delivery Service from the customers point of view
5. Transport Service from the 3<sup>rd</sup> party transport providers’ point of view
6. Co-operation and business milieu

Most of the information is collected through personal interviews and observations. The respondents were mainly employees at Mack’s Beer Brewery with detailed knowledge about the topics that the researchers wished to obtain information about. It has been a close co-operation with the employees at Mack’s, and a number of workshops have been arranged to gather information and to create improvement solution. In addition some customers and 3<sup>rd</sup> party transport providers were interviewed.

## **FINDINGS FROM THE ANALYSIS**

### **Order handling**

In the order handling process there are two findings that may contribute to failure in the delivery service. Both are the responsibility of Mack’s Beer Brewery. The first one is that orders may be registered wrongly in the enterprise resource planning (ERP) system. Errors in the order handling lead to deviations of the deliveries, and is felt as a failure of the security of supply, from the customers point of view.

Second, when a salesman receives an order from a customer, Mack's do not know if they are capable to deliver the requested goods. In addition, complaints from the customers concerning deviations in previous deliveries are somewhat vague handled. In cases where Mack's Beer Brewery is not able to deliver the requested goods (which in fact, is a failure in the ability to deliver), the customers may feel this as a failure of the security to deliver – something which is fortified from the unclear handling of the complains.

### **Stock handling**

Some causes that contribute to failure of delivery service are found in relation to handling and packing customer orders at the final stock. Generally, the stock level seems too big according to the customers' requests. This relation influences products with limited quality time. It happens from time to time that customers get products that are nearly omitted on date. The customers will feel this as a quality failure in terms of security of supply. When Mack's cannot deliver because products are omitted on date, the customers regard this as a failure in the ability to deliver. It should be mentioned that on high volume products this is not a big problem. For those kinds of products, high inventories keep the delivery service at a high level. On the contrary, the capital costs and storage costs related to high inventories is a problem for Mack's Beer Brewery.

Another relation is when the stock balance does not reflect the physical amount of goods in the stock. Especially, when the physical stock is lower than the stock balance in the ERP system, the ability to deliver may be some troublesome. The customers' experience with this is often fortified, because the customers normally are not informed about such deviations - unless the deviation is very high.

The last relation is connected to errors when the customer order is set up and packed. This will be regarded as a failure of the security of supply from the customer's point of view. Tries to avoid such failures contribute to extra work (counting) at the stock floor.

### **Distribution**

Mack's Beer Brewery, the transport companies and the customers are all responsible for deviations found in the distribution. Exceeding the van's capacities and delivery delays are the most common problems. Sometimes, orders are not picked and packed when the van comes to get them. The salesmen sometimes sell more orders on given days, which overflow the capacity of the vans. Returnable goods from the customers are not reported, so the vans get capacity problems. It happens that the van drivers take goods from one customer's order to complete a delivery to another customer. Delays of delivery to subsequent customers happen because customers do not have made the returnable goods ready. Unclear routines for handling of returnable goods fortify this problem. All these events influence on the security to deliver and the reliability of supply.

### **Planning**

When the sales prognoses are not justified frequently, neither the production nor the procurement gets updated information about changes in the market. This lead to situations where Mack's Beer Brewery has too much of specific beer types in

stock, and lack other types. This influences on Mack's ability to deliver the "other" types.

### **Production**

It has occurred that the production was interrupted because of missing raw materials. All delays in the production influence on the ability to deliver. Long set-up times leads to production of bigger volumes than necessary. This may influence on the keeping quality of the goods and make products obsolete, which in turn influence on the ability to deliver.

### **Procurement**

Often, requirement of procurement and cancellations from customers turns up too late in relation to the suppliers' delivery times. Both aspects have consequences for the company. Cancellations result in higher inventories of raw material, which in turn influence on compulsory savings. Limited quality of raw material may cause problems if the raw material inventories are too high – the raw material may be outdated and result in delays for the production. There are instances found with deviation between physical inventory and registered inventory levels. This may also result in delays of the production. Such problems transmit through the whole supply chain and influence on the ability to deliver from a customer's point of view.

## **IMPROVEMENT SUGGESTIONS**

The delivery service at Mack's Beer Brewery is represented as "the ability to deliver from stock". The objective of the brewery from this point of view is to have a delivery service degree of 97% on beer and 95% on mineral water. At the moment they are within those goals with figures of 97.7% and 96.4% respectively.

The measures are computed from figures from their ERP system. If there are deviations between the physical stock balance and the stock balance figures in the computer system, the delivery service may be computed wrong. Especially if the physical stock are less than the stock figures represented in the computer (which often happens). The computer system can in such cases count an order to be delivered as complete. In the reality the order could not be sent.

The measured delivery service looks very good, but regarding delivery service this way says nothing about the value of delivery service for the customers. The analysis showed that there are three elements connected to delivery service that is important and deeply affects the total delivery service from the customers' point of view. That is the ability to:

- Get the requested goods at all
- Get the right products in right quantities and in a satisfied condition
- Get the products at right time

In addition, one can raise a question about Mack's way to look at delivery service. To use the same target value for all product variants may costs the company a lot according to production and stock area.

To balance the use of resources and stabilise the level of the delivery service, the following improvements were suggested. The suggestions are divided into short-term and long-term improvements:

Short term improvement suggestions:

1. Establish fixed routines to report deviations when customers receive incomplete orders. Such reports have to come from the customers.
2. Assortment reorganisation and management. Products with low request should be removed from the assortment.
3. Prioritise and distinguish between the products according to sales volume and strategic significance. I.e. use different delivery service targets for different products.
4. Establish frequent stock checks of the products keeping qualities.
5. Improve stock routines for picking of right products to the orders.
6. Look at possibilities to put together customer orders at the delivery vans or at terminals.
7. Improve the planning of order handling capacity in the high seasons.
8. Empties for returnable goods must be planned into the vans' capacities.
9. Create routines to communicate with the customers about returnable goods and empties.
10. Create routines where "cash paying" customers have to pay before delivery.
11. Better co-ordination of plans for purchases of raw material and production plans.
12. Create a solution in the ERP system, which automatically suggests purchase of raw material based on production plans.
13. Systematic registration of the ability, trustworthiness and security of deliveries from Mack's suppliers.
14. Creating a system, which updates sales prognosis according to changes in the market.
15. Develop standardised formats of packaging which increase the productivity of the transport and logistic.
16. Develop better and more frequently communication between purchase, sales, production, stock and transport.

Long term improvement suggestions:

1. To develop an information technology based application used by the salesmen, which enable the salesmen to see the stock level of goods when they are outside the company, visiting the customers.
2. Develop processes to insure the quality of registration both of orders (stock out) and production (stock in)
3. Produce only requested goods. Do not produce beer types with low demands only because it fits in the production plans. This is one initiative to increase the stock turnover.
4. Create a system, which make it impossible to move goods in or out of stocks. This should be done for both raw material stock and finished goods stock.
5. Reorganise the use of counting area and limit the use of cargo ports at the same time, in order to improve the correctness of order quantities.

6. Reorganise the procedures with a view to simplify and quality. Today these procedures are complex, time consuming and of variable quality.
7. Create a system, which does not make it possible to sell more than the vans' capacity on a specific route.
8. Reduction of set-up times in production.
9. Develop a system to register and to measure the delivery service in the complete supply chain.

## CONCLUSIONS

The level of delivery service seems high, but can vary heavily especially in the high seasons. When it comes to delivery service, Mack's uses a limited measurement method when they only measure delivery service from final stock. This indicates that the delivery security and reliability are not very well known. Further, is it proper to raise a question about the reliability of the measurement. Even though the products are represented in the stock balance, they have no guarantee of that the products physically exist in the stock with the same quantities. It is reasons to believe that Mack's Beer Brewery can reduce the stock levels both for raw material and finished goods without negative consequences for the delivery service – especially if they make a distinction between high volume and low volume products.

The project came up with a number of improvement suggestions. These suggestions were grouped as short- and long-term proposals. A few of the suggestions are carried out, but most of them are still remaining.

Today Mack's Beer Brewery strives hard to survive in the market. They have problems with earning money. In the autumn of year 2000 they had to fire approximately 30 employees because that the annual accounts showed red figures. At the moment Mack's have come to a point where line reorganisation at management level are more important than process improvement for productivity increase. Fortunately there is a climate for productivity improvements. Mack's have recently joined a new research project where focus is put on reorganisation for productivity improvements and new measurement methods for delivery service. This project, which will be completed in the year 2002, hopefully have contributed to Mack's survival in the long run.

## REFERENCES

- Dreyer, H.C. & Kalsaas, B.T. (2000) Gjennomgående leveringservice i verdikjede, Eksempel fra Macks Ølbryggeri AS, SINTEF Industrial Management, Report STF38 A00604, 57 pages
- Greenwood, J.D. & Levin, M. (1998): Introduction to Action Research. Social Research for Social Change, Sage Publications, London, New Delhi
- Persson og Virum (1995): Logistikk for konkurransekraft, 4. utgave, Ad Notam Gyldendal a/s, Oslo
- Porter, M. E. (1990): The Competitive Advantage of Nations, London
- Sayer, A. (1992): Method in Social Science: A Realist Approach", 2nd edition, Routledge, London
- Schary, B.P. & Skjøtt-Larsen, T. (1995): Managing the Global Supply Chain, Handelshøjskolens forlag, København.