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Logistic Processes of European Grocery Retailers

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Logistics Processes of European Grocery Retailers

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Executive Summary

The inspiration for doing this study came from an observation made by several researchers independently. The researchers had noticed significant differences between practices that they had encountered in companies and some common assumptions concerning grocery retailers' logistics processes. Since there currently is little factual information available on this subject, the study "Logistics processes of European grocery retailers" was launched.

Data for the study was collected through in-depth interviews with twelve leading European grocery retailers. The interview questionnaire was designed to solicit and capture information regarding the companies' supply chains, key performance indicators, logistics processes, and challenges. The interviewees were mainly directors or managers in charge of logistics and supply chain management, development, category management, or information technology. The retailers represented six geographical areas: the Nordic countries, the UK, Northern Continental Europe, Western Continental Europe, Central Continental Europe, and Southern Continental Europe.

The study resulted in interesting findings within three main areas: supply chain organization and performance, logistics processes, and information sharing and collaboration. In addition, a number of interesting practices were identified in areas ranging from assortment planning to distribution, supplier collaboration, and performance measurement. These are presented in thirteen case inserts in the report.

Grocery retailers have a great interest in developing **store operations** and performance. What used to be a somewhat neglected part of the supply chain is now seen as the next big opportunity for efficiency improvements. This is logical in light of logistical key performance indicators. Firstly, stores tend to carry a high proportion of the stock in retailers' distribution networks. Notable differences in companies' store inventory turns also suggest room for improvement. Secondly, on-shelf availability is a major concern. To meet these challenges, companies are implementing automatic store ordering and processes for measuring on-shelf availability. Still, there is much work left to do. Making automatic store ordering work for promotions and other events as well as developing tools that would enable efficient measurement of on-shelf availability are important challenges for many companies. In addition, retailers are looking into a wide range of approaches to improve efficiency and customer service: some are developing tools for efficient management of store-specific assortments, others are looking into store fixtures and other factors affecting store processes and personnel costs.

In the **distribution** part of the supply chain, automatic store ordering and other pull-based operations cause pressure in the form of smaller batch sizes, increasing order lines, and more fluctuating demand. A few companies have implemented interesting solutions to increase transport efficiency and level out capacity requirements. Traditional logistics issues, such as distribution strategies, cross-docking, and transport optimization are still seen as important development areas. Moreover, many companies see developing and remodeling their distribution networks as their main short-term development opportunity. Forecasting is also recognized as an important challenge; currently many companies rely on very basic forecasting approaches although they are interested in the more advanced tools available.

The retailers express mixed feelings concerning **information sharing and forecasting collaboration** between retailers and suppliers. A few companies already have large-scale implementations, but the gap betweeb these companies and the others is wide. Some companies are concerned about giving outsiders access to internal data. In addition, companies are looking for less resource-intensive approaches to collaboration than the CPFR process model. Some retailers are quick to point of that there are other opportunities for increasing **total supply chain efficiency**, as well. Working together to reduce case pack sizes to enable more efficient store operations and increasing the flexibility and pull-orientation upstream in the supply chain are considered important opportunities.

To conclude, one can say that much is happening inside and outside of current hype areas such as on-shelf availability or radio-frequency identification. There are big differences between the retailers and no company masters all areas, indicating opportunities for benchmarking and learning. Yet, companies need to critically assess the suggested improvements opportunities – different business strategies may require different logistics processes.

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1. ABOUT THE STUDY

The "Logistics processes of European grocery retailers" study was launched in Fall 2003. The aim of the study was to investigate grocery retailers' current logistics processes and examine European grocery retailing in the light of logistics-related key performance indicators.

The study was conducted by a research group consisting of five researchers from five different European universities. The research was led and coordinated by Johanna Småros (Helsinki University of Technology). The other members of the research team were: Alfred Angerer (University of St. Gallen), John Fernie (Heriot-Watt University), Beril Toktay (INSEAD), and Giulio Zotteri (Politecnico di Torino).

1.1 Research approach

The study was carried out by means of in-depth structured interviews with leading European grocery retailers. The interview questionnaire was designed to solicit and capture information regarding the companies' key logistics processes, performance measures, opportunities and challenges.

Interviews were conducted with more than twenty persons. Several interviews with between one and three representatives of each of the participating companies took place. The group of interviewees consisted mainly of directors and managers in charge of logistics and supply chain management, development, category management, or information technology.

Based on the interviews, company specific case reports were compiled. These reports were checked internally by members of the research group as well as externally by the interviewees. The data collection effort lasted from August 2003 to June 2004.

1.2 Participating companies

A total of twelve grocery retailers were included in the study. Although many of these companies have operations in several European countries, only one country per company was selected as the target market of investigation. All of the data and process information collected, therefore, reflect a particular company's operations in a specific market, rather than the company's overall situation in Europe.

Six geographical areas were included in the study: the Nordic countries, the UK, Northern Continental Europe, Western Continental Europe, Central Continental Europe, and Southern Continental Europe.

Since the aim of the study was to examine the logistics processes and performance of leading European grocers, the majority of companies interviewed belong to the top three in the target markets, measured in market share. In fact, out of twelve participating companies, only two are outside of the top three in their respective markets.

The companies form a heterogeneous group. The smallest of the companies has a turnover of approximately 1 billion euros, whereas the largest ones reach turnovers of over 20 billion euros. The study includes:

- 6 retailers with turnovers of less than 5 billion euros,
- 3 retailers with turnovers of between 5 and 10 billion euros,
- 3 retailers with turnovers of 10 billion or more.

Most of the companies operate several retail chains or store formats. Only three of the retailers focus primarily on either supermarkets or hypermarkets. Due to this, the range of store formats covered by the study is wide, ranging from extremely large hypermarkets to very small neighborhood stores. However, it is important to note that no discounters are included in the study.

There are also significant differences between the retailers' private label penetrations due to the companies' different business strategies as well as the special characteristics of the target markets:

- 9 retailers with private label penetration of below 20%,
- 0 retailers with private label penetration of between 20 and 50%,
- 3 retailers with private label penetration of over 50%.

1.3 Reporting the results

Out of the respect of the companies' wishes to remain anonymous, the names of the companies or the countries examined in this study are not disclosed.

Due to the decision to focus on leading retailers operating in different geographical areas rather than trying to interview a statistically representative sample of European grocery companies, the authors have selected a qualitative approach to dealing with the data collected.

Supply chain configurations, processes, and challenges are presented on a general level, highlighting similarities and differences between the companies. Particularly interesting practices found in some of the companies are presented in the form of miniature case study inserts. Where quantitative analyses are presented, their background needs to be understood. The data are intended as illustrations of trends rather than accurate statistics on European grocery retailing.

The findings of the study are compiled in this report, which is only available to the participating retailers, the authors' universities, and the research bodies funding the study. Academic articles, available to the public, will also be written based on the collected data.

This report is organized as follows:

- Section 2 presents the structure and some key performance indicators of the supply chains examined,
- Section 3 focuses on the operative processes of the retailers interviewed,
- Section 4 looks at information exchange and collaboration in the supply chains,
- Section 5 presents the most important development opportunities and challenges as seen by the retailers.

2. SUPPLY CHAIN ORGANIZATION

2.1 Physical distribution

In the supply chains examined in this study, two main distribution alternatives are used:

1. Typically, goods flow from the manufacturers' warehouses through retailer-operated distribution centers or depots to the stores. In some cases, consolidation centers are employed to increase volumes and transport efficiency in primary distribution (i.e. between the manufacturers and the retail distribution centers).
2. Less frequently, direct-store-delivery, i.e. delivery straight from the manufacturers to the stores, is employed.

In this sample of companies, direct-store-delivery is of less importance than distribution through retailer-operated distribution centers. In half of the cases, the role of direct-store-delivery can be considered marginal. In the other cases, direct-store-delivery is considered important, but still only used in specific product categories, such as very fresh goods, e.g. bread or newspapers, or non-food specialty goods.

The companies in the sample have somewhat different views on outsourcing of distribution facilities and operations. Whereas some of the companies are looking for opportunities to outsource distribution centers, others are moving in a different direction by taking over ownership of previously outsourced facilities. The current situation is that:

- 8 companies own their distribution facilities (i.e. distribution centers, consolidation centers, and depots),
- 2 companies have outsourced their distribution facilities, and
- 2 companies employ a mixed approach.

The network of distribution facilities is set up slightly differently in the different supply chains. Four basic building blocks can be identified:

- Regional distribution centers,
- Distribution centers dealing with products with different temperature requirements (e.g. separate distribution centers for frozen, chilled, and ambient goods),
- Different distribution facilities for slow-moving or fast-moving goods, and
- Cross-docking depots at which incoming shipments are directly transferred to outgoing trucks without the goods being stored.

Few of the companies interviewed employ only one of these approaches. In fact, a large amount of different combinations can be found. Two trends can, however, be detected: increasing use of cross-docking and a move towards centralized storage of slow moving goods. Currently almost all of the companies examined employ cross-docking for part of their products, typically fast moving goods such as fruit and

vegetables or meat products. Most of the companies are planning to increase the proportion of goods being cross-docked, some even see it as one of their main development opportunities in the area of logistics. Four of the companies currently employ centralized storage of slow movers.

1: Efficient distribution of slow-moving goods

Slow-moving goods are often considered challenging from a distribution point of view. Due to relatively large batch sizes and modest demand, these goods tend to pile up at distribution centers, taking up space and tying up assets.

One of the companies in the sample used to keep the majority of its goods in regional distribution centers close to its stores. For some goods this is a very good distribution approach, enabling rapid replenishment of stores. However, it also caused slow-movers to stockpile in numerous distribution centers.

While examining its products and product categories, the company noticed that about 70% of its stock-keeping units (SKUs) could be considered slow-movers, generating only 25% of sales. The company started a project of classifying products into three categories: slow-, fast-, and superfast-movers, in order to be able to apply the right kind of distribution model to each of these groups.

The classification process was rather complex and time consuming. The most important issue was to assure that the classification would in no way influence the processes in the stores. The classification was made on a category level. The decision was made by the logistics and purchasing department based on information not only on the products' sales volumes, but also on their size and weight, shelf-life, storing conditions, supplier, transportation routes etc. For example, soil was not classified as a slow mover although it barely sells in the winter. It is a very seasonal product with substantial sales in the summer, and it weighs a lot, which means that transporting it from the central distribution center to the regional centers would have been too expensive. The solution was to put it into the fast-moving group. In some other categories, as well, the decisions were somewhat controversial and trade-offs had to be faced.

The company is currently moving all slow-movers into one national distribution center (DC) serving all regions. From the national DC, the slow-movers are brought by rail to the regional DCs storing fast moving goods and cross-docking, for example, fruits and vegetables. The slow-movers coming from the national DC are already commissioned for the individual stores when they arrive and are merely cross-docked at the regional DCs.

By centralizing storage of the slow-moving goods, the company is aiming to reduce the inventory commitment of slow-movers and increase the efficiency of its material flows.

An interesting observation is that retail companies in some markets have teamed up with their competitors to increase distribution efficiency. Since volume is a critical factor when striving to attain cost-efficiency in operations, co-operation is an important opportunity especially in smaller markets and for smaller companies operating in larger markets. In the sample of companies examined, three companies are currently involved in joint ventures with competitors with the aim of increasing distribution efficiency.

2: Increasing distribution efficiency by teaming up with competitors

For small companies or companies operating in small markets, attaining large enough volumes to enable efficient distribution presents a substantial challenge. In one of the cases examined, two competitors have found a solution to this problem by teaming up and creating a jointly owned logistics company that is responsible for purchasing, warehousing, and distribution for the majority of the two companies' products.

By bringing together both competitors' volumes, distribution can be arranged more efficiently, resulting in cost savings and increased delivery frequency towards the stores. Interestingly, as a result of the joint ownership, the logistics company has been forced to pay special attention to visibility of cost structures and efficiency of operations. This has led to acknowledged operational efficiency and award-winning logistics competence.

The two grocery retailers owning the logistics company are very pleased with the arrangement. It is seen to significantly benefit both parties, who despite co-operating in purchasing and distribution are fierce competitors in all other aspects. The logistics company is described by one of its owner's as "a crown jewel".

2.2 Decision-making and chain control

An important feature of grocery supply chains is who makes decisions concerning assortments, product display, pricing, and promotions. In the sample of companies interviewed, centralized decision-making (decisions made at the headquarters) is generally preferred over decentralized decision-making (decisions made by the individual stores). Each of the four decisions is subject to a varying degree of centralization. Centralized price control is the most prevalent (employed by ten companies), followed by centralized assortment decisions (employed by nine companies).

In general, centralized decision-making is seen as part of an efficiency-focused strategy. By limiting the stores' freedom of choice, the range of items can be controlled, decisions can be made by experts using special tools, and purchasing and distribution can be optimized when demand at individual stores behaves predictably.

Centralized decision-making is also seen as a prerequisite for collaborative planning and forecasting with suppliers; if the stores are responsible for decisions, collaboration should take place between each store and the suppliers, making it very difficult to accomplish in practice.

According to the companies interviewed, the downside of centralization is the risk of losing contact with local demand and customers. Some companies have, therefore, selected a decentralization strategy. These companies emphasize the importance of decentralized decision-making as a means of creating new business opportunities by adapting assortments to local preferences and motivating store personnel.

Typically, the companies strive to combine centralized and decentralized decision-making. One common strategy is to allow stores to choose between pre-defined assortment modules for different categories. This strategy combines centralized control over the overall product offering with store control over the local emphasis on different product categories. Another strategy of combining decentralized and centralized decision-making is to place central guidelines or limits on pricing, but allow stores to determine the retail price within those limits. Some companies also use different approaches based on store format or the relationship between the retail chain and the stores (owned by the chain or by franchisees).

3: Centralized or decentralized management based on store characteristics

The centralization vs. decentralization dilemma is a classic in the retail industry. As many other managerial decisions, also this one seems to be affected by certain fashions or trends, causing companies to swing from one direction to the other. A multi-format company in the sample does not believe in managerial fashions and has developed a more contingent approach. The retailer manages some formats in a very decentralized fashion whereas others are managed centrally.

In particular, smaller supermarkets are managed centrally as they lack the scale to hire talented department managers, which means that department managers cannot be put in charge of making pricing, assortment, or stocking decisions. For smaller stores, the degree of complexity and room for local assortments is also limited. For the hypermarket chain this company adopts a completely different approach. These stores have the scale to hire talented employees, which can, consequently, make decisions on assortment (including local products not carried by any other hypermarket) and pricing (within ranges set by the central organization).

Several companies are also currently looking for information technology (IT) tools to enable efficient creation of store-specific assortments instead of the currently much used store format or cluster-level planograms.

4: Using IT to combine centralized control with locally adapted assortments

Traditionally retailers face a trade-off between offering a standardized assortment set by the headquarters based on general trends and customer needs and offering very customized assortments set by store managers and probably fitting local needs but perhaps failing to provide the desired consistency and scale within a retail chain.

A company in the sample is trying to use IT to shift this trade-off. The aim is to design store-specific assortments at the headquarters.

The logic of this solution is rather innovative: Basically, the company compares the additional sales and margins that it can make by allocating more space to an existing item that will have higher availability and consequently will sell more, with the additional sales that can be created by allocating the same shelf space to a new item. To make this algorithm work, an important question arises: How can one estimate the demand for an item at a store where it is not currently sold? The idea is to estimate the sales potential of the item by looking at how the product is doing at "comparable stores", i.e. stores that for other products show similar sales patterns.

2.3 Supply chain performance

The participating companies were asked to deliver information on service levels, inventory levels, and order-to-delivery lead-times in the different parts of the supply chain. The data are presented here on a rough level. However, since the companies' assortments (especially the number of non-food items compared to the number of food items), the geographical properties of the target markets, and the supply chain structures (using cross-docking to reduce inventory of fast moving goods may paradoxically increase the average inventory measured in days of supply) special care should be taken when comparing numbers.

2.3.1 Order-to-delivery lead-times

When examining the *order-to-delivery lead-times between manufacturers and distribution centers*, it can be noted that the orders are typically filled within 48 hours, with a median value of about 20 hours for the companies in the sample. The reported average order-to-delivery cycles range from about 14 hours to 48 hours. The lead-times for fresh goods tend to be significantly shorter with a median value of about 14 hours and ranging from about 12 to 30 hours. For other product types, the median value is 48 hours, ranging from 32 to 168 hours. For imports and specialty goods, lead-times can be anything between 1 and 100 days.

The lead-times between manufacturers and distribution centers seem to be notably lower than the ones presented in a recent report from the US (Roland Berger, 2003)[*]. In the report, the average order-to-delivery cycle time was reported to be 148 hours for all customers and 126 hours for continuous replenishment program (CRP) accounts. Based on the report, manufacturers were expecting order-to-delivery cycles to drop to 98 hours for all customers and 89 hours for CRP accounts by 2004. It is, however, important to keep in mind that these figures are based on a sample of only 25 manufacturers.

The *order-to-delivery lead-times between distribution centers and stores* are slightly shorter on average. The median value of the reported average lead-times for fresh goods is 24 hours, ranging from 14 to 32 hours. For other goods, the median value is about 34 hours, ranging from about 15 to 48 hours. The median of the average lead-times for all products reported by the companies is 32 hours, ranging from about 14 to over 32 hours.

Several companies pointed out that the order-to-delivery lead-times to stores do not necessarily give an accurate picture of reality. In practice, lead-times are not only determined by the time it takes to handle the order and pick and ship the goods, but in essence a function of the *delivery frequency* to the stores. Although four of the companies interviewed have daily deliveries to all of their stores – even several deliveries a day – the eight others serve different stores with different frequency, mainly based on the size and location of the stores. In general, the smaller stores receive deliveries two or three times a week, while the larger stores receive between five and seven deliveries a week.

2.3.2 Inventory levels

When examining inventory levels at the distribution centers, it seems that stock coverage is, in general, on an acceptable level. The companies are still trying to lower inventory levels, but are not expecting radical changes.

The companies considered inventory problems to be mainly related to non-food and imported goods, which tend to have longer lead-times, larger order batches, and more unreliable deliveries. Also for other goods, safety stock was needed to deal with suppliers' unreliability. In addition, some companies identified forecasting and ordering practices at the distribution centers as being somewhat problematic.

[*]Roland Berger Strategy Consultants (2003). *2003 GMA Logistics Study*, GMA.

Inventory	Distribution center		Store
	Fresh	Other	Overall (incl. fresh and other goods)
Median	2 days	13 days	12 days
Minimum	0 days*	7 days	4 days
Maximum	10 days	20 days	16 days

*The goods are cross-docked

It is notable that a high proportion of the goods in the part of the supply chain controlled by the retailers is located at the stores. A majority of the companies interviewed is dissatisfied with store inventory levels.

The following reasons for high inventory levels at stores were identified by several of the companies:

- Store ordering practices and lack of store manager incentives to keep inventory levels down (inventory levels are rarely monitored),
- Too large case packs of certain products,
- Safety stock needed to guarantee a good service level, especially for non-food goods with delivery problems,
- Leftovers from promotions,
- Delivery errors,
- A need to keep shelves well-stocked for marketing and esthetical reasons, and
- Low delivery frequency to stores.

2.3.3 Service levels

The *service level from manufacturers to distribution centers* and from distribution centers towards the stores are both quite high on average. Yet, several of the companies interviewed stated that they are not satisfied with the manufacturers' service levels. In many of these cases, the companies are satisfied with the overall level, but not with the service levels offered by certain manufacturers or in certain situations. Most difficulties are related to non-food products and situations, such as promotions, with high demand uncertainty. Some of the companies also mentioned that competitor activities (e.g. big promotions by other retailers) sometimes affect the manufacturers' service levels towards them. In addition, two companies, rather surprisingly, stated that they find it difficult to get good service from the larger manufacturers.

Some of the companies, on the other hand, are satisfied with manufacturers' service levels, but not with the timeliness of their deliveries, i.e. according to these companies, the goods arrive at the distribution centers or cross-docking depots at the wrong time. This has led some retail companies to start pushing for increased control over primary distribution (i.e. from manufacturer to distribution centers) through initiatives such as factory-gate pricing.

The *service level from the distribution centers to the stores* is, in general, considered to be better than that of the suppliers. One of the companies estimated that out of the distribution centers' delivery problems only 5% were caused by the distribution center and 95% by supplier stock-outs. However, also here, promotions and other situations in which demand forecasts are critical are considered problematic. In addition, some companies mentioned problems with execution, i.e. picking errors and transportation-related problems.

Service level	Manufacturer to distribution center	Distribution center to store
Median	98 %	98 %
Max	98 %	99 %
Min	95 %	97 %

The service level offered by the stores towards the consumers, i.e. the *on-shelf availability*, seems to be slightly lower, but not as low as recent studies would suggest[*]. However, it is important to keep in mind that the on-shelf availability level is rather difficult to estimate since so few companies measure it, and those who do tend to do it differently.

The companies that are measuring or have measured their on-shelf availability reported values ranging from a low of between 90 and 95% to a high of 98%. The median value is between 96 and 97%. However, the companies mentioned that there are big differences in availability between promoted products and normal products, between measurements conducted at different times of the day, as well as between product categories.

Of the companies who do measure on-shelf availability either regularly or through one-off studies almost all are unsatisfied with their current performance. Interestingly, the companies not measuring on-shelf availability tend to be more satisfied with their on-shelf availability.

The problems with on-shelf availability are, according to the companies, mainly related to:

- Promotions,
- Store ordering practices,
- The need to balance lost sales and spoilage for perishable products, and
- Too little shelf-space being available to certain products.

[*]Gruen, T.W., Corsten, D.S., Bharadwaj, S. (2002). *Retail Out-of-Stocks: A Worldwide Examination of Extent, Causes and Consumer Responses*, GMA.

Out of the twelve companies in our sample, only six companies have a process for regular store level availability checks; four companies check availability on a daily level, two regularly but less frequently. In addition, three companies have commissioned one-time studies to examine their availability in select product categories. Three of the companies do not measure on-shelf availability at all. However, on-shelf availability and approaches for measuring it are considered extremely important development areas by the majority of companies.

5: Examining on-shelf availability from multiple angles

A company in the sample has a very interesting approach to measuring on-shelf availability in its stores. It uses three different approaches:

1. One hour before the store is replenished, the store personnel walk the store and count the items that are stocked out (i.e., they count the percentage of items available before the store gets replenished). This metric is fairly conservative in that it measures availability when the likelihood of stock-outs is relatively high. The metric only measures the number of items stocked out, without taking into account their selling rates.
2. A second tool is used to estimate unfulfilled demand. This metric has the advantage of capturing the relative importance of items that might have sharply different selling rates. In other words, the company not only measures the percentage of items not available in the store but also estimates the total business that it might lose in case customers are not willing to substitute. One issue faced when using this tool is the difficulty of estimating the potential demand for items that have stocked out. The tool basically provides statistical estimates of what the item could have sold had it been available. It also corrects for situations, such as erroneous inventory records or defective items, where the system thinks a few units are left on the shelf but either no unit is actually there or just one unit that customers are not willing to take (as it is damaged) is available.
3. Finally, the company takes into account the attractiveness of the shelf. In order for the shelf to be attractive to the customer, it has to be filled at a given percentage of its capacity at the least. The key concept behind this metric is that inventory on the shelf is not only needed for meeting demand but also needed to draw the consumers' attention and create demand. The company does not only want to measure the ability of the inventory position to fulfill demand but also its ability to create demand. The company, thus, also measures the percentage of items with inventory positions below a specified percentage of shelf capacity.

These metrics provide the supply chain managers of the company with a very good sense of how the consumers experience the quality of the store operations.

The most common approach used for measuring on-shelf availability is zero walks performed by the store personnel, i.e. the store personnel walking down the aisles and noting stock-outs. There are differences between how often this is done (some companies focus on different parts of the store on different days, others require that

the whole store is checked every day) and when it takes place (some check the situation in the morning, others at a specific time during the day, and others in the evening). In some cases, stock counting is also used. Several companies have also tried to develop tools for analyzing sales data to detect stock-outs, but this has proven difficult and none of the companies interviewed rely solely on this kind of approach, although it is sometimes used as a complement to manual checks.

3. MATERIAL FLOW MANAGEMENT

3.1 Purchasing and inventory management

Purchasing and inventory management at the distribution center level is typically done in one of the following two ways, when facing *normal demand* (during promotions and strong seasons, the logic is often slightly different):

1. Purchasing and inventory management based on demand forecasts,
2. Purchasing based on store orders: store orders are processed and passed on to suppliers and the goods cross-docked at the retail companies' distribution facilities.

The trend among grocery retailers is to use more and more cross-docking in order to reduce inventory levels, especially for fresh goods. Out of the twelve companies interviewed in this study, almost all employ cross-docking to a significant degree. However, as cross-docking places high requirements on suppliers (punctuality, responsiveness, and IT capabilities) and the retailer, as well (reliable operations, efficient planning), purchasing and inventory management based on demand forecasts still forms an important part of the retail companies' operations. The majority of items is stocked and requires inventory control.

6: High forecast accuracy of system-generated forecasts for products with stable demand

Although most retailers find it difficult to accurately forecast demand for products that are promoted or, for example, react significantly to changes in the temperature, a fact is that a large proportion of the material flow in grocery retail is rather stable and does not vary a lot from week to week. Although manual checks and adjustments are widely used for improving promotional forecasts, several companies have noticed that products with stable demand can be satisfactorily managed with system-generated forecasts.

One company in the sample started out with a very simple forecasting method. The method was based on a weighted average of the previous four weeks of sales. This forecasting approach was not considered satisfactory – it didn't react to changes rapidly enough. Especially in the beginning of seasons there used to be a lot of stock-outs.

Instead of relying on increased manual intervention in the forecasting process, the company decided to invest in a more sophisticated forecasting tool. The tool is still based on analyzing historical data. However, it takes into account a much longer period of history data; two years rather than a few weeks. This makes it possible to take seasonality into account. The tool also includes trend projections and causal relationships. Although the tool was purchased from a large systems vendor and was not custom-made for this company, it has proved very valuable. The quality of the forecasts is described by the company as "almost perfect".

For goods with normal demand, i.e. items that are not affected by promotions or other disruptive events, the forecasting and inventory control techniques used are in general rather basic. Typically, the companies use some kind of warehouse management or ERP system that generates order suggestions based on all or some of the following factors: demand forecasts, current inventory level, target service level, order batches, and economic order quantity calculations. The forecasting techniques used are pre-dominantly simple: many of the companies use moving average techniques to generate a base forecast that may be updated by purchasers or logisticians. Some companies include seasonal factors in their forecasting. Although a few companies do, in fact, use more sophisticated forecasting models including, for example, causality, simpler models are in general considered satisfactory as long as no major disruptions occur.

In situations where there is more *uncertainty concerning demand*, i.e. when items are promoted or affected by substantial seasons, such as Christmas, forecasting is considered much more difficult. Many of the companies interviewed mentioned forecasting of promotions and goods affected by, for example, temperature changes as a significant challenge. They identified a need to develop better tools and better forecasting processes.

In the companies interviewed for this study, major promotions or substantial seasons are typically (eight out of twelve companies) dealt with by delegating a lot of responsibility to the individual stores. The stores are often required to make reservations or advance orders several weeks before major events. These orders are then aggregated and either directly passed on to the manufacturers or the sum of orders increased or decreased by the retailer's purchasing organization or product managers before placing an order to the manufacturer. The goods are often delivered to the stores before the event, based on the stores' orders. In some cases, only part of the goods are delivered at first, giving the stores an opportunity to place additional orders later on according to realized demand.

For smaller promotions and less intensive seasons, more companies rely on the central organization and their forecasting tools to produce the forecasts and, thus, make the purchasing decisions. In these cases (six of the companies), the stores only take responsibility for placing the right replenishment orders or monitoring the automatic ordering system during the event.

In some cases, there is a dialog between the stores and the central organization. In two of the companies examined, forecasts for promotions are first developed by the central organization and then checked and updated by the stores. One of these companies also discusses the forecasts with the suppliers.

7: Managing promotional demand

Promotions are a common practice, but many retailers struggle with managing the promotions as demand in these periods is rather hard to predict. One of the retailers in our sample seems to have designed an effective way of managing promotions.

Before the promotion starts the company uses a rather sophisticated demand-forecasting tool. The tool analyses past history to predict the number of customers that are going to enter the stores. A separate algorithm analyses the units sold per customer. Multivariate regression, taking into account variables, such as the features of the promotion, the price cut, the weather etc., is used to predict the lift in sales per customer.

The outcome of this data-driven analysis is then shared with the suppliers and the store managers so that all echelons of the supply chain share the same view of the expected demand increase. This initial forecast assumes that all stores are going to enjoy the same promotional lift. However, it is well-known that the effectiveness of the promotion depends on many store-specific variables, such as where the product is placed in the store, the number of facings it has been allocated etc., and that these variables seldom can be fully controlled by the central organization. What the company does is to look at the first few days of sales at each store and then update the initial estimates literally by the hour. Thus, a generic forecast for the overall chain is updated and made store-specific as more evidence about how effective the promotion actually is at each of the stores is collected. Since the retailer benefits from a rather quick supply chain (both lead-times from distribution center to store and from supplier to distribution center are rather short), the company can adjust its replenishment plans promptly.

The company also manages the inventory position during promotions in an interesting way. In the beginning of the promotion, the company overstocks in the stores. It knows that even if the products do not sell as expected, it is likely to be able to sell them by the end of the promotion. On the contrary, towards the end of the promotion the company is more conservative, since it acknowledges the increased risk of being stuck with the product when the promotion is over. In other words, the company (as several others) has figured out that the cost of overstocking at the beginning of the promotion is much lower than the cost of overstocking at the end of it and plans accordingly. Interestingly, an IT tool is used to optimize profitability and automatically changes the stocking quantities during the promotion.

It can be concluded that in situations where suppliers have good forecasting tools and, thus, reliable availability, and lead-times are short – as they often are for grocery products – the retailer can compensate for somewhat inaccurate forecasts by reacting swiftly to demand. This is probably the reason why only few of the companies interviewed have dedicated forecasting resources or monitor forecast accuracy. However, in cases where lead-times are longer and suppliers are less willing to accept take on inventory risk, accurate forecasting becomes more important to the retailers.

8: Link between forecast accuracy requirements and responsiveness

Many companies measure their forecast accuracy using standard measures such as Mean Absolute Deviation (average absolute errors) or Root Mean Squared Error (average squared error).

A company in the sample employs a different approach. The underlying logic is that the company does not aim for forecast accuracy *per se*. Accuracy is just a means enabling operational excellence. Based on past experience and calculations, the company knows that during promotions (i.e. the most critical situations) it can cope with a 50% forecasting error without ending up with excessive inventory or stocking out. By reading early sales signals and constantly monitoring realized demand, the company – with help of its suppliers – is able to react promptly to any deviations from the plan.

Consequently, rather than measuring the average error, the company measures the frequency with which the inaccuracy exceeds the specified percentage.

3.2 Store replenishment and store operations

Stores typically lag behind the distribution centers as far as automation and IT support of ordering and inventory management are concerned. Automatic store ordering is, however, a major trend. Out of the twelve companies examined in the study, only three rely solely on manual ordering.

For the *normal material flow* (i.e. goods that are not affected by substantial promotions or seasons) four companies employ order suggestions generated based on store sales, safety stock targets (expressed either in items or days of supply), and potentially a simple forecast calculated from historical data. These order suggestions are reviewed by the store personnel.

Two companies use predefined delivery schedules. This means that a delivery schedule defining the exact amount of product to be delivered on each weekday for each store and stock-keeping unit (SKU) is created and followed, unless the store personnel make changes to the schedule.

Five companies use automatic sales based ordering. This means that the system monitors the out-flow of goods from the store as well as keeps tracks of delivered goods and based on the product's shelf-space, safety stock targets, and some sort of forecast (derived from historical sales data) generates orders. Interestingly, out of the five companies, at least three report that they currently do not use automatic ordering for managing fresh goods or important holidays, although they are planning to in the future.

When looking at *promotions and other events*, which cause changes in demand, the picture changes. Several of the companies that use order suggestions or automatic sales based ordering for the normal material flow switch to advance orders or manual ordering for promotions and important seasons. In addition, one of the companies that use automatic ordering for promotions does not use it in situations where the temperature significantly affects item sales.

Interestingly, there seem to be some differences in how the automatic ordering systems or systems creating order suggestions are managed. In most of the cases (five companies), centralized control is exercised, i.e. both the ordering logic applied to the different product categories and the parameters used for controlling ordering (e.g. inventory targets) are set by the central organization. However, in three companies, the store personnel are in charge of setting the parameter values used by the store ordering system. In addition, in two of these companies, the store personnel is in charge of both selecting the replenishment method and of setting the parameters.

9: Employing prioritization of replenishment orders to increase distribution efficiency

Retailers often have two contrasting objectives: one is to fulfill demand that shows seasonal patterns both within the week and during the year; the second is to have a level flow of goods from the warehouse to the stores to improve the utilization rate of trucks and warehouses.

A company in our sample has developed an interesting way to cope with these apparently contrasting objectives. It uses slow-moving goods to even out the flow of goods to the stores and the workload at the warehouses. The company's automatic replenishment system either postpones the shipment of slow-movers or send them in advance in order to leave enough room on the trucks for fast-movers during a demand peak (either toward the end of the week or during events such as Easter).

The logic is that for fast-movers one can hardly send a shipment in advance, as there is rarely space on the shelves to store it. It is also impossible to postpone the shipment of fast-movers; indeed, if the fast-mover is not shipped when an order is triggered, it is likely to stock out. On the contrary, slow-movers usually have more shelf-space, relatively speaking, which means that it is possible to send shipments in advance. In addition, it is possible to postpone the shipment as slow-movers usually have more safety stock both because demand variability is higher and because case packs often are large compared to average daily demand. So, even if the delivery of these products is postponed it is not really a problem - it is unlikely that a customer is going to be disappointed.

The "slack" in the supply chain is, in this way, used to even out the flow of goods and make transportation and warehouse management more efficient. This rather complex replenishment scheduling is performed automatically by custom-built software. Proprietary software also optimizes the vehicles' routes.

A general trend that some companies mentioned during the interviews and that is partly linked to increasing replenishment frequencies and automatic ordering systems is the increase in total order lines. Batch sizes when delivering to stores are moving closer to one. The demand at the store level, which tends to fluctuate according to weekdays, is also reflected more clearly on the rest of the supply chain. This causes increased stress on the distribution system, in picking operations, transportation, and shelving operations at the store. To cope with this problem, one company uses promotional goods to level out capacity requirements, i.e. promotional goods can be sent out in advance to stores to fill up trucks that would otherwise be running only partly filled. Another company is employing a similar approach: it uses bulky goods, such as mineral water or toilet paper, to fill up trucks. A third company takes into account the fact that slow-moving goods (i.e. goods which case packs are large compared to their daily demand) that are automatically ordered tend to have relatively high levels of safety stock (at least compared to the fast movers) and relatively much space to store goods on the shelves. The company takes advantage of this “slack” in the supply chain by postponing deliveries of slow-movers in situations when picking and transportation capacity is scarce.

4. COLLABORATION WITH SUPPLIERS

4.1 Sharing of sales data

All of the grocery retailers interviewed in this study are engaged in information sharing with their suppliers. Information on market research, upcoming promotions and ads, new products etc. is commonly exchanged.

When looking at sales data and, for example, information on product margins, it can be concluded that this kind of information is exchanged, as well. However, a great deal of this information exchange is somewhat ad hoc in nature, related to specific, temporary development projects. The information exchange also relies on the people involved in the process, especially the retailers' category or product managers. The information exchange is seldom part of a documented process and there is rarely any IT support for the activities – e-mail and spreadsheet programs are the main tools.

Information exchange	Number of companies
Ad hoc information exchange	All companies
Systematic information exchange without IT support	3 companies
Systematic information exchange with IT support	2 companies + 7 companies sharing sell-through or POS data with CMI/VMI/JIT* partners
IT integration	1 company

*Different kinds of replenishment collaboration where the supplier monitors the retailer's inventory levels and suggests or generates replenishments.

When suppliers are given access to sales data, it is usually part of some kind of co-managed inventory (CMI), vendor-managed inventory (VMI) or just-in-time delivery (JIT) arrangement, in which the supplier monitors retailer inventory levels and sales and suggests or automatically sends replenishments. Of the twelve companies interviewed, seven have such arrangements; in five of these, sell-through data from the retailers' distribution centers are exchanged, only in two actual point-of-sales (POS) data is made available to the suppliers.

In addition, three companies share point-of-sales data with suppliers in a systematic way, but without much IT support. Two use spreadsheet programs and e-mail for communication. One of the two shares sales data with all of its suppliers on a monthly basis, as well as some information on product availability and spoilage. The other retailer frequently shares point-of-sales data on newly introduced products with suppliers, in order to enable the suppliers to rapidly update their forecasts for these products. A third company also shares sales information on paper, but never in electronic form as it is concerned about data leakage.

Although some companies are planning to give suppliers access to data and invest in IT solutions to support efficient information sharing, only two companies in the sample currently have systems in place to enable rapid and efficient information sharing with all or the majority of their suppliers. They share data on sales, margins and the like with suppliers on a daily basis (the data is actually updated several times a day) using extranet solutions.

10: Efficient information sharing with suppliers

While many retailers are still contemplating whether or not to give suppliers access to their demand data, some companies are moving fast ahead and have already implemented working systems for large-scale information sharing.

One of the companies in our sample provides all of its suppliers access to data on, among other things, sales, margins and inventory levels of their own products. Suppliers with Category Captain status are even given access to information on other suppliers' products.

The data is updated by the minute and very detailed – sales information can, for example, be viewed on a store level. The information is accessed by logging on to the retailer's private exchange through the Internet.

Suppliers are not charged for accessing the information. The retailer's goal is to help suppliers serve the company better by giving them access to relevant information.

One of the retailers has a rather unique arrangement with vertically integrated suppliers. It offers them full access to the data in its ERP system, which makes it possible for the suppliers to examine, for example, their products' turnover in the stores.

In general, it can, however, be concluded that less information exchange than one might expect takes place between grocery retailers and suppliers. This is partly due to IT issues, but perhaps even more with retailer attitudes and retailers' and suppliers' divergent objectives. In the interviews, the following obstacles to exchange of demand information were mentioned:

- Reluctance to give suppliers access to point-of-sale data as this would reveal the magnitude of the retailers' forward buying practices,
- Worries about retailer information leaking out to competitors or being used in a way that benefits competitors,
- Skepticism concerning the value of point-of-sale data to suppliers, and
- Suppliers' unrealistic expectations in asking for product margins and competing suppliers' sales information.

4.2 Replenishment collaboration

Replenishment collaboration is implemented in several of the companies interviewed. Seven of the twelve companies interviewed use it to a significant extent. In general, the collaboration is set up so that the suppliers get access to information on the outflow from the retailer's distribution center to the stores or directly to sales data collected at the stores. Based on this information as well as data on current inventory levels and inventory targets, the suppliers suggest replenishments that can, if needed, be changed by the retailers' logistics planners or buyers. One of the companies interviewed also has arrangements where the suppliers take full responsibility for replenishments, i.e. there are no replenishment suggestions being checked by the retailer. However, these suppliers also own the inventory located at the retailer's warehouse.

11: Automation, standardization and removal of duplicate work

Integrated processes and retailer-supplier cooperation are current buzzwords in the retail industry. One of the companies in the sample has turned these concepts into reality and managed to make transactions with its suppliers very easy and efficient.

With most suppliers the company exchanges invoices and provides payment information on-line. The company strives to standardize data, pallets, and packages. In the case of products that are not standardized, such as fish, the company weighs the product when it receives it. The suppliers' invoice is based on the weight in order to avoid discrepancies between invoice and actual inventories.

In addition, with more than twenty suppliers, the retailer engages in replenishment collaboration. The retailer provides POS and inventory data to the suppliers, and the suppliers provide purchase suggestions that are then validated by the retailers' logistics planners. This provides the supplier with relevant information and enables the retailer to save labor.

Replenishment collaboration is typically perceived to save the retailer work. It is considered to be most valuable in situations where the suppliers' expertise concerning the demand for their own products is most needed (e.g. seasons).

Although companies in general have been happy with their collaborative replenishment arrangements, some companies have experienced problems, as well. One company that has piloted vendor-managed inventory (VMI) but later terminated the pilot, during the interview stated that it needs to "do its homework first" before it can efficiently implement VMI. What the company means is that it needs to get its own IT systems in order before trying to integrate with suppliers. Moreover, a retailer who is currently engaged in several VMI relationships has experienced problems with suppliers not understanding its control logic and the limitations of its warehousing capacity. Some suppliers have, for example, managed to block the distribution center by trying to deliver all the products needed for a promotion at the same time. Finally,

a third retailer involved in JIT deliveries has noticed that some suppliers tend to fill up the retailer's inventories in anticipation of promotions in order to reduce the retailer's opportunity to purchase goods when prices are reduced.

4.3 Forecasting collaboration

Although most of the retailers are involved in different kinds of category management projects (aiming to improve category performance) or in high-level planning and development projects (aiming to improve business models) with suppliers, established processes for more operative forecasting collaboration are rather rare.

Collaborative forecasting	Companies
No efforts mentioned	4 companies
Pilots (on-going or ended)	5 companies
Permanent processes with a few suppliers	1 company
Large-scale implementation	3 companies

Although the study presented here focuses on large companies – market leaders – only three of the companies have large-scale implementations in the area of forecasting collaboration.

12: Collaborative forecasting of promotions

One of the companies in the sample has identified promotions as the area in which forecasting collaboration with suppliers is most valuable. After first piloting collaborative forecasting of promotions, the company has implemented an extranet-based solution that enables it to collaboratively develop forecasts for promoted products with all of its major suppliers.

This is how it works in practice: Twelve weeks before going live, supplier representatives and the retailer's buyers agree on the level of the promotion and enter it into the system. Three weeks later this is converted into case quantities in order that logistical requirements can be met. By the last four weeks this data are incorporated into the automated forecasting system and monitored. Through the system, suppliers get access to sales data and availability information, which makes it possible to monitor and evaluate whether the promotion is having the expected impact on demand. The system also provides companies with warnings when there are deviations from the plan.

Although the system is used with all major suppliers, the focus is on key value items, i.e. the 1000 best selling lines. The aim of the collaboration is to increase on-shelf availability of promoted products while at the same time reducing the cost of overstocking on these items. The retailer and its suppliers have been pleased with the results, although the retailer comments: "using [the system] for managing promotions requires much discipline".

Two of these focus on promotions, i.e. jointly developing forecasts for promotions (see Inserts 7 and 12). In one of the companies, the process is based on first developing an initial system-generated forecast and then checking it with stores and suppliers. The other focuses on retailer-supplier collaboration and includes more IT support, such as alerts (accessible to both retailer and supplier) when demand seems to develop differently than predicted. The third large-scale collaborations is, basically, a supplier-driven version of the CPFR process model (see Insert 13), in which the retailer generates forecasts based on its history data and the suppliers view these forecasts in order to pick up trends and identify exceptions compared with their own forecasts.

13: Supplier-driven CPFR

Although none of the retailers in the sample have implemented the CPFR process promoted by VICS in full, one of the retailers is using a very similar approach.

The retailer's different business units (representing ambient, frozen etc. goods) first develop forecasts for their products. The forecasts are divided into "normal" (based on trend forecasting) and "seasonal" (to account for Christmas, different kinds of events etc.). Through the CPFR software, suppliers can examine the forecasts, pick up trends, and adjust the forecasts. The collaboration process is, thus, rather supplier-driven. Millions of items are dealt with per day and initially tens of thousands of queries were handled by the retailer's staff. The company has now introduced an automated reply system that deals with most queries, but still a significant amount is handled manually.

The main objective for engaging in this kind of collaboration from the retailer's point of view is increasing on-shelf availability. According to the company, the collaboration has been successful. It is currently collaborating with its top ten international suppliers, but it planning a roll out to all its major suppliers within the near future.

Small-scale implementations can be found in at least one of the companies interviewed. It shares point-of-sales data on new product introductions with suppliers in order to enable them to rapidly update their forecasts for these products. The same company also collects promotional data in a database and gives one supplier access to it for forecasting purposes. Interestingly, the database contains information on both the supplier's and its competitors' promotions, which makes the amount of historical data larger than if it only focused only on one supplier's products. The company is committed to these processes – they are beyond pilot status – and looking for IT solutions to increase efficiency and enable a scale-up.

The interviewed companies have also piloted several different collaboration approaches. At least three companies have tested or are currently testing CPFR-like collaboration with some suppliers. In addition, one company is piloting collaborative forecasting of seasonal demand. Another one has tested sharing information on

delivery schedules with suppliers. However, none of these tests have so far led to permanent process implementations, and some of them have already been terminated or put on hold.

Based on their experiences of collaboration, the companies highlighted the following lessons and opinions:

- Need to look at the entire supply chain, not only specific functions or interfaces: It is, for example, important to get better information on store level costs to evaluate the impact of collaboration,
- Prioritization and focus: Several retailers stated that they do not consider it necessary to collaborate with all suppliers. In addition, some of them commented that collaboration should focus on promotions and special events and that close collaboration for products with stable demand is unnecessary. In addition, one retailer pointed out that not all information is worth sharing – as a basic rule only information that helps mitigate uncertainty in the supply chain is worth sharing,
- Scalable solutions needed: Some retailers emphasized the need for industry-wide solutions,
- Retailer processes and capabilities: Several companies stated that the retailers need to develop their own forecasting and replenishment processes before real collaboration can take place. One retailer also mentioned that forecasting collaboration is better suited for organizations employing centralized control than for decentralized ones as the retailer, otherwise there is a need to override the decisions of the local store personnel,
- Retailer benefits: The main benefit, according to several retailers, is increased on-shelf availability and improved store replenishment efficiency. One retailer, however, also commented that it is expecting some kind of reward if it starts sharing forecasts with suppliers.

During the interviews, the companies were also asked about the Collaborative Planning, Forecasting and Replenishment (CPFR) process model promoted by the Voluntary Interindustry Commerce Standards Association (VICS). The process has been focus of much attention in recent years. The following things were mentioned by several respondents:

- The process is too laborious: Many retailers mentioned that the process model in its suggested form requires too much work and resources, and, therefore, is unfeasible,
- Conceptual framework: Some retailers pointed out that the process model should be seen as a conceptual framework rather than an actual process to be implemented. When seen as a framework, CPFR is considered valuable as its highlights the right things and works as a change initiative,
- Valuable or not? Some retailers are skeptical about the value of collaboration in general (“If both parties do their job properly there is not a huge need for collaboration”), while many are interested in collaborating with their suppliers, in one way or the other.

5. LOGISTICS CHALLENGES AND OPPORTUNITIES

5.1 Store operations

When asking the retailers what they consider to be the main challenges and opportunities in the area of logistics, many companies mentioned store processes. It is clear that grocery retailers have a great interest in developing store processes and performance. What used to be a somewhat neglected part of the supply chain is now seen as the next big opportunity for efficiency improvements. This is logical in light of logistical key performance indicators. Firstly, stores tend to carry a high proportion of the stock in retailers' distribution networks. Secondly, on-shelf availability is a major concern. Thirdly, store operations are often associated with high personnel costs.

The following development opportunities and challenges were mentioned by several of the retailers interviewed:

- Implementing automatic store ordering for all product groups, including perishable goods and goods on promotion,
- Increasing on-shelf availability and decreasing store inventory,
- Measuring on-shelf availability and inventory levels accurately,
- Working together with suppliers to reduce case pack sizes to enable more efficient store operations and better inventory turns,
- Automating and increasing the granularity of assortment and space allocation decisions, and
- Developing store operations and solving practical problems with, for example, fixtures, to increase efficiency and reduce personnel needs.

Many companies are already implementing automatic store ordering and processes for measuring on-shelf availability. Still, there is much work left to do. Making automatic store ordering work for promotions and other events is an important challenge. In addition, many companies expressed a need for developing tools to enable efficient measurement of on-shelf availability and reducing the need for manual checks.

In addition, retailers are taking many different approaches to improving efficiency and customer service: some are developing tools for efficient management of store-specific assortments, others are looking into factors, such as store fixtures, affecting store processes and personnel costs.

It is clear that there are many research opportunities in the area of store processes and logistics solutions. In addition to such topics as on-shelf availability that receive a lot of attention at the moment, also other subjects, such as automatic store ordering and automation of space allocation and assortment management, provide important areas for research and development.

5.2 Distribution

Concerning warehousing and distribution, the following development opportunities were mentioned by several retailers:

- Taking new technologies, such as radio-frequency identification (RFID) at the warehouse level, into use
- Increasing transportation efficiency by increasing vehicle fill,
- Improving forecasting capabilities and providing own planners with better tools,
- Increasing flexibility of distribution,
- Increasing retailer control over primary distribution (through factory gate pricing) in order to attain efficiencies in goods reception and in transportation by using the same vehicles in primary and secondary distribution,
- Increasing cross-docking,
- Upgrading and remodeling current distribution networks and implementing or upgrading ERP systems,
- Dealing with the pressure caused by increasing order lines and fluctuating demand at the distribution centers, and
- Outsourcing of distribution.

Many very traditional logistics issues, such as distribution strategies, cross-docking, and transport optimization are still seen as important development areas. Moreover, many companies see developing and remodeling their distribution networks as their main short-term development opportunity.

Control and ownership issues were also mentioned. Interestingly, whereas some retailers see outsourcing as in important development opportunity, other companies are taking operations back in-house and even trying to increase control over the supply chain by taking ownership of primary distribution (i.e. distribution from manufacturers to retailers' distribution facilities) through factory-gate pricing.

Forecasting is also recognized as an important challenge. Currently many companies rely on very basic forecasting approaches although they are interested in the more advanced tools available. An interesting opportunity for research and development is, consequently, to examine why available forecasting tools are not yet widely used and how the tools can be made more suitable for the grocery retailing environment.

5.3 Supply chain management and collaboration

Development opportunities in the area of supply chain management and inter-company collaboration were also identified:

- Increased pull and cross-docking in the supply chain and increased responsiveness in manufacturing ("Now store ordering reflects demand, but the rest of the supply chain still needs to be changed from a push-oriented to a more pull-oriented way of operating"),
- Information sharing and forecasting collaboration with suppliers to help them attain better service levels, which translates into better on-shelf availability,
- Reducing the size of case packs (especially for fresh goods and expensive non-food) to better serve the needs of the stores, and
- Transparency of costs in the supply chain to increase effectiveness and understand where the biggest cost reduction potential really is.

Although there are significant differences between retailers' attitudes towards supplier collaboration, many consider information sharing and forecasting collaboration as important development opportunities and means of increasing on-shelf availability.

In general, the retailers express a need for more pull-based operations throughout the supply chain. Increased cross-docking, more flexible operations, and reduced case pack sizes are seen as areas in which retailers and suppliers should work together.

Finally, a few retailers mentioned transparency of costs in the supply chain as a prerequisite for truly effective development. By mapping the supply chain and its cost drivers, development efforts could be focused on the issues where they generate the largest benefits. However, sharing and discussing cost information in the supply chain requires even more openness from the parties involved than operational collaboration, making it a considerable challenge for most companies.

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