INVESTIGATION OF OPPORTUNITIES THAT EXIST WITHIN THE AUTOMOTIVE SUPPLY CHAIN FOR COLLABORATIVE PLANNING, FORECASTING AND REPLENISHMENT (VICS CPFR®)

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1 ABSTRACT

Due to collaborative planning, forecasting and replenishment (VICS CPFR®) amongst retailers or manufacturers and their suppliers, decreased inventory and better visibility can be achieved within the supply chain. The process was originally developed for the retail sector and will be discussed in a very detailed way for the automotive industry.

Therefore, a brief description including the origin, definition, benefits and current application of VICS CPFR®, is provided. Subsequently, a precise analysis of approaches in the automotive industry and a gap analysis between the retail and the automotive sector are presented. Examples in various areas emphasise each gap. Ways of solving these gaps are identified and a final suggestion of a VICS CPFR® model for the automotive industry is created. This model is based on the retail sector with detailed modification for the automotive industry in order to achieve great benefits in the supply chain.

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3 INTRODUCTION

This report is about an investigation of opportunities that exist within the automotive supply chain for Collaborative Planning Forecasting and Replenishment (VICS CPFR®). The process was originally developed for the retail sector. Due to significant benefits which were generated by CPFR, the question arose, whether these benefits could be used in the automotive industry.

As nearly all of the five writers are students of the University of Cooperative Education in Stuttgart/Horb and at the same time trainees at the car manufacturer Daimler AG, this report evaluates the applicability of VICS CPFR® for the automotive industry.

The investigation has been carried out in the course of the fifth semester at the University of Bolton, attendant on the lectures in Supply Chain Management and is evaluated as a group project assignment.

The report includes examples of the benefits for the automotive supply chain and provides a basic model for the implementation of VICS CPFR® in the automotive industry. Thus, it addresses managers of the automotive sector.

4 ORIGIN OF VICS CPFR®

American retailers and consumer good companies were struggling with stagnation of revenues, rising costs and an increase in productivity was scarcely realised in the early nineties. This often led to a negative impact on margins, contribution margins and profit on sales. Changes and real gains could only be accomplished through open cooperation partnerships for retailers and manufacturers. This partnership is described in the following section, starting with the Efficient Consumer Response (ECR) concept as the origin of Collaborative Planning Forecasting and Replenishment.
4.1 ECR

A truly success in the retail sector was achieved by Wal-Mart. It focused more on a closed-knit cooperation with its suppliers due to a so-called Efficient Consumer Response concept. The aims of improving quality, a more efficient production, which should be quicker and with less expense, were reflected in the outcomes of storewide records for inventory turnover, revenue per unit sales area and operating profit.

As the ECR concept was so successful for Wal-Mart, it has to be discussed what it is and what it consists of. For retailers and manufacturers the concept is based on value added processes. It focuses on consumer oriented needs as well as on efficient response by optimising the supply chain and coordinates individual elements. The basis of ECR is a mindset of partnership and cooperation between retailers and manufacturers.

ECR contains two main concepts. Within the supply side, a cooperation in logistics between manufacturers and retailers aspires an optimal supply chain. Strategies, which are involved in this concept, are Efficient Replenishment (ER), Efficient Administration (EA) and Efficient Operating Standards (EOS). The second concept aims at a better marketing mix with the help of collaboration in marketing through Category Management and exchange of customer data. This concept is based on the demand side and contains the following strategies: Efficient Store Assortment (ESA), Efficient Promotion (EP) and Efficient Product Introduction (EPI).

The aim of ECR is to satisfy the customers by increasing availability, quality of products and creating optimal prices. These aims can be achieved by eliminating uncoordinated sequences in the supply chain. Examples are unused long period inventory and information which need to be disposed as well as abolishing unnecessary safety stock in the warehouse. Moreover, rectifying mistaken promotion, assortment determination and product introduction can accomplish any given targets.

Overall, ECR creates a value added win-win-win situation for consumers, retailers and manufacturers. Low prices, fresher products and higher availability can be allocated
through Efficient Replenishment. This leads to customer satisfaction. Benefits for the retailer and manufacturer are lower costs and increased revenue with the help of reduced inventory, quicker and more efficient systems (Seifert, 2003).

4.2 Genesis of VICS CPFR®

In 1995, Wal-Mart and Warner-Lambert, supported by the IT companies SAP, Manugistics and the consulting firm Benchmarking Partners, started the first CPFR project in the United States of America. First, it was called Collaborative Forecasting and Replenishment (CFAR). Warner-Lambert supplied mouthwash products of Listerine which was the first project where CFAR was implemented. Wal-Mart provided forecast information in order to project fluctuation in consumer demand. This collaborative work intended to decrease inventory within the supply chain and offered better visibility. Therefore, early reaction was possible (KJR Consulting, 2002).

The experiment ended in fall 1996 and success was announced by increasing stock position from 85 percent to 98 percent, sales enhanced by $8.5 million in one year and inventory decreased by 25 percent. The supply management of Warner Lambert upgraded considerably. During the pilot project, an adaptive model was created by the VICS (Voluntary Interindustry Commerce Standards) Working Group which later evolved into CPFR. VICS is an association which was founded in 1986 in the U.S.A and works voluntarily and with no profit. VICS CPFR® was first described and publicised by this association (Seifert, 2003).

4.3 Distinction between ECR and CPFR

CPFR is the expansion of ECR which is listed below:

- Sales and order forecasting processes,
- Feedback systems in order to control and improve supply chain,
- Information systems to detect and devolve point of sale, inventory and other demand and supply information,
• Exception handling processes (SCRC Supply Chain Resource Cooperative 2000-2006).

5 DEFINITION AND EXPLANATION OF VICS CPFR®

Collaborative Planning, Forecasting and Replenishment (CPFR) is in the first place an evolution and refinement of the original Efficient Consumer Response (ECR). (Seifert, 2003, p. 27)

![Figure 1 Participants of the SCM process](image)

ECR means the consequent optimisation of the supply chain to the customers' needs and wishes, by passing on information along the supply chain. This should lead to an optimum in quality, service and the variety of products (Zillgitt, 2005).

The fundamental objective of ECR is the collaboration between all affected participants by the supply chain, the customer, retailer and supplier, respectively the appliance of technical and process standards (Zillgitt, 2005).

The Collaborative Planning, Forecasting and Replenishment aims to enhance the use of ECR and to optimise the collaboration along the entire value chain for companies by
bringing the methods and techniques of ECR in a holistic business model together (Zillgitt, 2005). The conjunction of the separately recognised issues concerning the demand and supply side in the ECR model, offer the possibility to achieve remarkable synergetic effects (Zillgitt, 2005).

Concisely, VICS CPFR® displays “an initiative among all participants in the supply chain intended to improve the relationship among them through jointly managed planning processes and shared information” (Seifert, 2003, p. 30).

The aim of VICS CPFR® is achieved by the use of a common control process relating to all relevant planning, forecasting and replenishment issues. All activities of the CPFR process try to provide the highest availability of goods while optimising the inventory (Zillgitt, 2005), improving the company’s own position in the market and the optimisation of its own value chain (Seifert, 2003, p. 28).

Since the fundamental planning and forecasting of the process require an intensely information exchange, e.g. in logistics, sales management, marketing and finance planning, CPFR is a tool for comprehensive value chain management of an organization (Seifert, 2003, p. 28).
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<th><strong>Planning</strong></th>
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<td>The main idea of CPFR is to achieve higher benefits in a partnership, by working together towards the same goal (Peterson, 2003). This does not mean the stronger partner uses his power to dictate the terms of the collaboration, but having the common goal to satisfy as many customers as possible while gaining the highest profit for both parties (Peterson, 2003).</td>
<td>The word “planning” was added to the original Collaborative Forecasting and Replenishment model because the VICS group saw collaboration in terms of business and financial planning of all affected parties by the supply chain as a vital role in CPFR (Peterson, 2003).</td>
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<th><strong>Forecasting</strong></th>
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<td>Forecasting can be done by both, the vendor and the retailer, depending on the circumstances which party can produce more accurate, respectively valuable data (Peterson, 2003). By an optimized collaborative forecasting, the inventories and sales can be improved over the whole supply chain (Peterson, 2003). Especially, products depending highly on seasonal influences can be better analysed by a collaborative forecasting (Peterson, 2003).</td>
<td>The sales forecasting are converted into order forecasts. Thus, supplier constraints such as order cycle time, lead-times, order minimums, case packs and chronic open-to-buy inhibitors need to be controlled. Moreover, the transportation planning is named by VICS as a “key lever” in replenishment (Peterson, 2003).</td>
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VICS CPFR® as a very successful business practice is being implemented at many enterprises along the globe. Over the past nine years, CPFR guidelines have been published several times, both to provide a better understanding of CPFR and to point out the steps required for the CPFR implementation process. The original CPFR Model, which was published by the VICS Association in 1998, showed the CPFR implementation as a linear process divided in nine steps. At the end of this process there was the consumer (VICS, n.d.).

In order to adjust the VICS CPFR® Process Model to the changing global requirements and by gaining more and more implementation experience the original CPFR Model was revised (VICS, 2004, p.5).

The latest version of the CPFR guidelines, edited by the VICS CPFR committee in 2004, is an interactive cycle of four main activities, so called Collaboration Activities:

- Strategy and Planning
- Demand and Supply Management
- Execution
- Analysis

Furthermore, the crucial role of the consumer, on whom lays the focus of collaborate efforts, is demonstrated by placing it in the centre of the model (VICS, n.d.).
The manufacturer as the seller and the retailer as the buyer collaborate at any stage of the four activities, which is shown in the model through the arrows between them. Each collaboration activity consists of two collaboration tasks that specify the main activity.

6.1 Annotation on the Collaboration Activities and Tasks

6.1.1 Strategy and Planning

This activity appoints the basic rules for the collaboration between the manufacturer and the retailer. It determines both the product mix and placement and the event plans for the following period.

- **Collaboration Arrangement**
The business goals for the collaboration are set and the scope for relationship is defined. Furthermore the responsibilities, checkpoints and escalation procedures are assigned.

- **Joint Business Plan**
  Important events that influence supply and demand are disclosed for the planning period. This includes for example promotions, inventory policy changes, store openings and closings respectively or product introductions (VICS, 2004, pp. 7-9).

### 6.1.2 Demand and Supply Management

This part of the CPFR Model forecasts the customer demand, also referred to as point-of-sale (POS) demand, and the order and shipment requirements.

- **Sales Forecasting**
  The demand at the point-of-sale is projected by means of consumption data. Depending on the product, industry or trading partner the consumption data could be the retailer POS data, distribution centre withdrawals or manufacturer consumption data. It must be pointed out that planned events mentioned in the Business Plan have to be embraced in the Sales Forecasting (Bozarth, 2006a).

- **Order/Planning Forecasting**
  Based upon the sales forecast, the order forecast and the delivery requirements are issued. Compiling the Order/Planning Forecast transit lead times, manufacturer’s capacity limitations, inventory positions and other factors have to be considered (VICS, 2004, p. 9).

### 6.1.3 Execution

Execution comprises all operational actions like place orders, prepare and deliver shipments, receive and stock products on retail shelves. Furthermore the record of sales transactions and the effort of payments are components of the Execution as well.
• **Order Generation**
  
  Order forecasts are transitioned to firm demand.

• **Order Fulfilment**
  
  Products are produced, shipped, delivered and stocked for consumer purchase (VICS, 2004, p. 10).

### 6.1.4 Analysis

The task of this activity is to detect deflections that lead to exception conditions. Therefore, a monitoring of planning and execution activities is needed. The results gained by monitoring are aggregated and key performance metrics calculated. The retailer and the manufacturer share their insights and adjust their plans to achieve continuously improved results.

• **Exception Management**
  
  It includes monitoring of planning and activities to arrange the exception conditions. Exceptions could arise both in sales and order forecast (VICS, 2004, p. 10).

• **Performance Assessment**
  
  The calculating of key metrics is a crucial task in Performance Assessment. Key metrics are divided into two groups: the operational measures that include fill rates, service levels, forecast accuracy, lead times or inventory turns and the financial measures which could be costs or item profitability. Their calculating helps to appraise the achievement of the business goals, to perceive new trends or to develop alternative strategies (Bozarth, 2006b).
6.2 Collaboration in the VICS CPFR® Process Model

For each collaboration task in the CPFR Process Model, there are corresponding enterprise tasks that are performed by the manufacturer and the retailer. The coordination of these efforts is ensured by the framework provided by CPFR (Bozarth, 2006b).

For example, the retailer conducts periodical replenishment planning and the manufacturer a demand planning. When CPFR is involved in this process the teams accomplishing the enterprise tasks, come together and compile the Order Planning/Forecasting including all important information from both sides, the retailer and the manufacturer.
6.3 N-tier Collaboration

If there are more than two tiers in the trading process the CPFR Process Model can be extended. Therefore, the supplier which provides the manufacturer, is placed in an enclosing ring of the CPFR Process Model like shown below in the figure.

![Figure 3: n-tier Collaboration (VICS, 2004, p.12)](image)

7  BENEFITS AND CHALLENGES OF VICS CPFR®

7.1 VICS CPFR® Benefits

Collaborative Planning, Forecasting and Replenishment creates a win-win situation between their trading partners if it is applied properly (Industry Directions and Syncra Systems, 2000). There are tremendous opportunities for the participants in demand and supply matters.
CPFR is based on a strong supplier–buyer relationship. The involved parties spend a lot of time together in CPFR meetings, such as Business Plan meetings, Forecast and Planning meetings etc. The more often they meet the stronger the relationship gets. As a result, both parties make a contribution to share internal company data to improve their Planning figures which is known as “Infopartnering” (Seifert et al., n.d.).

The joint planning and forecasting has an immediate influence on the quality of forecasts (Simchi-Levi et al., 2003). The example of the German manufacturer Henkel and its retail customer Eroski endorses the above mentioned argument:

50 percent of Henkels’ and Eroskis’ sales forecasts had an average error of more than 50 percent. After having started a CPFR partnership in 1999, they achieved an average error of less than 20 percent with three quarters of their forecast figures (Simchi–Levi et al., 2003, p. 283). Furthermore, stock out levels could be reduced dramatically.

More accurate forecast figures lead to lower inventory and backorder levels, that means by using CPFR the often mentioned bullwhip effect in the supply chain can be reduced (Simchi-Levi et al., 2003, p. 282). Furthermore, a close collaboration on planning and forecasting results in a more realistic business plan. That means that marketing decisions becomes more effective which has a direct effect on sales figures (VICS, 1999).

In addition to the above mentioned points, the questioned companies saw “exciting benefits” in terms of

- replenishment cycle times,
- stock rates for retailers,
- days of supply, inventory level and inventory turns,
- service level,
- and last but not least costs arising from production, planning and deployment (Industry Directions and Syncra Systems, 2000).
Taking everything into account “CPFR improves efficiency, increases sales, reduces fixed assets and working capital and reduces inventory for the entire supply chain, while satisfying consumers’ needs” (Semchi-Levi et al., 2003, p. 282).

7.2 VICS CPFR® Challenges

The whole process of CPFR is based on sharing sensitive information with trading partners. One of the biggest threats is the misuse of this information (Drayer, 2002). Therefore, choosing the right trading partners is important. Besides having a trusting business relationship, the counterparts must have the required commitments and resources available. Otherwise CPFR will not be successful. With reference to the above mentioned CPFR Study of Industry Directions and Syncra Systems, more than 60 percent of the questioned manufacturers, retailers, wholesalers and distributors see even more difficulties in internal change followed by cost matters.

![Figure 4: Challenges of CPFR (Industry Directions, 2000)](image)

Nowadays, the whole CPFR process is done electronically. In this connection the introduction of new technology can become a barrier if the company does not provide the required funds. The same percentage of the respondents saw it as a challenge to roll out CPFR without having the required executive support. The executive board has to be fully behind it and CPFR has to become a priority within the organisation which is often
linked to a “cultural shift and human capital investment” (Industry Directions and Syncra Systems, 2000).

If the company is able to overcome these barriers to success, CPFR offers significant business benefits.

8 APPLICATION OF VICS CPFR®

While it is somewhat obvious that demand visibility will be improved by external collaboration, the importance of improving internal collaboration is often overlooked. Eventually, all successful VICS CPFR® practitioners find that the real monetary value is derived from improved internal collaboration (Oracle Corporation, 2006).

8.1 Involved Departments

Therefore, it is important to know which departments are actively involved in CPFR. A survey conducted by the VICS organisation shows that beside the Supply Chain department or Logistics, Sales, Customer Service, Inventory, IT, Finance, Operations, Executive Management, Trade Relations or Customer Development and Marketing are involved, too (Barratt et al, 2001). Of course, each company has its own nomenclature.

8.2 Involved Sectors

CPFR initiatives started in the retail sector. Seeing the success, many other sectors tried to transfer this to their own business.

Interviews by the Supply and Value Chain Centre with managers involved in CPFR projects in 2002 demonstrated that in almost every sector CPFR pilots are conducted.
The diagram above shows the wide range of allocation: Aerospace, automotive, agriculture, transportation, electronic, telecommunication or chemistry companies are represented. CPFR can also be used in the paper, textiles, pharmaceutical, consumer or manufacturing industry. Even real estate, energy companies, financial services and consulting companies take part (ECR Europe, 2002).

Most CPFR implementations have been in North America and Europe. In the USA alone, more than $15 billion in the supply chain is managed by CPFR processes and more than thirty CPFR programs are currently underway in Europe (Stiely et al., 2003).

8.3 Successful Companies

The following are examples of some companies of different sectors that implemented CPFR successfully.

The VICS CPFR® initiative of Wal-Mart is very well-known. The retailer has experimented with CPFR since 1995 and has had significant success in this regard and can be seen as a pacesetter.
The CPFR system has helped the beer producer Heineken to reduce order cycle times from three months to four weeks in the USA. Other benefits include lower procurement costs, smaller inventory, and fresher products to consumers (Lothair, 2001).

Dell sells PCs directly to customers and starts assembly after receiving a customer order. The company leverages the internet in dealing with both customers and suppliers. The system helps Dell to extend its leadership position in a competitive computer market (Attaran, 2007).

Coca-Cola FEMSA (KOF) is headquartered in Mexico City and is the second largest bottler and distributor of Coca-Cola products in Latin America. KOF has increased demand-planning accuracy up to 93 percent and reduced stock-outs to less than 1 percent. The system has helped the company to achieve greater overall efficiency and most important, better customer service (Norbridge, 2001).

In the scientific and technical aerospace reports NASA is discussing ‘Reparable Supply Chain and Applying CPFR concepts’ for the US Air Force in the future (NASA, 2006).

8.4 Technology

The VICS CPFR® process does not fundamentally depend on technology. But it uses common tools and processes to improve supply chain planning through accurate and timely information flow.

A VICS research in 2002 showed that Excel spreadsheets, internally developed software or third-party software were used. However, specialized technology can make the CPFR process more scaleable. To facilitate the process, the technology has to be flexible across the industry, guarantee secure communication and should be extensible to all supply chain processes. Moreover, the sharing of historical data and forecasts, the interoperability with existing systems, the automation of the collaboration process and joint business plan, the possibility of revisions and the evaluation of exception situations should be possible (Barratt et al, 2001). These requirements were successfully tested by the Uniform Code Council, Inc. (UCC) for the following companies’ software.
Participating vendors were i2 Technologies, Inc, IPNet Solutions, Inc., JDA Software Group, Inc., Logility, Inc., Manugistics Group, Inc., SAP, and Syncra Systems, Inc. The test was the first of its kind worldwide (KJR Consulting, 2002).

Among the most used software today are mySAP, Manugistics CPFR Solution, Voyager Solutions, Oracle's J.D. Edwards Advanced Planning Solutions, Agile Anywhere, CLOExpress and JDA Software (Erman, 2002).

9 CPFR IN THE AUTOMOTIVE INDUSTRY

Since the emergence of VICS CPFR® in the retailer sector, some other branches of industry, for example apparel, have adopted the CPFR business process as well. But are there any automobile manufacturer and their suppliers already using the concept of CPFR? This question should be discussed in this chapter, showing results of a research on CPFR processes in the automotive industry.

Fuji Heavy Industries Ltd. (FHI) uses some contents of CPFR to compile sales forecasts for its Subaru automobiles. In doing so, FHI focuses upon the collaboration between more than 50 Subaru managers and the district sales managers. Instead of sending paper projections from the corporate offices, the district sales managers provide an up-to-date feedback on the sales numbers and forecasts for their regions on the corporate internet. These data are compared with the production numbers and plans. Thus, changes in the market conditions can be recognized and the manufacturing programme can be adjusted to them. The responsibility for both monitoring the up-to-date sales numbers and forecasts and the alerting of headquarters in case of required changes is borne by the managers on the manufacturing side. Hence, Subaru uses a collaborative solution to create a more up-to-date bottom-up forecast (Cavinato and Kauffman, 2000, p. 32).

Collaboration is as well aspired in the automotive industry during the development process of a new vehicle. The automotive manufacturer Daimler AG, for example,
CPFR in the Automotive Industry

involves its suppliers in the development operations by providing a cut-out of the car that should be devised. The suppliers then present their proposals for the new part of the car and Daimler AG chooses the most innovative component with the best quality and cost-performance ratio. Thereby, a competition of innovation is created. However, not until a contract with the supplier is closed, Daimler AG will not furnish detailed plans for the new car to its suppliers. During the development of a model upgrading, the circumstances are not that strict and for instance, the supplier of bumpers is allowed to evolve a new more sportive fender on his own.

Automotive manufacturers that cooperate just with few definite suppliers (quasi home-suppliers) already collaborate at an early stage of the development process with them and share explicit construction plans.

A considerable emphasis of collaboration in the automotive industry lays currently on e-business, more precisely data sharing. The formation of this status of e-business began in the 80s when there was a global structural change in the automotive industry. Lean Management led to a decrease of the number of suppliers for an enterprise and to an outsourcing of logistic activities for instance. Moreover, the life cycles of a car shortened from five years in 1990 to three or even two years nowadays. Automotive manufacturers focus more on specific customer demands and have to deal with a narrow time-frame from an order to a delivery. Consequently, there is a need for a high complex logistic network and a necessary flexible cooperation between partners (LiNet, 2001).

Out of the desideratum illustrated above arose the electronic platform Covisint.com. It was built at the beginning of the year 2000 by the so called Big Three Manufacturer (General Motors, DaimlerChrysler and Ford), later on Renault-Nissan and Peugeot Citroën joined. The concept of Covisint was simple: For the automotive manufacturers it should serve as a platform where they can buy goods and services required for their manufacturing and business concerns at a bargain price. Contrary, the suppliers should have the opportunity to submit quotes. Potential suppliers would have been chosen and could bid to get the contract in an electronic auction.
Moreover, the platform should have been used to share complex data between the automotive manufacturer and its suppliers to save costs. Therefore, applications like Covisint Connect, Covisint Communicate and Covisint Collaborative were developed.

In 2004, Covisint was used by 25,000 enterprises that were located all over the world. Nevertheless, Covisint was sold by its owners to a software company named Compuware at the beginning of 2004. Unfortunately, Covisint did not match properly the expectations of both, the automotive manufacturers and the suppliers. Further, it was not possible to convince the suppliers of the benefits of the system to a satisfying extent.

Nowadays, the utilisation of Covisint, irrespective the automotive industry, is open to other sectors as well, for example the healthcare sector (Abcmarkets, 2004).

Another advertising project for the supply chain management in the automotive industry exists in Germany and is aided by the German Federal Ministry of Research and Technology. It is called LiNet which stands for Lieferanten-Netzwerkmanagement and can be translated as suppliers-network-management (Frauenhofer Institut Materialfluss und Logistik, 2007). Automotive manufacturers (Audi, BMW, Daimler), suppliers (Behr, Peguform, Holzschuh, Faist) and logistic service providers (Craiss, Rhenus Logistics, Südkraft Spedition) work together and determine requirements for such a network-management. Out of it, processes and IT systems are designed and tested together with software contributors and IT service providers (Scientific Commons, 2007). The project focuses on innovative development and spanned network for logistic solutions. Moreover, it concentrates on the execution of these solutions. Concepts, methods and applications are developed together, validated and tested. Results are, for instance standard and network capable logistic processes for the automotive and supply industry, integrative management concepts for the entire supply chain and an IT implementation of an entire supply network (Frauenhofer Institut Materialfluss und Logistik, 2007).

LiNet, like Covisint, is not a fully integrated CPFR method because the partners are only working together for a common logistic network until now.
On the other hand, though, it is already a collaborative partnership with the aim to achieve higher benefits for every member. Moreover, a collaborative planning within the logistics and collaborative replenishment is executed through a conjoint supply and transportation planning as well as an implementation of an IT network.

A very specific approach of CPFR has been made by General Motors, the largest automotive manufacturer in the world with a wide network of suppliers, dealers and logistics providers. General Motors is investigating methods to detect customer demand quickly and responding to it in order to confront rapid changes of demand and complex products. A research is exploring if CPFR leads to more success within the automotive supply chain and should be used as a framework in their automotive environment in order to gain best value for the General Motors business.

The company, as all other automotive manufacturers, is confronted with, for instance, great competitors and constantly changing customer taste which lead to a high volatility on the demand side. Within the supply side, demand is not visible and not shared with all partners and order, inventory, shipment and delay information are not transferred in real time. The supply and demand side mismatch. Consequently a significant, more flexible, agile and responsive supply chain for General Motors is necessary.

An Enterprise Demand Sensing Research Program was developed as a solution for an investigation and innovation of analytical methods with an IT framework and collaborative decision-making in procurement, manufacturing, marketing, sales and logistics within the existing business processes. Furthermore, the program contains researches of improved sensing technologies, sharing and propagation of demand information within the entire enterprise. There is a focus on collaborative forecasting with suppliers and collaborative replenishment with their dealers. Internal General Motors research staff, external research colleagues and partners from universities and other companies are involved in this investigation and all participants gain benefits from it. The objectives of the program are an increased satisfaction and enthusiasm of customers which could lead to higher sales, greater profitability and an improved
market share. Enterprise Demand Sensing is aiming to have the right product at the right place and time. That means, sensing customer demand for their vehicles, specific options and accessories in order to allocate these parts for the right assembly plant and the right vehicle for the dealer. The following figure highlights the collaborative information flow from the suppliers to the customers of Demand Sensing framed by CPFR at General Motors.

![Figure 1: Demand Information Pipeline](image)

**Figure 6: Demand Sensing with a CPFR framework at General Motors (Lynn et al., 2006)**

Questions which have arisen within the research for the information flow are about how to identify correct demand signals, what information needs to be captured and what value and quality has the information at each stage. Therefore, projects for analysing databases containing order information, sales and inventory and click stream data (tracking specific page visits and General Motors websites) were started. The research program is assessing the data and usefulness for particular participants.
General Motors launched Saturn as a “greenfield company” in the late 1980s (Lynn et al., 2006). In order to improve visibility, a new service supply chain strategy was implemented by Saturn which focuses on sharing inventory control and a collaboration with their dealers. There has been an agreement of the dealers to share real time part inventory and daily demand information with central Saturn systems. Additionally, these systems recommend stocking policies on each stock keeping unit for dealers. The recommendation can be accepted, changed or declined if the dealer thinks differently. Risks and rewards are allocated appropriately for dealers and Saturn in order to encourage them to share information and keep the inventory level not below the suggestion of Saturn. All transportation costs, for instance, are paid by Saturn except for those parts the dealer rejected the stock policies suggested by Saturn. Additionally, dealers are incited of pooling their inventory because of short supply. If a participating dealer can procure the short part from another dealer, it will be rewarded. Furthermore, a parts obsolescence protection for the dealer is ensured by returning inventory that has not been demanded over the past nine months. It can be detected by Saturn systems and will be paid by Saturn. All this leads to improvements in part availability, inventory turns and reduced costs for emergency shipping, for example.

Beyond, collaborative forecasting has been investigated in order to create more visibility for upstream suppliers and effective respond to demand changes on a daily basis instead of only a monthly or weekly exchange. This is realisable by supply chain partners through an exchange of relevant data, co-managing forecast requirements and refines capacity and replenishment plans (Lynn et al., 2006).
10 GAP ANALYSIS

10.1 Branches

This chapter aims to investigate the opportunities of CPFR in the automotive industry.

To draw conclusions from the retail industry to the automotive supply chain a gap analysis of both sectors will be carried out.

10.1.1 The Retail Industry

Any organization selling goods or services to end consumers is called retailer or retail store. The definition of retailing does neither define the way of distribution nor the kind of goods which are distributed (Simchi-Levi et al, 2003, p.504).

Over the years, the retail industry was dominated by a few giant retailers such as Wal-Mart, Metro and Tesco. "Through their superior information systems, logistical systems, and buying power giant retailers are able to deliver good service and immense volumes of product at appealing process to masses of consumers. They are crowding out smaller manufacturers who cannot deliver enough quantity and often dictating to the most powerful manufactures what to make, how to price and promote, when and how to ship, and even how to improve production and management." (Simchi-Levi et al, 2003, p.517).

10.1.1.1 Growth Markets

The retail industry in the industrialised countries is very much consolidated and mature. Therefore, the globalization of big retail organisations accelerates. According to the Global Retail Development Index 2006 (GRDI), published by the consulting company A.T. Kearneys, the most attractive emerging markets for the retail industry can be found in Asia followed by Eastern Europe, the Mediterranean, Latin America and Africa. The leading market in terms of GRDI scores is India. GRDI scores are based on
the criteria country risk, market attractiveness, market saturation and time pressure.

The following figure represents the top 10 emerging markets for the retail industry.

<table>
<thead>
<tr>
<th>2006 rank</th>
<th>Country</th>
<th>Region</th>
<th>Country risk</th>
<th>Market attractiveness</th>
<th>Market saturation</th>
<th>Time pressure</th>
<th>GRDI score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>India</td>
<td>Asia</td>
<td>55</td>
<td>34</td>
<td>89</td>
<td>76</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Russia</td>
<td>Eastern Europe</td>
<td>43</td>
<td>59</td>
<td>53</td>
<td>90</td>
<td>85</td>
</tr>
<tr>
<td>3</td>
<td>Vietnam</td>
<td>Asia</td>
<td>43</td>
<td>24</td>
<td>87</td>
<td>81</td>
<td>84</td>
</tr>
<tr>
<td>4</td>
<td>Ukraine</td>
<td>Eastern Europe</td>
<td>42</td>
<td>37</td>
<td>76</td>
<td>81</td>
<td>83</td>
</tr>
<tr>
<td>5</td>
<td>China</td>
<td>Asia</td>
<td>58</td>
<td>40</td>
<td>57</td>
<td>85</td>
<td>82</td>
</tr>
<tr>
<td>6</td>
<td>Chile</td>
<td>Americas</td>
<td>67</td>
<td>57</td>
<td>47</td>
<td>48</td>
<td>71</td>
</tr>
<tr>
<td>7</td>
<td>Latvia</td>
<td>Eastern Europe</td>
<td>58</td>
<td>50</td>
<td>31</td>
<td>88</td>
<td>69</td>
</tr>
<tr>
<td>8</td>
<td>Slovenia</td>
<td>Eastern Europe</td>
<td>78</td>
<td>52</td>
<td>25</td>
<td>70</td>
<td>68</td>
</tr>
<tr>
<td>9</td>
<td>Croatia</td>
<td>Eastern Europe</td>
<td>57</td>
<td>51</td>
<td>28</td>
<td>91</td>
<td>67</td>
</tr>
<tr>
<td>10</td>
<td>Turkey</td>
<td>Mediterranean</td>
<td>46</td>
<td>59</td>
<td>64</td>
<td>40</td>
<td>56</td>
</tr>
</tbody>
</table>

*Figure 7: Global Retail Development Index*

A further pretty good visualisation of the emerging retail markets is shown in the following figure. Market attractiveness, market saturation and time pressure are consolidated in the criteria market potential.
Figure 8: GRDI market attractiveness

The bigger the bubbles the higher are the retail sales in the corresponding country.

Asian markets are responsible for 32 percent of global retail sales.

10.1.1.2 Retailing Structure

As there exist plenty of different retailers, it is very difficult to generalize their organizational structure. In the following, we provide a brief outline of some of the divisions in a retail organization.
However, it is very difficult to make detailed statements about retailing by considering the whole industry. The author decided to concentrate on three representative retailers and draw conclusions to the whole sector.

Amongst the top five global retailers, Wal-Mart Stores Inc, Metro AG and Tesco will be analysed in a more detailed way.

### Top 250 global retailers

<table>
<thead>
<tr>
<th>DT Rank FY 06</th>
<th>Name of Company</th>
<th>Country of Origin</th>
<th>2006 Group Sales (US$m)</th>
<th>2006 Retail Sales (US$m)</th>
<th>2006 Group Income (Loss) (US$m)</th>
<th>Formats</th>
<th>Countries of Operation</th>
<th>5 yr Retail Sales CAGR % (Local Currency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wal-Mart Stores, Inc.</td>
<td>US</td>
<td>315,654</td>
<td>312,427</td>
<td>11,231</td>
<td>Cash &amp; Carry/Warehouse Club, Discount Department Store, Hypermarket/Supercenter/Supermarket</td>
<td>Argentina, Brazil, Canada, China, Germany, Japan, Mexico, Puerto Rico, S. Korea, UK, US</td>
<td>11.6%</td>
</tr>
<tr>
<td>2</td>
<td>Carrefour S.A.</td>
<td>France</td>
<td>92,776</td>
<td>92,776</td>
<td>1,788</td>
<td>Cash &amp; Carry/Warehouse Club, Convenience/Forecourt Store, Discount Store, Hypermarket/Supermarket</td>
<td>Argentina, Belgium, Brazil, China, Columbia, Dominican Republic, Egypt, France, French Polynesia, Greece, Guadalupe, Indonesia, Italy, Malaysia, Martinique, Oman, Poland, Portugal, Qatar, Reunion, Romania, Saudi Arabia, Singapore, S. Korea, Spain, Switzerland, Taiwan, Thailand, Turkey, Tunis, UAE</td>
<td>2.6%</td>
</tr>
<tr>
<td>3</td>
<td>The Home Depot, Inc.</td>
<td>US</td>
<td>81,511</td>
<td>81,511</td>
<td>5,856</td>
<td>Home Improvement</td>
<td>Canada, Mexico, Puerto Rico, US, Virgin Islands</td>
<td>12.3%</td>
</tr>
<tr>
<td>4</td>
<td>Metro AG</td>
<td>Germany</td>
<td>69,336</td>
<td>69,134</td>
<td>808</td>
<td>Apparel/Footwear Specialty, Cash &amp; Carry/Warehouse Club, Department Store, Electronic Specialty, Hypermarket/Supercenter/Superstore, Other Specialty/Supermarket</td>
<td>Austria, Belgium, Bulgaria, China, Croatia, Czech Rep., Denmark, France, Germany, Greece, Hungary, India, Italy, Japan, Luxembourg, Moldova, Morocco, Netherlands, Poland, Portugal, Romania, Russia, Serbia and Montenegro, Slovakia, Spain, Switzerland, Turkey, Ukrainia, UK, Vietnam</td>
<td>5.0%</td>
</tr>
<tr>
<td>5</td>
<td>Tesco plc</td>
<td>UK</td>
<td>58,666</td>
<td>58,666</td>
<td>2,837</td>
<td>Convenience/Forecourt Store, Department Store, Hypermarket/Supercenter/Superstore, Supermarket</td>
<td>China, Czech Rep., Hungary, Japan, Rep. of Ireland, Malaysia, Poland, Slovakia, S. Korea, Taiwan, Thailand, Turkey, UK</td>
<td>12.8%</td>
</tr>
</tbody>
</table>

10.1.1.3 Wal-Mart

Wal-Mart is the worldwide retail market leader and the biggest company in the United States in terms of sales and employees (Financial Times Deutschland, 2007).

Its worldwide retail sales came up to 312,427 billion US Dollars in 2005. According to the mentioned figure, US based Wal-Mart operates in 11 countries. The first store was
opened in 1962. Nowadays, "the discount stores average 107,000 square feet, employ an average of 225 associates and offer 120,000 items". Every week, Wal-Mart serves more than 176 million customers worldwide.

Their discount stores offer products within the following categories: family apparel, automotive products, health and beauty aids, home furnishings, electronics, hardware, toys, sporting goods, lawn and garden items, pet supplies, jewellery, and housewares (Wal-Mart Facts, 2007).

Wal-Mart employs approximately 1.9 million associates worldwide.

10.1.1.3.1 Deployment of CPFR

Wal-Mart was one of the first retailers which carried out CPFR pilots. The pilots started in 1995, among others with the pharmaceutical manufacturer Warner Lambert and the American based consumer good manufacturer Sara Lee. The results were tremendous. The efficiency of the supply chain improved remarkably. That is why the results of the business partnership were recognized throughout the grocery company and other companies started to implement similar processes (DWF, n.d).

10.1.1.4 Metro Group

With only one fifth of the sales of Wal-Mart, Metro Group is still one of the top three merchandising companies in the world. The 270,000 employees, working in 31 countries, were responsible for a net sale of 59.9 Billion € in 2006 (Metrogroup Website, 2007a).
"The operative business is divided into the business segments of wholesale, food retail, non-food specialty stores and department stores" (Metrogroup Website, 2007b).

10.1.1.4.1 Deployment of CPFR

Düsseldorf based Metro started in 2002 with the brand Metro Cash and Carry the implementation of the CPFR process together with seven strategic suppliers in the detergent and paper goods categories, among others Kimberly-Clark Corp., Procter & Gamble Co., Johnson & Johnson and Colgate-Palmolive Co. (Internetretailer, 2007).

Based on the Global NetXchange platform, Metro shares, besides transactional data, also sales forecasts and production schedules with their CPFR partners. These facts illustrate the strong supplier-buyer relationship which Metro has built with its most important suppliers.

The results are impressive. For example, a reduction of out-of-stocks by more than 61 percent and an increase of the promotional stock service level by 0.74 % to remarkable 99.53 % could be achieved in the meantime (Allbusiness, 2007).

10.1.1.5 Tesco

Tesco employs over 450,000 people. Its core market is the United Kingdom. Nevertheless, they operate in twelve additional countries and the Tesco Group achieved about £ 43.14 billion sales in the year of 2006. The retailer, listed on the London stock exchange, perceives the strategy "to create value for customers to earn their lifetime loyalty" (Tesco Website, 2007).

10.1.1.6 Deployment of CPFR

Surprisingly, Tesco deployed CPFR by adopting business processes from the car manufacturer Toyota and the Toyota's book Lean Thinking "became standard reading in Tesco" (ECR Journal, 2002).
10.1.1.7 Conclusion for the Retail Sector

The strategic growth of retail companies is focused on Asian and Eastern European markets. The retail markets of the United States and Western Europe are pretty mature and saturated. "In a largely mature retail market in which opportunities for growth are becoming ever more elusive, maintaining sufficient in-stock positions that adequately satisfy existing and potential consumer demand remains a cornerstone of retail success" (Lake West Group, 2007).

Top retailers like Wal-Mart, Metro and Tesco solved that problem by building close supplier-buyer relationships through implementing CPFR. The benefits of this collaborative business processes have already been discussed. But not every supplier is appropriate to a strategic partnership. The supplier selection has to be carried out very thoroughly. "Each organization must determine the minimum size partner with whom they will collaborate [...] Everything you do has to be thought of in terms of economy of scale [...] Unless your partner represents at least 5% of your business, collaboration would not have enough impact" (Peters, n.d.).

Furthermore, the supplier must have an appropriate readiness for collaboration in order to share confident business information (IMC Consulting, n.d).

"However, the fact is that CPFR is only being implemented by some supermarkets and with only the largest branded manufacturers, who have the systems capability, the know how and the resources to adopt, implement and exploit CPFR to its full potential. Too expensive, too complex, not enough trust between partners, a lack of strategic vision and incompatible organisational structure/culture are the most common reasons advanced for the failure of retail organisations and their suppliers to adopt CPFR and embrace the principles of collaborative commerce" (Cadilhon et al, n.d.).

Taking all this into consideration, the success of a CPFR partnership can be guaranteed.
10.1.2 Automotive Industry

In the last 100 years, the car has influenced our way of living tremendously. During the years, millions of new vehicles were sold to a steadily growing customer base.

In the United States of America, nearly 90 percent of every household owns a car (Syracuse University, n.d.).

"Modern motor transport is the key to all lifestyle and business activities from commuting to internet shopping delivery and on to cross-continental haulage" (World Automotive Statistics, 2004, p. II). "One sixth of all jobs in the USA are directly correspondent to the automobile industry" (Syracuse University, n.d.).

In the year of 2006, Toyota sold most vehicles worldwide followed by General Motors and Ford.

- **Toyota** (9.2 millions)
- **General Motors** (8.9 millions. vehicles, including Daewoo)
- **Ford** (7.7 millions, including Mazda)
- **Renault-Nissan** (5.7 millions)
- **Volkswagen** (5.7 millions)
- **DaimlerChrysler** (4.6 millions, recently split up)
- **Hyundai-Kia** (3.8 millions)
- **Honda** (3.7 millions)
- **Peugeot-Citroën** (3.4 millions) (Pommert, n.d.)
The growth of the international automotive markets slightly weakened in 2006. In Western Europe, Japan and the USA the automotive markets are saturated. There is even a negative trend in the car segment. Emerging markets for the car manufacturers are located in South America and China.

In the following, there will be given an analysis of the three aforementioned car manufacturers in a more detailed way. Besides Toyota and General Motors, Daimler was picked because of the fact that four authors are Daimler employees.

10.1.2.1 Daimler AG

Beginning with some history of Daimler, for over 100 years Mercedes is standing for the most innovative automotive brand of the world. The development started in 1900 with the first delivery of a Mercedes car by the Daimler-Motoren-Gesellschaft (DMG) (Mercedes-Benz, 2007). It led to the foundation of DaimlerChrysler AG in 1998 through the merger of the Daimler-Benz AG and the American Chrysler Cooperation. Today, Mercedes-Benz is the most successful automotive brand worldwide and the Mercedes star became the most well-established automotive symbol (Mercedes-Benz, 2007). In 2007, the company was selling over 80 percent of the Chrysler shares to the investment company Cerberus and is now called Daimler AG.
The Daimler AG is a German passenger car and utility vehicle manufacturer as well as a provider of financial services. The headquarter is located in Stuttgart, Germany and the chairman is Dr. Dieter Zetsche. The company employs around 271,500 people (30.06.2007) and produces in 17 countries all over the world. If the distribution sector is being taken into account, the Daimler AG is represented in almost every country of the world. That is the reason why the business language is English, although the company is German. Brands which are produced by the Daimler AG are Mercedes-Benz, smart, Maybach, AMG, Freightliner, Sterling, Western Star, Mitsubishi Fuso, Setra, Detroit Diesel, Thomas Built Buses and Orion which are passenger cars as well as delivery vans and trucks. Around 591,000 cars and 385,500 utility vehicles were sold in the first six months of 2007 (Daimler, 2007).
Company Structure of Daimler:

Other interests:

- **cars**, including sport utility vehicles (SUV)
- **light and heavy trucks**
- **buses and coaches**
- **motorcycles**
- **engines and other components; non-automotive activities**
- **contract manufacturer**

Figure 12: Company Structure of Daimler (Pommert, n.d.)

10.1.2.2 Toyota Motor Corporation

The Toyota Motor Corporation employs approximately 300,000 people in 522 companies and is "widely acknowledged as one of the most efficient manufactures in the world". Although, Toyota produces high quality vehicles, their key success factor lies in their sophisticated production systems which is based on customer relations, product development and manufacturing as well as supplier relationships (ECR Journal, 2002).

Besides the well known labels of Toyota and Lexus, the motor corporation sells trucks and buses under the name of Hino. More compact and small cars are sold as Daihatsus
(Toyota Website, 2007). A total overview about the structure of the Toyota Motor Corporation is shown below.

**Company Structure of Toyota**

<table>
<thead>
<tr>
<th>Company</th>
<th>Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daihatsu</td>
<td>Kobe, Japan</td>
<td>51.2%</td>
</tr>
<tr>
<td>Hino</td>
<td>Toyota City, Japan</td>
<td>30.7%</td>
</tr>
<tr>
<td>Isuzu</td>
<td>2004</td>
<td></td>
</tr>
<tr>
<td>NUMMI</td>
<td>Fremont, CA, USA</td>
<td>14.7% (20% of total)</td>
</tr>
<tr>
<td>Panasonic EV Energy</td>
<td>Kawasaki, Japan</td>
<td>10% (30% of total)</td>
</tr>
<tr>
<td>Solin</td>
<td>2001</td>
<td></td>
</tr>
<tr>
<td>TMME</td>
<td>Cambridge, ON, Canada</td>
<td>5%</td>
</tr>
<tr>
<td>TMUK</td>
<td>Georgeskirk, KY, USA</td>
<td>5%</td>
</tr>
<tr>
<td>TMUK</td>
<td>Burntwood, England</td>
<td>5%</td>
</tr>
<tr>
<td>Toyota</td>
<td>Tokyo, Japan</td>
<td>Taigun, China 42% est. in 2000</td>
</tr>
<tr>
<td>Yamaha</td>
<td>Nagoya, Japan</td>
<td>4.6%</td>
</tr>
<tr>
<td>Aisin</td>
<td>Kariya, Aichi, Japan</td>
<td>30%</td>
</tr>
<tr>
<td>Denso</td>
<td>Aichi, Japan</td>
<td>30%</td>
</tr>
<tr>
<td>Guangzhou Toyota</td>
<td>Guangzhou, China</td>
<td>opened in 2006</td>
</tr>
<tr>
<td>Subaru</td>
<td>Tokyo, Japan</td>
<td>19% acquired in 2005</td>
</tr>
<tr>
<td>Tianjin Toyota</td>
<td>Tianjin, China</td>
<td>42% est. in 2000</td>
</tr>
<tr>
<td>Yamaha</td>
<td>Nagoya, Japan</td>
<td>4.6%</td>
</tr>
</tbody>
</table>

**Other interests:**

- cars, including sport utility vehicles (SUV)
- light and heavy trucks
- buses and coaches
- motorcycles
- engines and other components; non-automotive activities
- contract manufacturer

**Figure 13: Company Structure of Toyota (Pommert, n.d)**

Most of the parts and materials of their cars are produced by suppliers. Therefore, they only cooperate with world class competitive suppliers in terms of quality, costs, delivery and technological capabilities (Toyota Supplier Website, n.d.).

Toyota is well known for its strong buyer-supplier relationship. The motor corporation implicitly guarantees long term business relationships with their suppliers. In return the suppliers invest in adapting their business processes which again improves Toyota’s productivity. Nowadays, they have 56 first tier suppliers and 191 first and second tier suppliers. Most of the first-tier suppliers, which manufacture high value components tailored to Toyotas specific needs, are subsidiaries or affiliated companies. In general, the relationship between a Japanese car manufacturer and its suppliers present very high levels of trust. This is based on the Japanese way of life as a trustful relationship is an important element of their society. Therefore, confidential information can be shared with their suppliers without concerns (Emerald, 2003).
10.1.2.3 General Motors

The General Motors Corporation is the world’s largest automaker and employs approximately 280,000 people. In 2006, nearly 9.2 million cars of the following brands were produced in 33 countries: Buick, Cadillac, Chevrolet, GMC, GM Daewoo, Holden, HUMMER, Opel, Pontiac, Saab, Saturn and Vauxhall. The General Motors enterprise is a complex network of suppliers, dealers and logistic providers.

Company Structure of General Motors

<table>
<thead>
<tr>
<th>Other interests:</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM-AvtoAZ</td>
</tr>
<tr>
<td>Shanghai General Motors</td>
</tr>
<tr>
<td>Suzuki</td>
</tr>
<tr>
<td>Wuling</td>
</tr>
</tbody>
</table>

- cars, including sport utility vehicles (SUV)
- light and heavy trucks
- buses and coaches
- motorcycles
- engines and other components; non-automotive activities
- contract manufacturer

Figure 14: Company Structure of General Motors (Pommert, n.d.)

During the 1990s, General Motors perceived rather arm’s length arrangements with their suppliers by attempting "to save cost by encouraging intense supplier competition". Therefore, the supplier-buyer relationship is not that strong compared to Toyota for example (Emerald, 2003).

10.1.2.4 Conclusion for the Automotive Sector

The aforementioned tremendous differences in terms of supplier relationship management between General Motors and Toyota can be confirmed by the following figure which compares the U.S. automotive companies with their Japanese competitors.
Figure 15: Supplier-Buyer relationship differences between US Automakers and Japanese ones

The above shown figure distinguishes between contractual suppliers and relational suppliers of the car manufacturers. Japanese car manufacturers perceive a very strong buyer-supplier relationship which can be recognized by the fact that 60 percent of Toyotas suppliers’ sales are made by relational suppliers compared to only 34 percent in the US car supply chain. The relationship is strengthened through a higher amount of so-called man-days meetings. As a result, the Japanese suppliers trust their car manufacturers far more than their US competitors and thus, confidential information sharing displays a lower risk for the Japanese supply chain than for their US counterparts. The benefits of the strong buyer-supplier relationship represent the high ratings of assisting in cost reduction and quality improvement for the Japanese parties.
10.1.3 Gap Analysis between Automotive Sector and Retail Sector

Products of the automotive industry are much more complex than those of big global retailers. Nowadays, cars are manufactured specific to the customer's needs. It is all about having the right product at the right place, at the right time, in the right quantity and with the right quality. Special configurations and relatively long lead-times (approximately 40 days for a car compared to the apparel [Zara] 2-3 weeks) make the challenge of sensing and responding to customers demand even more challenging.

A steady change of customers’ taste and shorter and shorter product life cycles complicate the forecasting of accurate demand figures in the automotive industry. Moreover, the inaccurately calculated demand figures are not shared with their suppliers. Some of the parties in the supply chain do not even get the intermediate supply chain information, such as orders, inventory, shipments, delays, etc.

Compared to the retail industry, the automotive sector has a lack of flexibility and agility in terms of responding to customers demand.

Compared to the retail industry, there exist more touching points for the car manufacturers.

In terms of staff, both the leading car manufacturers and the top retailers employ nearly the same amount of people in their companies worldwide, except from Wal-Mart who plays in its own league.

The analysis of the automotive and retail industries showed that their markets, both are very consolidated and mature in Western Europe and in the USA.

Nevertheless, some global retailers achieved a strategic growth during the last couple of years against the market trend. This was accomplished by reengineering their supply chains with the help of CPFR. The reduction of process costs was directly passed on the consumers and consequently additional market share could be gained.
The same successful approach should be carried out by the car manufacturers in order to create competitive advantages in the stagnant car markets.

The deployment of CPFR seems to be most feasible with Japanese car manufacturers, as Toyota already developed a strong and trustful buyer-supplier relationship which is crucial for the collaborative planning and forecasting processes.

The other automakers cannot refuse cooperation with their suppliers in order to enhance their performance and create additional value. Hence, a re-orientation of the “conservative” car manufacturers, such as Daimler and especially GM, towards a closer and more relational partnership with their supply chain parties seems to be inevitable.

10.2 Gap Analysis – Ratios

In the automotive industry 70 per cent of the value added chain is operated at the supplier (Kleinert, 2006). Hence, the principle of cost saving through the intended collaboration by CPFR seems especially promising for the automotive sector.

In this part, the gap between the retail and automotive industry should be examined in terms of ratios. Moreover, the possible advantages which could evolve from using CPFR in the automotive industry should be analyzed.

According to a report published in “The Journal of Business Forecasting”, the following benefits could been achieved in the retail sector in pilot projects (Truss et al., 2006):

- 10 to 40 percent improvement in business forecasting
- 2 to 8 percent in-stock improvement
- 10 to 40 percent reduction in inventory
- 5 to 10 percent customer service improvement

The “Retailer benefits calculator” from VICS has been used in order to display the possible cost savings which could be attained for the automotive industry and would affect financial ratios.
## COMPANY FINANCIALS

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales per year (8 millions)</td>
<td>$700,657</td>
<td></td>
</tr>
<tr>
<td>Operating margin</td>
<td>3.6%</td>
<td></td>
</tr>
<tr>
<td>Percentage of sales that is fixed SG&amp;A</td>
<td>12.1%</td>
<td></td>
</tr>
<tr>
<td>Cost of capital</td>
<td>8.8%</td>
<td></td>
</tr>
<tr>
<td>Non-GSD inventories (8 millions)</td>
<td>$17,890</td>
<td></td>
</tr>
<tr>
<td>Annual warehouse labor expense (8 millions)</td>
<td>$0</td>
<td></td>
</tr>
<tr>
<td>Annual third party storage costs (8 millions)</td>
<td>$0</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL BENEFITS = $438,49 million**

**Figure 16: VICS – Calculating benefits for Daimler AG (VICS, 2007)**

The annotations concerning sources for the calculating benefits for Daimler AG can be found in the Appendix (15.1).
The result shows potential, even though the labour expenses and annual third-party storage have been disregarded. A total cost saving which could be possible for the Daimler AG is calculated by the VICS tool with the limited values of $438.49 million.

10.2.1 Financial Ratios

Ratios are used in every business to measure its performance (Bragg, 2002). As in a business process various participants are involved and financial ratios are used for instance to forecast the future success of a company (Salmi and Martikainen, 1994). So the gap between financial ratios of the retail and automotive industry should help to analyze the greatest benefits for the automotive industry.
10.2.1.1 Overview of Competitors

In this part, basic figures of the companies are presented which were used to display a gap in terms of ratios between the retail and the automotive industry. The companies were selected due to their importance on the US market provided by finapps.forbes.com.

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Revenue (M)</th>
<th>Profit Margin (12 months)</th>
<th>Employees</th>
<th>Market Cap (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wal-Mart Stores, Inc.</td>
<td>$348,650.0</td>
<td>5.4%</td>
<td>1900000</td>
<td>$185,104.3</td>
</tr>
<tr>
<td>Macy’s, Inc.</td>
<td>$26,970.0</td>
<td>5.4%</td>
<td>188000</td>
<td>$12,318.9</td>
</tr>
<tr>
<td>LVMH Moet Hennessy L.V. (ADR)</td>
<td>$22,622.9</td>
<td>19.1%</td>
<td>53841</td>
<td>$62,920.7</td>
</tr>
<tr>
<td>J.C. Penney Company, Inc.</td>
<td>$19,903.0</td>
<td>8.8%</td>
<td>155000</td>
<td>$9,205.0</td>
</tr>
<tr>
<td>Kohl’s Corporation</td>
<td>$15,544.2</td>
<td>11.3%</td>
<td>23000</td>
<td>$15,495.3</td>
</tr>
<tr>
<td>The Daiei, Inc. (ADR)</td>
<td>$11,651.1</td>
<td>NA</td>
<td>11900</td>
<td>$698.9</td>
</tr>
<tr>
<td>Dillard’s, Inc.</td>
<td>$7,810.1</td>
<td>1.7%</td>
<td>51385</td>
<td>$1,395.4</td>
</tr>
<tr>
<td>The Bon-Ton Stores, Inc.</td>
<td>$3,455.8</td>
<td>1.3%</td>
<td>33000</td>
<td>$207.4</td>
</tr>
<tr>
<td>Retail Ventures, Inc.</td>
<td>$3,067.7</td>
<td>2.8%</td>
<td>7,422</td>
<td>$326.7</td>
</tr>
</tbody>
</table>

Table 1: Overview of competitors – Retail sector

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Revenue (M)</th>
<th>Profit Margin (12 months)</th>
<th>Employees</th>
<th>Market Cap (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daimler AG (USA)</td>
<td>$224,055.2</td>
<td>7.8%</td>
<td>271961</td>
<td>$100,901.3</td>
</tr>
<tr>
<td>Toyota Motor Corporation (ADR)</td>
<td>$217,324.7</td>
<td>10.1%</td>
<td>299394</td>
<td>$175,268.8</td>
</tr>
<tr>
<td>General Motors Corporation</td>
<td>$207,349.0</td>
<td>-1.4%</td>
<td>273000</td>
<td>$14,880.0</td>
</tr>
<tr>
<td>Ford Motor Company</td>
<td>$160,123.0</td>
<td>-2.9%</td>
<td>283000</td>
<td>$15,277.9</td>
</tr>
<tr>
<td>Volkswagen AG (ADR)</td>
<td>$155,009.8</td>
<td>5.1%</td>
<td>328300</td>
<td>$95,099.3</td>
</tr>
<tr>
<td>HONDA MOTOR CO., LTD. (ADR)</td>
<td>$100,613.8</td>
<td>7.8%</td>
<td>167231</td>
<td>$61,886.3</td>
</tr>
<tr>
<td>Nissan Motor Co., Ltd. (ADR)</td>
<td>$95,000.5</td>
<td>6.2%</td>
<td>165729</td>
<td>$41,801.5</td>
</tr>
<tr>
<td>Fiat S.p.A. (ADR)</td>
<td>$76,610.0</td>
<td>4.6%</td>
<td>177592</td>
<td>$34,564.8</td>
</tr>
</tbody>
</table>

Table 2: Overview of competitors – Automotive sector

10.2.1.2 Margins

The average margins of the last five years between the retail and automotive industry differ only slightly. However, except of the EBITD Margin, the retail industry achieved in average better results concerning the Gross, Operating, Pre-Tax and Net Margin within the last five years.

The smaller EBITD Margin of retail industry, compared to the higher gross margin indicates that the retail industry has higher Sales, General & Administrative expenditures. This is due to the difference of calculation:
**Gross Margin percentage**  
“Revenues minus cost of goods sold divided by revenue, expressed as a percentage” (finapps.forbes.com, 2007)

**EBITDA Margin percentage**  
“Earnings before interest depreciation and amortization divided by revenues, expressed as a percentage” (finapps.forbes.com, 2007)

That means that the Gross Margin percentage represents the percentaged amount which is earned compared to the revenue, after only the costs for each good have been subtracted.

In contrary, the EBITDA Margin percentage represents the percentaged amount which is earned of the revenue after all costs have been subtracted, except of those costs which are not primary caused by the company, the interests, taxes, depreciation and amortization.

According to this, the difference between those ratios are the costs which are caused by the company but do not affect the cost of a good directly and therefore can be caused by other loosing deals or by some kind of general and administrative costs.

This can be proved by the Sales, General & Administrative expenditures (SGA) per Sales Ratio in Table 6 and should be considered further at the Operational Efficiency Ratios at 10.2.1.3.

<table>
<thead>
<tr>
<th>Margins</th>
<th>Industry</th>
<th>Difference (Retail - Automotive)</th>
<th>S&amp;P 500¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Retail</td>
<td>Automotive</td>
</tr>
<tr>
<td>Gross Margin - 5yr</td>
<td>25,90%</td>
<td>19,70%</td>
<td>6,20%</td>
</tr>
<tr>
<td>EBITDA Margin - 5yr</td>
<td>8,30%</td>
<td>11,60%</td>
<td>-3,30%</td>
</tr>
<tr>
<td>Operating Margin - 5yr</td>
<td>6,20%</td>
<td>5,50%</td>
<td>0,70%</td>
</tr>
<tr>
<td>Pre-Tax Margin - 5yr</td>
<td>5,90%</td>
<td>5,50%</td>
<td>0,40%</td>
</tr>
<tr>
<td>Net Margin - 5yr</td>
<td>3,80%</td>
<td>3,50%</td>
<td>0,30%</td>
</tr>
</tbody>
</table>

Table 3: Profitability ratios – Comparing industries

¹ The index S & P 500 by Standard & Poor’s should not be explained in detail, but only allows the reader to consider the mentioned ratios in the context of those of other sectors.
10.2.1.3 Operational Efficiency Ratios

The operational efficiency ratios display basic differences between the industries. In the retail industry the revenue per employee is about a third of that of the automotive industry, since the retail sector needs more salesmen in the shops to sell in order to achieve the same revenue of that of the automotive industry. However, this does not affect inevitably the efficiency in terms of proceeds of the whole company, as the salesmen usually receive less remuneration.

The SGA divided by “Sales” in the retail industry is in average 9.0 percent higher than in the automotive industry. According to the aforementioned additionally required salesmen, this figure does not describe inevitably again a difference of efficiency between these industries.

However, the efficiency between the industries can be measured in at least one respect by the inventory turnover. This ratio displays whether the inventory, which is often the biggest part of a company’s working capital, is not “used up by operations at a reasonable pace” (Bragg, 2002). It is calculated by “cost of goods sold” divided by “inventory”.

Table 5 shows that the inventory turnover is by 1.8 lower in the retail industry than it is in the automotive industry. That means the inventory in the automotive sector is in average more often used than the retailer’s. This might be explained by the fact that the automotive industry is able to produce much more on request than on stock, in contrast to the retail industry.

<table>
<thead>
<tr>
<th>Margins</th>
<th>Wal-Mart Stores Inc</th>
<th>Macy’s, Inc.</th>
<th>General Motors Corp</th>
<th>Daimler AG (USA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Margin - 5yr</td>
<td>22,90%</td>
<td>40,30%</td>
<td>19,60%</td>
<td>18,50%</td>
</tr>
<tr>
<td>EBITD Margin - 5yr</td>
<td>7,40%</td>
<td>13,20%</td>
<td>9,60%</td>
<td>10,90%</td>
</tr>
<tr>
<td>Operating Margin - 5yr</td>
<td>5,90%</td>
<td>8,70%</td>
<td>-2,20%</td>
<td>2,20%</td>
</tr>
<tr>
<td>Pre-Tax Margin - 5yr</td>
<td>5,50%</td>
<td>7,00%</td>
<td>-1,60%</td>
<td>2,40%</td>
</tr>
<tr>
<td>Net Margin - 5yr</td>
<td>3,60%</td>
<td>4,60%</td>
<td>-0,80%</td>
<td>1,80%</td>
</tr>
</tbody>
</table>
On the other hand, the retail industry is able to achieve a higher asset turnover by 1.3 compared to the automotive industry. The higher asset turnover might be caused on account of the cheaper products of the retail sectors and the cheaper production.

<table>
<thead>
<tr>
<th>Operational Efficiency</th>
<th>Industry</th>
<th>Difference (Retail - Automotive)</th>
<th>S&amp;P 500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retail</td>
<td>Automotive</td>
<td></td>
</tr>
<tr>
<td>Revenue/Employee</td>
<td>$204,726,60</td>
<td>$609,285,30</td>
<td>-$404,558,70</td>
</tr>
<tr>
<td>Net Income/Employee</td>
<td>$8,944,90</td>
<td>$31,463,10</td>
<td>-$22,518,20</td>
</tr>
<tr>
<td>SGA/Sales</td>
<td>20,4</td>
<td>11,4</td>
<td>9,0</td>
</tr>
<tr>
<td>Inventory Turnover</td>
<td>7,2</td>
<td>9,0</td>
<td>-1,8</td>
</tr>
<tr>
<td>Asset Turnover</td>
<td>2,1</td>
<td>0,8</td>
<td>1,3</td>
</tr>
</tbody>
</table>

Table 5: Operational efficiency – Comparing industries

<table>
<thead>
<tr>
<th>Operational Efficiency</th>
<th>Wal-Mart Stores Inc</th>
<th>Macy’s, Inc.</th>
<th>General Motors Corp</th>
<th>Daimler AG (USA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue/Employee</td>
<td>$194,973,00</td>
<td>$142,968,10</td>
<td>$662,264,30</td>
<td>$465,745,70</td>
</tr>
<tr>
<td>Net Income/Employee</td>
<td>$6,949,50</td>
<td>$4,888,30</td>
<td>$0,00</td>
<td>$15,265,00</td>
</tr>
<tr>
<td>SGA/Sales</td>
<td>18,4</td>
<td>31,9</td>
<td>8,8</td>
<td>12,4</td>
</tr>
<tr>
<td>Receivable Turnover</td>
<td>127,4</td>
<td>29,6</td>
<td>2,1</td>
<td>2,4</td>
</tr>
<tr>
<td>Inventory Turnover</td>
<td>8,1</td>
<td>3</td>
<td>11,9</td>
<td>6,8</td>
</tr>
<tr>
<td>Asset Turnover</td>
<td>2,4</td>
<td>0,9</td>
<td>0,6</td>
<td>0,8</td>
</tr>
</tbody>
</table>

Table 6: Operational efficiency – Exemplary companies

10.2.1.4 Return Ratios

The average Return on Assets, on Equity and on Investment have been in the retail industry over the last five years higher than in the automotive industry. This might have evolved from a variety of reasons which should not be further analyzed in detail. However, one reason for higher return ratios is a more efficient respectively cheaper production process. CPFR can be named as one possibility for an improved production process whose benefits should be analyzed for the automotive industry in order to reduce the production and inventory costs.

<table>
<thead>
<tr>
<th>Returns</th>
<th>Industry</th>
<th>Difference (Retail - Automotive)</th>
<th>S&amp;P 500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retail</td>
<td>Automotive</td>
<td></td>
</tr>
<tr>
<td>ROA - 5yr</td>
<td>8,00%</td>
<td>3,10%</td>
<td>4,90%</td>
</tr>
<tr>
<td>ROE - 5yr</td>
<td>18,30%</td>
<td>9,10%</td>
<td>9,20%</td>
</tr>
<tr>
<td>ROI - 5yr</td>
<td>12,00%</td>
<td>4,90%</td>
<td>7,10%</td>
</tr>
</tbody>
</table>

Table 7: Returns – Comparing industries
10.2.1.5 Liquidity

The quick ratio enables to “gain a better understanding of a company’s very short-term ability to generate cash from more liquid assets, such as accounts receivable and marketable securities” (Bragg, 2002). It is calculated as follows:

\[
\frac{\text{Cash + Marketable securities} + \text{Accounts receiveable}}{\text{Current liabilities}}
\]

As the Quick Ratio of the automotive industry is higher than in the retail sector, it indicates that either the current liabilities are less or the ability to generate cash for the automotive industry is higher. As the current ratio of the retail industry – which also includes the inventory (Bragg, 2002, p. 86) – is only slightly different from the automotive industry, the value of the inventory in the retail industry has to be considerably higher.

<table>
<thead>
<tr>
<th>Liquidity</th>
<th>Industry</th>
<th>Difference (Retail - Automotive)</th>
<th>S&amp;P 500</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retail</td>
<td>Automotive</td>
<td></td>
</tr>
<tr>
<td>Quick Ratio - qtr</td>
<td>0,3</td>
<td>1,0</td>
<td>-0,7</td>
</tr>
<tr>
<td>Current Ratio - qtr</td>
<td>1,1</td>
<td>1,2</td>
<td>-0,1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Liquidity</th>
<th>Wal-Mart Stores Inc</th>
<th>Macy’s, Inc.</th>
<th>General Motors Corp</th>
<th>Daimler AG (USA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick Ratio - qtr</td>
<td>0,2</td>
<td>0,1</td>
<td>0,0</td>
<td>1,1</td>
</tr>
<tr>
<td>Current Ratio - qtr</td>
<td>0,8</td>
<td>1,0</td>
<td>0,0</td>
<td>1,4</td>
</tr>
</tbody>
</table>

Table 9: Liquidity – Comparing industries

Table 10: Liquidity – Exemplary companies
10.2.1.6 Growth

The “Sales” ratio is mainly important to analyze other ratios in the right context. The main purpose of CPFR is not to increase sales, therefore, the gap of the ratios between the automotive sector and the retail sector should not be considered further.

<table>
<thead>
<tr>
<th>Growth</th>
<th>Industry</th>
<th>Difference (Retail - Automotive)</th>
<th>S&amp;P 500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales - 5yr</td>
<td>Retail</td>
<td>10,80%</td>
<td>7,00%</td>
</tr>
</tbody>
</table>

Table 11: Growth – Comparing industries

<table>
<thead>
<tr>
<th>Growth</th>
<th>Wal-Mart Stores Inc</th>
<th>Macy’s, Inc.</th>
<th>General Motors Corp</th>
<th>Daimler AG (USA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales - 5yr</td>
<td>11,10%</td>
<td>11,50%</td>
<td>4,20%</td>
<td>0,20%</td>
</tr>
</tbody>
</table>

Table 12: Growth – Exemplary companies

10.2.2 How to close Gap

As research at Wal-Mart and P&G has shown that a lack of collaborative planning leads to a significant impact on supply chain performance (Attaran, 2004). According to AMA Research, collaboration enables up to 3 percent to profit margins for all types of supply chain players (Attaran, 2004).

One key intention of CPFR is to enable lower inventory. Therefore, both the inventory turnover and the quick ratio of a company will increase. The asset turnover will do so as well, if the assets are reduced.

Consequently, the production will become cheaper and therefore the gap between the retail and automotive sector concerning the return ratios in 10.2.1.4 will shrink.

However, CPFR does not only reduce inventory but leads by better collaboration to less out of stock situations. Thus, the turnover of a company will increase, as a company is able to provide a better customer service. Accordingly, other ratios indicting the success of a company will increase similarly.
10.3 Business Processes in the Retail and Automotive Industry

10.3.1 Definition “Business Processes”

In general, business processes can be construed as a set of connected tasks which are aligned to limited functional activities (IBM, 2003). They are conducted collaboratively by a group of people and equipment that aims for a specific goal for the organisation (TechTarget, 2000-2007). These processes are designed to create value by making and saving money for an enterprise within a defined starting and finishing point. In order to create a successful, applicable and in most cases repeatable business process it is necessary to add thought, clarity, detail and time investment. Moreover, a product or service provided by an enterprise reflects intellectual assets and knowledge integrated in a process and ensures required quality (IBM, 2003).

A distinction is drawn between support and core processes of an enterprise. An analysis especially on the latter is made in this chapter to emphasize the differences between the automotive and retail industry.

Figure 19: Business Processes
10.3.2 Development Processes

10.3.2.1 Integration of Customers

In the retail sector companies like Adidas (miAdidas) or Procter&Gamble (Reflect) produce goods and services to meet individual customer needs with almost mass production efficiency. This strategy is called mass customization (Pine II, 1992). Adidas provides an online platform where the customer is able to build an individualised shoe. Not only the design but also the functionality can be configured (HYVE AG, 2007).

“Reflect.com was an early user of personalization applications to drive web sales” (Internet Retailer, 2006). On the internet site skin care, hair care and fragrance products were sold but customers could choose the exact colours, textures, ingredients and foundation for each product. In this vein customer integration is created and above all market research information can be generated to use for the creation of new products.

Some companies even go a step further using the so called “open innovation” by providing some creative customers the opportunity to become innovator configuring future products. According to this, important customer information is gained which cannot be achieved by market research (Piller, n.d.). For example DIGGIT, a rucksack with an integrated avalanche shovel and a system to carry ski or snowboard, was not developed by a company but by its customer who promoted this innovative idea (Piller, 2007).

The conversion of innovations into new marketable products assures the sustainable economic success and the existence of the automotive manufacturer as well. However, only 10 out of 100 development projects lead to an enduring success on the automobile market (Wildemann, 2004, p.2). Therefore, the closeness to the customer is a crucial element of the development processes.

Finally, the customer determines the success or failure of a company respectively of its products. In view of the increasing heterogeneity of the demand profile on the
automotive market there is a great claim to adjust the products to the customer’s requirements.

Nevertheless, the predominant part of the automotive companies use internal analyses and results of benchmarking on the base of historically determined figures as sources for the goal setting of the product development. Merely, 30% of the automotive manufacturers involve systematically the customer into the development process (Wildemann, 2004, p.2). One of these automotive manufacturers is the Daimler AG which involves customers very early in the development process of new vehicles or model upgrading by interviewing them directly. The accomplishment of field studies is used as well in terms of structured questionnaires that are filled in by customers.

10.3.2.2 Integration of Suppliers

The early integration of suppliers in the development processes is also visible in the retail industry. Bang & Olufsen (B&O) is a Danish company producing audio-visual equipment. Among of their total suppliers, the company chose twelve system and strategic suppliers (Mikkola and Skojett-Larsen, 2003, p.8). These suppliers collaborate very closely with B&O and develop unique components. Therefore, they are already involved both in the design and development stages of B&O. Additionally, these system suppliers have got access to sales forecasts, production plans and material requirements (Mikkola and Skojett-Larsen, 2003, p.9).

The similar trend can be seen in the automotive industry. The target of both branches is to integrate the suppliers as soon as possible in the development process. Toyota can serve as a role model in this context. The Japanese automotive manufacturer collaborates considerably earlier with its suppliers compared to other western motor vehicle manufacturers (Viebranz, 2007). Actually, the latter support development partnerships, but only in a limited extent which is exemplified in the chapter “CPFR in Automotive Industry”.

page 50 ©
10.3.3 Sales Forecast

A high potential of CPFR results from the generation of a joint forecasting, issued by both the manufacturer and the retailer. The knowledge of the manufacturer (e.g. market research results) and the retailer are combined in a common forecast (Seifert, n.d., p. 71). The historic data is compared to the expected sales data assigned in the joint business plan. Thus, the occurrence probability of the sales forecast increases (Seifert, n.d., p. 66). During the deployment of CPFR at Wal-Mart (retailer) and Warner-Lambert (manufacturer) in 1995 each party issued every week six months long a sales forecast. Any deflections were solved and both forecasts were adjusted to one common sales forecast for both parties (Seifert, n.d., p. 59).

The same procedure was accomplished at Nabisco (supplier) and Wegmans food markets. The two companies shared data on 22 items within the scope of a CPFR-pilot. Nabisco sales force developed a sales forecast that was compared with Wegmans’ forecasts (Aghazadeh, 2003, p.126).

Henkel, a German company with a product range including detergents, cosmetic, hygiene and chemical products as well as adhesives, and Eroki, the food retail industry leader in Spain, decided to unify their attempts of improving sales forecast in 1998. It was a pilot project for both partners. Henkel employed the demand planning module from Manugistics which was used to create their business plan, compare sales forecasts and share information from different workflow. In a collaboration period over five months an improving quality of sales forecasts was achieved. Henkel as well as Eroki calculate the sales forecast weekly but an exchange of data takes only place every other week. First it was carried out with the help of excel files, later with the NetWORKS Collaborate module of Manugistics (Jouwen Editions, 2000).

On the contrary, the automotive Industry confines to use its own historic and market research data without comprising its suppliers forecasts. The sales forecasts at Daimler AG for new vehicles are issued in the following manner:
The sales data for the whole life cycle of a model are considered and estimated. Afterwards, the estimated sales data are allocated to the different vehicle and engine types (diesel-/ benzene-engine vehicle, four-, six-, eight-cylinder engine, etc.). Thus, a top-down sales estimation is utilized. It is followed by a bottom-up sales forecast that is compiled by interrogating the market, for example by interviewing the branches or executing a market research. By means of these two sales data estimations, the sales department issues a sales forecast that is internally adjusted and then remitted to the suppliers (Kleinert, 2007).

10.3.4 Order Planning
Retailers using CPFR-processes, generate out of the sales forecasts the order forecasts. Both the sales and order forecasts are shared between the manufacturer and supplier.

A further improved method of order planning is executed by Dell, an American manufacturer of IT hardware. Dell's order strategy is to customise orders with the help of recommended "offerings to buyers based on inventory, opportunity for higher margin, qualification of buyer and other factors" (Glushko, 2005). The assembly of the product is only carried out when the customer places an order. This process requires a systematic coordination with a small amount of suppliers (Glushko, 2005).

Exemplary for the order planning processes of the automotive manufacturers the order process of the Daimler AG will be defined below. A distinction is drawn between the order processes before a start-up of a production and those during the production run. The demand of the Daimler AG is communicated to the supplier during the production run and compared to the production capacity of the supplier. A nine-month order forecast is provided to the suppliers so that supply shortages can be recognized betimes.

Before the start-up of the production the adequate capacity and the flexibility of the supplier is checked by Daimler AG by means of so called supplier planning audits. Moreover, conversations are held with the supplier which has to fill out a questionnaire
concerning its capacity and flexibility. Based on these procedures the supplier is approved or changed and the maximum supply demand is fixed in the contract.

10.3.5 Replenishment

In the 1980s Procter & Gamble Company (P&G), an American worldwide cooperating consumer goods group, prototyped a collaborative business process, the so-called continuous replenishment. It automatically shipped Pampers to the warehouses of Schnucks, a St. Louis grocer, without the Schnuck manager having to place orders. It was carried out through an IT software, sharing information and focusing on the final consumer. Today, this software and process design of P&G is a standard for the retail industry. Dramatic benefits of continuous replenishment, like improved service level and reduced inventory, were created for the retailer and consumer. Moreover, the software establishes a foundation for collaborative trading relationship including sharing consumer information. In order to decline inventory and apply continuous replenishment, transportation had to be reorganised, too. Re-education of plants on just-in-time approach were introduced. It is a strategy to manage inventory by delivering raw material and components from the vendor immediately as they are required (International Data Group, 2007).

The Daimler AG in Sindelfingen uses also the just-in-time and the just-in-sequence replenishment (see figure 16).

![Figure 20: JIS- and JIT-processes](image)

Additionally, the collaborative replenishment process Vendor Managed Inventory (VMI) is utilized with some suppliers. Using this process, the Daimler AG has not to place an
order, but the OEM leaves the decision about delivery quantity and delivery time up to the supplier. If the stock of Daimler needs to be refilled with new components, the supplier will dispose independently. Planning and controlling of orders from Daimler are executed by the supplier. In return, the Daimler AG provides better information, like point of sale data, planned activities, own prognoses and market analysis. VMI is only a relationship between the Daimler AG and specific suppliers and therefore the residual logistic related information flow remains vast. In contrast to the two-stage stock keeping, where the supplier has its own warehouse as well as the customer, VMI moves to the one-stage stock keeping. Consequently, only one warehouse remains which is usual located directly to the production. The supplier only stores a shipment buffer at his place of production. The responsibility for the inventory and operation remains with the supplier and the material belongs to the supplier as well. Mutation takes place when the supplier takes the material out of the VMI warehouse. Orders from Daimler and disposition are omitted. Transportation costs still have to be paid by the supplier (Hellingräd, 2007).

10.3.6 Exception Management

Exception management is an important issue for CPFR-processes as by means of it sales trends can be recognized and further processes reconciled to future tendencies. Wal-Mart, as an outrider of implementing CPFR, has been executing this process since 1998. The American retailer and his partner Sara Lee, Inc. (manufacturer) mutually calibrated sales lift effects like price reductions on several items. In addition, exception criteria for example store in-stock levels or sales trends were refined. These operations were at first executed manually but later on an automated process was established to identify and reconcile exceptions to the shared forecast. Moreover, a weekly exception-analysis reporting format, based on information of both business partners, was developed to refine the defined item tolerances (Seifert, 2003, p. 107).

Canadian Tire Retail (CTR), Canada’s leading hard goods retailer, implemented a software system that triggers an e-mail notification when items in the forecast
comparison between CTR and its suppliers fall outside of defined tolerances ranges set. In such cases variances are discussed and resolved by both parties (Seifert, 2003, p. 107).

In contrast to retailers, most automotive manufacturers do not share their forecasts with their suppliers, but only provide order forecasts that have to be fulfilled by the suppliers. Before choosing a company to deliver certain parts, the Daimler AG for example accomplishes supplier audits to assure the required order amounts and quality of items. However, if problems occur in suppliers’ processes the manufacturer depends completely on a betimes indication of the supplier. Moreover, some suppliers try first to manage occurring delivery problems, before forwarding bad news, even though it is contrary to the committed standards.

To avoid these situations, the Daimler AG demands from its suppliers to check their capacities according to the given order forecast and respond if problems might occur. In the case when a critical situation can not be avoided anymore, the Daimler AG adjusts its production to the capacities of the supplier until the requirements can be fulfilled by the supplier again. This strategy leads to several secondary effects. For example the production planning has to be modified so that the Daimler AG has to change and to increase orders at other suppliers.

10.3.7 GAP-Analysis

Facing an increasing market fragmentation and customer individualisation, the importance of the customer integration is enormous. Mass customization is performed in both the automotive and the retail industry. Nevertheless, in the retail sector the intensive customer integration is more common than in the automotive industry. But this situation emerges from the fact that the products to develop are much more complex in the automotive industry than in the retail industry. For instance, the average customer does not have the knowledge of how to develop engines. In addition, the development time of vehicles is much longer than that of retail products (e.g. clothes). Consequently, more money has to be invested in the development process with a higher
risk of loosing it. The automotive industry has to consider the long-term trends in customer demand and can not just chase every trend on the market like often done in apparel. Nevertheless, methods like questionnaires or interviews for customers have to be confronted with the open innovation method gaining ground in the retailer branch.

Considering the integration of suppliers into the early development process, both the retailer and automotive industry are willing to follow this concept. Because “one of the motivations behind early supplier involvement is to increase product development efficiency and effectiveness as well as to tap into suppliers’ technological capabilities” (Mikkola and Skojett-Larsen, 2003, p.1). Comparing the branches, it is visible that the automotive and the retail industry advance the development of the integration process.

Completely different is the attitude to and the execution of sales forecasts between the two mentioned sectors. It is evident that in the automotive industry there is less or even no collaboration with the suppliers during the compilation of the sales forecast. The suppliers do not participate in the process of issuing the forecast and therefore do not have the opportunity to enrich it with their manufacturing data. So the crucial difference between the retail and the automotive industry is that the automotive manufacturer and its suppliers do not work with the same sales forecast but each of them issues its own.

Another issue arising out of the longer development time for vehicles and concerns the generation of sales forecasts in the automotive sector is that the automotive sector has to forecast two or three years into the future. Consequently, the likelihood for a correct sales estimation in the automotive sector is less compared to the retail sector, since it has to forecast less further into the future.

Different to the retail sector is as well the order planning of most automotive manufacturers that follows the subsequent scheme: automotive company allocates its demand and the supplier checks if this amount of parts can be provided. Consequently,
at this point of business processes a collaboration to a small extent is given but a more comprehensive one like in the retail branch can be achieved.

Quite similar in contrast are the replenishment processes in both sectors. So methods like VMI, JIT or JIS are applied by both the retailer and automotive industry. But a major difference between retail and automotive manufacturer is the created order plan. The retailers which use CPFR produce it in collaboration with their supplier providing the basis of the replenishment process. In this vein critical conditions or out-of-stock situations are less likely and the stock keeping level can be reduced further.

A better collaboration in the retail sector is also given in exception management. Retailers have got approved CPFR-methods to recognize pre-defined “out-of-bounds” conditions. The exception criteria are set up jointly by the retailer and the supplier. Contrary, in the automotive industry mostly the manufacturer dictates standards that have to be achieved by the supplier. Random and continuous monitoring is executed in both sectors. In automotive industry these are for example the supplier audits, in the retail branch the collaborative systems like aforementioned. By applying CPFR-methods out-of-bound conditions are researched and if necessary the sales and order forecasts are adjusted.

Taking everything into account the development of collaboration in the retail industry referring to business processes is much further proceeded as in the automotive industry. Nevertheless, a huge potential of the benefits of CPFR for the automotive industry is arising. By imitating, adjusting and modifying CPFR-processes to the carmaker's idiosyncrasies, the automotive industry can gain a high profit of the previous cognitions made by deploying CPFR in the retail sector.

10.3.8 Gap Solution

In order to achieve a better performance in the automotive industry following steps have to be taken:
• The customer has to be more involved in the development process of a vehicle to meet the customers' requirements better. Questionnaires and interviews with customers have to be amended by an active participation in the development process. Whereas this is very difficult in the technical development, the design of a vehicle, its ex- and interior, can be influenced by Lead-User.

• Long known suppliers that are trustful have to be involved in the development process. According to this, they can give advice with their technological knowledge and their ideas can flow into the vehicle to develop.

• Collaboration between supplier and automaker is indispensable. By doing this especially in the carmaker's industry very confidential data, like the sales forecast, have to be shared. Therefore, only a trustful supplier should be chosen as a partner for CPFR and with him a single sales forecast, order and replenishment plan have to be created in collaboration. As coverage the car manufacturer can agree upon a penalty fee with the supplier in case of forwarding automaker’s data for example to a competitor.

• For a successful exception management the “out-of-bound” conditions have to be set conjointly by the automaker and the supplier. Moreover, an agreement should be reached to inform the business partner as soon as possible, if deviations in conjoint plans arise.

10.4 Communication

10.4.1 Definition of Communication

A key factor in business is communication across barriers of departments and locations. Since the 1970s, retailers, manufacturers and their suppliers use electronic communication, such as Electronic Data Interchange Technology (EDI) via Virtual Private Networks (VPN). The German automotive industry organisation splits these transactions into E-Business, Electronic Commerce, Electronic Procurement, Business-to-Business processes (B2B) and Business-to-Consumer processes (B2C) (VDA, 2007).
10.4.2 Gap Identification

In the following, the communication situation of the retail and automotive sector is shown and then the gap will be identified.

First of all, most retail supply chains use common hard- and software that are compatible with each other. This means a standardized data exchange can take place via collaborative hubs. The communication process is current, accurate and up-to-date for all participants in the trading community. In principle, the customer supervisors have a large amount of data available to them, which they can use for forecasting e.g. delivery amounts from P&G to its customers. POS scanner data from its customers, details of the customer's warehouse activity and inventories, access to the customer's Extranet and historical information on sales targets during promotions can be seen, too. These supplier management systems also provide online viewing, via the Internet of purchase order information by both, suppliers and retailer personnel. They are easy to operate and provide many features to enhance the business process, such as automatic purchase order releases for items placed on long-term agreements, common timelines, direct online viewing of drawings, specifications, routes or electronic quality tools and controls including online corrective action requests and performance measurements (Ashley, 2007). Another example is FairPrice, the leading supermarket chain in Singapore. Speaking about its electronic procurement nearly 500 suppliers are connected with FairPrice. This represents nearly $400 million worth of orders through e-procurement every year (IDA Singapore, 2006). In conclusion, the retail supply chain has one tool for planning, plan supervision and communication, and the data are presented transparently in a tabular or graphic format. Hence, only on a quarter annually basis, or in emergency cases, people to people meetings take place (IDA Singapore, 2006).

In the automotive sector, suppliers still fear high specific investments for new technology and hardware without having close collaboration with the manufacturer (Schlösser, 2005). However, e-marketplaces as Covisint, SupplyOn andNewtonAutomotive were also established (export academy, 1999). Automotive Plants
are also linked via hubs with their business partners, e.g. Hyundai Motor Company’s new factory in Alabama enables the fifteen suppliers to exchange trading documents and information including forecasting and delivery notifications, between Hyundai and more than 50 first-tier suppliers of components for the Hyundai Sonata sedans and Hyundai Sante Fe SUVs being built at the Alabama plant (Manufacturing & Logistics, 2006). Daimler tries to increase the transparency for suppliers and itself by synchronising the demand planning of all manufacturer parts and supplier parts. An overview of the inventory is given. The data can be seen online from both sides and are changed on a daily basis (Kleinert, 2006). In conclusion, there is a huge variety of systems used to improve communication.

10.4.3 Gap Analysis

Taking all the facts into consideration, the communication technology between retailers and their suppliers and automotive manufacturers and their suppliers is almost the same. They all use e-commerce, electronic marketplaces and have several hubs. The frequency of data exchange within the retail supply chain is much higher than in the automotive industry. In the retail sector, all chain members can see data changes in real time on the screen and the more nodes there are in the network, the greater are the benefits of the network to each individual. The automotive industry exchanges data to specific chain members on a daily or weekly basis (Schlösser, 2005). Whereas people to people direct contact meetings more often take place in the automotive industry. A reason for this might be the bigger complexity of parts, the longer life cycle and traditional behaviour pattern in the automotive industry (Schlösser, 2005). Furthermore, the sharing of confidential information is a vital problem amongst the automotive supply chain; much more information is shared in retail supply chains (Seiffert, 2003).
10.4.4 How to solve Gap

In the future, the communication technology and frequency of the automotive industry will conform automatically to the communication patterns in the retail sector over time by using best practice examples.
11 The CPFR Model for the Automotive Supply Chain

All the solutions that were found in the GAP analysis influence the following model, but in order to prevent repetitions they are not mentioned again. The CPFR Model for the automotive supply chain differs slightly from the retail model.

![Figure 21: CPFR-Model for Automotive Industry](image-url)
The descriptions in the middle bar represent joint activities executed by the car manufacturer together with the supplier. The “left column” contains activities which are carried out only by the car manufacturer, just as well as the “right column” represents the operations for the CPFR supplier.

11.1 Strategy and Planning

![Figure 22: Strategy and Planning](image)

The first collaborative step of the new developed CPFR defines the rules and basic principles for the collaboration between the car manufacturer and the supplier. However, before the collaborative arrangement is taken into consideration, the car manufacturer must be aware of its strategic planning. After having decided to implement CPFR, the suppliers have to be evaluated thoroughly. A significant purchase volume as well as sufficient system capabilities and a trustful relationship are the most important selection criteria. If the supplier’s strategic planning agrees on joining a CPFR partnership, a Joint Business Plan is created. The results of separate market planning by the car manufacturer and the supplier are introduced into the Joint Business Plan.
11.2 Demand and Supply Management

In order to generate a Sales Forecast in terms of CPFR, data from both the automaker and its supplier are required. Thus, the automotive manufacturer collects sales data from its dealers (POS Forecast) and analyzes the market. Moreover, there is an innovative possibility for the automaker to forecast sales and trends by analyzing the website orders of vehicles and the amount of web user clicks on a specific vehicle model presented on the manufacturers homepage. The supplier provides a market data analysis as well, and all collected data flow in a conjointly generated Sales Forecast visible for all parties at all times.

In this vein, a collective order plan is evaluated. Like this, on the one side the supplier can appraise the required volume of future deliveries and on the other side, both parties can determine conjointly the appropriate delivery methods (JIS, JIT, VMI, Milkrun, etc.) for the different vehicle parts for the future collaboration. With the help of demand planning carried out by the manufacturer and the supplier, a combined Replenishment Planning is generated. To point out is especially the fact that the changes in plans of replenishment are apparent in live-time for both parties.
11.3 Execution

Based on the aforementioned strategic planning the Order Generation activity is done conjointly. Then, the supplier and the car manufacturer compile their own production and supply plan. This process is done independently, since both, the supplier and the manufacturer, know best how to optimize their own production line after a common order forecast was done. However, the production and supply planning process is not a singular but a continuous process which is enhanced during the production. Within the same activity, the car manufacturer carries out its buying or re-buying process, as he transfers his buying requests to his suppliers. Afterwards, the order is fulfilled while the finished products of the car manufacturer are distributed to the retailer and the supplier allocates his products to the car manufacturer.
11.4 Analysis

![Figure 25: Analysis](image)

With the help of execution monitoring, carried out by the automaker and the supplier separately, an exception management can be achieved together. This means, data from the demand and supply management will be compared with the actual execution. If necessary, figures have to be adjusted. Safety stocks or the accuracy of forecast figures are checked, for instance. The automotive manufacturer uses supplier and dealer scorecards to measure the degree of target achievements. There, the punctuality will be examined, for example. Manufacturer scorecards are used by the supplier and have the same purpose. In order to evaluate achievements, uncover trends and create alternative strategies, performance management is used by both, the automotive manufacturer and the supplier, together. Therefore, prognoses of the supplier and car manufacturer will be compared and deviation will be appraised. Both partners focus on collaborative work and conjointly define solutions in order to optimise critical deviation.

11.5 Critique of the New Model

Despite the advantages of the new CPFR model for the automotive industry, there are some crucial discussion points. The biggest problem is the sharing of confidential information. It is quite unrealistic that all members of the chain share all their data completely with all others, because they cannot be 100 per cent sure that their suppliers are trustful. They deliver other automakers, they are competitors and there is a risk of forwarding developments to competitors by suppliers. Even if there were an agreement on a penalty fee, it would be hard to prove for the automaker that his partner supplier
forwarded his data to the competitor. Moreover, each development project is slightly different from each other. Hence, a standardisation of the processes at this point of time of the product life cycle is not possible. Furthermore, in order to get useful forecast information, the quality of the forecast data has to be improved. Another problem is the fact that it is difficult to describe the replenishment process in detail with all possible activities in advance of the order process. In addition, the complexity of a car and the dependency on each single part in order to manufacture it is much higher in the automotive industry than in the retail sector and conjoint development causes problems if the supplier has a lack of knowledge. Both partners should focus on collaborative work and conjoint solutions. However, sometimes it takes more time to discuss a solution with all partners than if only one partner develops a plan. The same situation can be found when problems occur. It is faster to solve them immediately instead of informing all clients. This could be interpreted as a weakness and therefore many companies keep such things to themselves.
12 CONCLUSION

First of all, it has to be stressed that CPFR was coined by the VICS Committee. Their importance for CPFR can be seen by means of the definitions and models which the authors use with reference to the VICS’ webpage.

After having explained how the approach works, the authors concentrated on the opportunity and benefits which CPFR delivered especially for the retail sector. The impressing improvements concerning the company’s efficiency, sales increase as well as reduction of inventory figures pointed out potential benefits for companies beyond the retail sector.

A closer evaluation of the automotive sector revealed some similar approaches to CPFR. The most advanced ones could be found at the Japanese car manufacturer Toyota. However, the automotive industry and the retail industry are different. As the CPFR approach originally was created specific to the needs of the retail sector, a gap analysis was carried out in order to evaluate the feasibility of its implementation.

Both sectors face similar threats concerning the external environmental development. Former core markets are more and more saturated. Sales increases predominantly are made in so-called emerging markets like India, China and eastern European countries. To increase performance in these difficult markets, the car manufacturers can learn from the global retailers which made a commitment to Collaborative Planning Forecasting and Replenishment during the last years.

The essence of CPFR is a trustful relationship between the involved parties. Some automakers, e.g. Toyota, already possess close relationships to their supplier, which is a good foundation to implement CPFR. However, the complexity of cars, long product development times as well as comparatively long product life cycles complicate the situation in the automotive industry.
Considering the communication technology between retailers and their suppliers and automotive manufacturer and their suppliers, it can be said that it is almost the same.

This means that, of course, the car manufacturers have to make some arrangements in order to be ready for a CPFR implementation, but taking everything into consideration, it offers tremendous potential for the car industry and seems to be feasible.

The findings of the gap analysis serve as the basis for the adjustment of the CPFR model for the requirements of the automotive sector, which was carried out in chapter 11 of this report. The different initial situation in the automotive industry leads to a slight adjustment of the CPFR retail model. However, the authors developed a powerful and meaningful model for automotive supply chains in order to implement CPFR successfully. As long as the parties in the automotive supply chain can rely on each other, the adjusted CPFR approach offers enormous potential for all participants.

13 RECOMMENDATION

In this report the advantages, disadvantages and difficulties of CPFR in the Automotive Industry are highlighted. For a better appraisal of financial impacts and their level of benefit caused by CPFR an economic calculation is recommended. By means of such a cost-benefit-analysis the decision for or against the deployment of CPFR in the Automotive Industry is facilitated.

Moreover, apart from the CPFR project at General Motors, further pilot projects are required to recognize difficulties during the deployment of CPFR, to prove the benefits of CPFR or the results of the economic calculation. In addition, the accomplishment of a pilot project can show whether the CPFR model for the Automotive Industry is feasible. If needed, the CPFR model can be adjusted or amended based on the results of the pilot projects.
14 APPENDIX

14.1 Calculating benefits for Daimler AG

Sales per year  
finapps.forbes.com

Operating margin  
Annual report of the Daimler AG 2006

SG&A  
finapps.forbes.com

Cost of capital  
8% were assumed

Non-DSD inventories  
Annual report of the Daimler AG  
2006,  
p. 63

Annual warehouse labour expenses  
Not known

Annual third-party storage costs  
Not known

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