

Fachhochschule Nordostniedersachsen
University of Applied Sciences
Fachbereich Wirtschaft

Diplomarbeit

Zur Erlangung des Diplomgrades
Diplom-Kauffrau (FH)
In der Fachrichtung Wirtschaft

**“Value Chain Management based on Examples of the
Automotive Industry“**

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List of Acronyms and Abbreviations

AG	Aktiengesellschaft
APS	Advanced-Planning- and-Scheduling
ASI	Automobile Supply Industry
BMW	Bayrische Motorenwerke
BSC	Balanced Scorecard
CEO	Chief Executive Officer
CLM	Council of Logistics Management
CPFR	Collaborative Planning, Forecasting and Replenishment
CR	Continuous Replenishment
ECR	Efficient Consumer Response
EDI	Electronic Data Interchange
e.g.	exempli gratia (Latin = for instance)
ERP	Enterprise Resource Planning
EVA	Economic Value Added
GM	General Motors
GSCF	Global Supply Chain Forum
IT	Information Technology
KPI	Key Performance Indicator
KSA	Kurt Salomon Associates
MCC	Micro Compact Car
MRP	Material Requirement Planning
MRP II	Manufacturing Resource Planning
NVA	Non-Value-Adding
NNVA	Necessary but Non-Value-Adding
OEM	Original Equipment Manufacturer
p.	page
POS	Point-of-Sale
pp.	pages
QR	Quick Response
ROI	Return on Investment
SCM	Supply Chain Management

1. Introduction

In order to understand the problems of the changing market structure, today, a number of trends that potentially impact the supply chains have to be discussed.

In times of *globalisation*, *computerization* and the *deregulation* of trading barriers, companies have to concentrate on boundary-spanning activities to strengthen their competitive position.

“Firms are seeking, or have developed, global strategies by designing their products for a world market and producing them wherever the low-cost raw materials, components, and labour can be found or they simply produce locally and sell internationally.”¹

More than ever, *cooperation* and *collaboration* among all supply chain members are essential to survive on the global market. Building *worldwide networks* and improving the transportation capacity and -organization with the support of sophisticated technology is the answer. The *change from a push- to a pull-market* requires more efficient logistical service to meet the customer’s demand of lower prices, higher quality and better services.

Nowadays, these aims can only be achieved if a company attempts to concentrate on their core competences. As a result, all other activities are outsourced to other firms, if possible.²

Most of all, massive changes have occurred as a result of information availability.

The internet as the supporting technology for e-commerce has changed the customer’s purchasing behaviour dramatically.³ The desires of customers have shifted from passive acceptance to actively taking part in the design and delivery of specific products and services. Just-in-time operating procedures and continuous replenishment of inventories have all contributed to customers expecting rapid processing of their requests, quick delivery, and a high degree of product availability. “Driven by these fundamental forces, a global economy rapidly emerged.”⁴

¹ Ballou, R., Business Logistics, 2004, p.15

² See Stadler, H., Introduction, 2002, p.1

³ See Stought, R. R., Technologies, 2001, p.513

⁴ Bowersox, D. J./Closs, D. J./Cooper, M. B., Supply Chain, 2002, p.3

1.1 Problems

The automotive industry represents an enormous supply chain which includes the physical flow of thousands of different parts, coupled to quality, cost and delivery time, and information flow in the reverse sense.

Not all car makers will survive even the next decade, at least not in their present forms. Takeovers by the big manufacturers like *General Motors* owning Sweden's *Saab* and Germany's *Opel* show how hard it is today to compete successfully or at least not to make any losses. The rising import of cars from low-wage countries like South-Korea forces the Western car-manufacturer to develop new strategies in order to stay competitive.

Nowadays, managing their supply chain more competitive has become a survival strategy, especially as up to 80 per cent of the value of a complete car is provided by outside suppliers. What will count in the future is the ability to sell fewer cars but more profitably.⁵

Beside of cost reduction and higher efficiency, gaining competitive advantage through differentiation is essential, too.⁶

The optimization of the whole value chain can only be realized by introducing new management-concepts that make the supply chain more efficient in order to increase the customer value.

Today, supply chains are often still slow, costly, and do not deliver particularly good value to the end consumer. Considering the supply chain of the automotive industry, it is not understandable why a car, which only takes about 20 hours to assemble, and a couple more days to ship it to the customer via the dealers, takes a month for a manufacturer to make and deliver it.⁷

Buying a new car can become a very frustrating process for the customer. In the UK, for example, the buyer has to wait, on average, 48 days for his custom-built vehicle from the factory to arrive – in some cases it is even longer than 60 days. For an increasing number of customers, this delivery time is not acceptable, so inevitably, many customers compromise on specification to obtain a car within a shorter time frame.⁸

⁵ See *Waller, D.*, Operations Management, 1999, pp. 539-542

⁶ See *Porter, M.*, Competitive Advantage, 1985, p.3

⁷ See *Harrison, A./van Hoek, R.*, Logistics Management, 2002, p.3

⁸ See *Hollweg, M./Jones, D.T.*, The Challenge, 2001, p.363

The aim of the automotive industry must be to minimize supply disruption and improve their relationships with the Automobile Supply Industry (ASI).⁹ This work will give some examples where improvements have been achieved, especially in manufacturing “built-to-order cars”.

1.2 Objectives

The objective of this work is to find out how Value Chain Management is being adapted to the automotive industry. To get an appropriate answer, an overall understanding of the supply chain’s elements, its business processes, strategies, plans and goals will be given. Furthermore, it will be examined how today’s automotive industry is going to introduce new Supply Chain Management-concepts in order to improve their value chain and to increase customer value. Different aspects of these management-concepts, like the supplier integration and the collaboration between the supplier and the manufacturer are going to be discussed. In addition, it will be focused on how the factor “value” can be taken into consideration when speaking about these concepts. Furthermore, an overview will be given of how the performance of supply chains can be measured and benchmarked. The theoretical basis of this work shall be approved and illustrated by giving practical examples of the automotive industry.

1.3 Procedure

A short overview of the work’s structure will explain how to proceed in order to meet the above mentioned objectives. After the introducing chapter including problems, objectives and procedure, the second chapter will elaborate the basics of Supply Chain Management (SCM). They embrace the background of Supply Chain Management and the definition-finding of all relevant terms for this work. Furthermore, elements, strategies and goals will be discussed. In the next step, some concepts of SCM will be described with an emphasis on manufacturer-pushed concepts. In the fourth chapter, it will be looked at the management of the value chain

⁹ See *Ramcharran, H.*, Profitability, 2001, p.12

and answers will be given on what value actually means; how it is created and transformed into value-adding processes that will then be analysed. In addition, the aspect of customer value will be discussed as it is the decisive factor of a successful Value Chain Management. After having examined the management-concepts of supply chain and value chain, two different instruments of performance measurement will be represented namely the *Balanced Scorecard* (BSC) and the *Supply Chain Operations Reference* (SCOR)-model. The work will end with a final closing view, which will sum up the results of the examination and give an assessment of the present situation.

2. Understanding the Supply Chain and the Value Chain

In order to understand the concepts of Supply Chain- and Value Chain Management, it is necessary to gather information about the historical development and the theory behind the concepts. In this chapter, first of all the roots and theory of Supply Chain Management will be described, followed by the definition-finding of logistics, Supply Chain Management and of the term “value chain”. A differentiation between chains and networks is going to be made and the chapter will close by viewing on the elements and its strategies, plans and goals.

2.1 Roots and Theory

First of all, the question “where does the term come from?” and “what is the theory behind it?” will be discussed.

The term “Supply Chain Management” was originally introduced by Anglo-American consulting-agencies in the early eighties¹⁰ and “has grown significantly in use and popularity since the late 1980s”.¹¹

The academic discussion about Supply Chain Management only started in the beginning of the nineties when the customer service had become a key competitive issue in many industries.¹² There has been an increasing realization that efficient management of the flow of materials through the supply chain is a critical factor for achieving higher service for the customer.¹³

Many of the current ideas on Supply Chain Management have their roots in the work of *Michael Porter*, a Harvard Business School professor, who introduced the Concept of Value Chain and Competitive Advantage. This concept states that a comprehensive view and optimisation of the whole company’s value chain leads to better results than the isolated optimisation of single business functions.¹⁴

¹⁰ See *Werner, H.*, Supply Chain Management, 2002, p.4

¹¹ *Lambert, D.M./Stock, J.R./Ellram, L.M.*, Logistics Management, 1998, p. 504

¹² See *Lambert, D. M//Cooper, M. C.*, Supply Chain Management, 2000, p.66

¹³ See *Taylor, D. H.*, Introduction, 1997, p. 3

¹⁴ See *Porter, M. E.*, Competitive Advantage, 1985, p.3

These ideas have been further developed by academics such as *Martin Christopher* in the UK. The meaning of “value chain” will be described in the next section and their concepts will be discussed in detail later in chapter four.

A good description of the theory, on which Value- or Supply Chain Management is based on, is given by *Ronald Ballou* who meanwhile connects the term “value” with “logistics” in a logical sense. According to him, “value in logistics is primarily expressed in terms of time and place. Products and services have no value unless they are in the possession of the customers when (time) and where (place) they wish to consume them...However, value is added when customers are willing to pay more for a product or service than the cost to place it in their hands.”¹⁵

2.2 Definitions

A considerable confusion exists about what Supply Chain Management actually means because there are many definitions of SCM coined by authors, consultants and practitioners. For the relatively young concept of Supply Chain Management it has not been found a common definition of the term either on national nor international basis, yet.¹⁶

Various other terms are used among management-scientists in the literature as synonyms for the most widely spread “Supply Chain Management“. Some examples are: Value Chain Management, Logistics Network Management, Demand Network Management, and Value Net Management.¹⁷ The reason for such a diversity and variety of definitions results mainly from the fact that the concept of SCM was born by practitioners and not by management-scientists.¹⁸

I will now determine and examine more closely the terms “logistics”, “supply chain” and “value chain”. Afterwards, I will compare the most commonly used terms “chain” and “network” that are presenting the second part of the management-definition.

¹⁵ *Ballou, R. H.*, Business Logistics, 2004, p.13

¹⁶ See *Zimmermann, K.*, Balanced Scorecard, 2003, p.10

¹⁷ See *Seuring, St.*, Supply Chain Costing, 2002, p.17

¹⁸ See *Zimmermann, K.*, Balanced Scorecard, 2003, p.10

2.2.1 Logistics and Supply Chain Management

Some authors use the concepts of Logistics Management and Supply Chain Management synonymously or interchangeably. Although this is not correct, there is logic to their beliefs. Especially “the boundary between the logistics and supply chain management terms is fuzzy”¹⁹ as the logistics process builds the basic process of managing the supply chain.²⁰

Ronald Ballou and *Douglas Lambert* both discuss this problem more detailed. *Ballou* regards the problem from a practical point of view. A differentiation between Logistics Management and Supply Chain Management seems to be difficult, as, in so many respects, they promote the same mission:

“To get the right goods or services to the right place, at the right time, and in the desired condition, while making the greatest contribution to the firm”.²¹

The existence of so many different opinions of the management-scientists concerning this problem has resulted in the formation of two groups of thinking.

Authors of the first definition-group put Supply Chain Management in direct relationship to *logistics*. This is intensified by using logistics chain, delivery chain or logistics network as a synonym for supply chain.²²

According to *Lambert*, these authors see no appreciable difference between SCM and the contemporary understanding of Logistics Management defined by the *Council of Logistics Management (CLM)* in 1986. This includes all activities from the point of origin to the point of consumption.²³ The CLM was formed by logistics managers, educators, and practitioners in 1962 and is the biggest North-American logistics organization.²⁴

Representative for the first definition-group are the interpretations in the works of *Martin*

¹⁹ *Ballou, R. H.*, Business Logistics, 2004, p.7

²⁰ See *Novack, R. A.*, Supply Chain Management, 2000, p. 146

²¹ *Ballou, R. H.*, Business Logistics, 2004, p.6

²² See *Göpfert, I.*, Supply Chain Management, 2002, p.28

²³ See *Lambert, D. M.*, Logistics Controversy, 2001, p.100

²⁴ See *Kotzab, H.*, Supply Chain Management, 2000, p.23

*Christopher*²⁵, *Simchi-Levi/Kaminsky/Simchi-Levi*²⁶, and *Handfield/Nichols*. When studying the literature, the definition of *Handfield/Nichols* was the most frequently adapted one which is quoted by notable authors like the German *Stefan Seuring*²⁷ and the American *Ronald Ballou*²⁸. *Handfiel/Nichols* state that:

“The supply chain encompasses all activities associated with the flow and transformation of goods from the raw material stage (extraction), through to the end user, as well as the associated information flows. Materials and information flow both up and down the supply chain. Supply Chain Management (SCM) is the integration of these activities, through improved supply chain relationships, to achieve a sustainable competitive advantage.”²⁹

According to *Cooper/Lambert/Pagh* in 1997, the SCM-concept had to be re-conceptualized and extended by integrating and managing key business processes across the whole supply chain.³⁰

In 1998, the CLM announced a modified definition of logistics as a response to the emerging distinction between logistics and Supply Chain Management. In the revised definition, the Council explicitly declares that Logistics Management is only a part of SCM.³¹

The revised definition, posted at the CLM`s homepage, is:

“Logistics Management is that part of Supply Chain Management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services, and related information between the point of origin and the point of consumption in order to meet customers` requirements.”³²

The interpretation of SCM by the second group of authors refers to *management* in general. They define Supply Chain Management as the inter-organizational management of integrated *key business processes* within the supply chain.³³

Among others, authors representing this group are for example *Douglas Lambert* and *Martha*

²⁵ See *Christopher, M.*, Logistics, 1998, p.18

²⁶ See *Simchi-Levi, D./Kaminsky, P./Simchi-Levi, E.*, Supply Chain, 2000, p.1

²⁷ See *Seuring, St.*, Supply Chain Costing, 2002, p.2

²⁸ See *Ballou, R. H.*, Business Logistics, 2004, p.5

²⁹ *Handfield, R. B./Nichols, E. L.* Supply Chain Management, 1999, p.2

³⁰ See *Cooper, M. C./ Lambert, D. M./Pagh, J. D.*, Logistics, 1997, p.4

³¹ See *Lambert, D. M.*, Logistics Controversy, 2001, p.101

³² Council of Logistics Management, Logistics, 2004, www.clm1.org

³³ See *Göpfert, I.*, Supply Chain Management, 2002, p. 28

Cooper. In *Cooper/Lambert/Pagh*, the three authors have given their own comprehensive version of SCM, saying: „The integration of all key business processes across the supply chain is what we are calling supply chain management.“³⁴

Lambert adopted the definition of the *Global Supply Chain Forum* (GSCF). The GSCF is a group of non-competing firms and academic researchers with the objective to improve the theory and practice of SCM³⁵ and was founded in 1996 by *Douglas Lambert* and the members of “The International Centre for Competitive Excellence“.³⁶

The GSCF’s definition is: “Supply Chain Management is the integration of business processes from end user through original suppliers that provides products, services, and information that add value for customers.”³⁷

Although the interpretation of *The Global Supply Chain Forum* reflects very well our modern business-reality in comparison to the logistics-based interpretations, the definition of *Bowersox/Closs/Cooper* is the most suitable one for this work. These three authors from the Michigan State University, USA use supply chain and value chain synonymously. They concentrate on a company’s strategy by saying: “**Supply chain** (sometimes called the *value chain* or *demand chain*) **management** consists of *firms collaborating to leverage strategic positioning and to improve operating efficiency*.”³⁸

Focusing on a company’s strategy is the most important key element today in order to build up an efficient supply chain which will be competitive and successful in future.

Naturally, logistics will always remain as the backbone of Supply Chain Management and will be that part of an organization in which many opportunities for improving the customer’s value exist.

³⁴ *Cooper, M. C./Lambert, D. M./Pagh, J. D.*, Logistics, 1997, p.11

³⁵ See *Lambert, D. M.*, Logistics Controversy, 2001, p. 99-100

³⁶ See *Lambert, D. M./Stock, J. R./Ellram, L. M.*, Logistics Management, 1998, p.504

³⁷ *The Global Supply Chain Forum*, Supply Chain Management, 1998

³⁸ *Bowersox, D. J./Closs, D. J./Cooper, M. B.*, Supply Chain, 2002, p.4

2.2.2 The Value Chain

Most of the management-scientists make a differentiation and use the term “value chain” only when they speak about creating value and “supply chain” when a physical action is involved. Generally speaking, the value chain includes all activities which create value to the customer within the overall supply chain – in other words, it is embedded into the supply chain and expresses these activities in value-speaking terms.

The most famous value chain is the generic value chain created by *Michael Porter*. It consists of *value activities* a firm performs physically and a *margin* which is received when the *total value* created by the activities is higher than the collective costs.

In order to gain information about the origin of costs and the opportunities of reducing them, every firm’s value chain is composed of nine generic categories of activities which are linked together in characteristic ways. The generic value chain presents all activities which are performed to design, produce, market, deliver, and support its products.³⁹

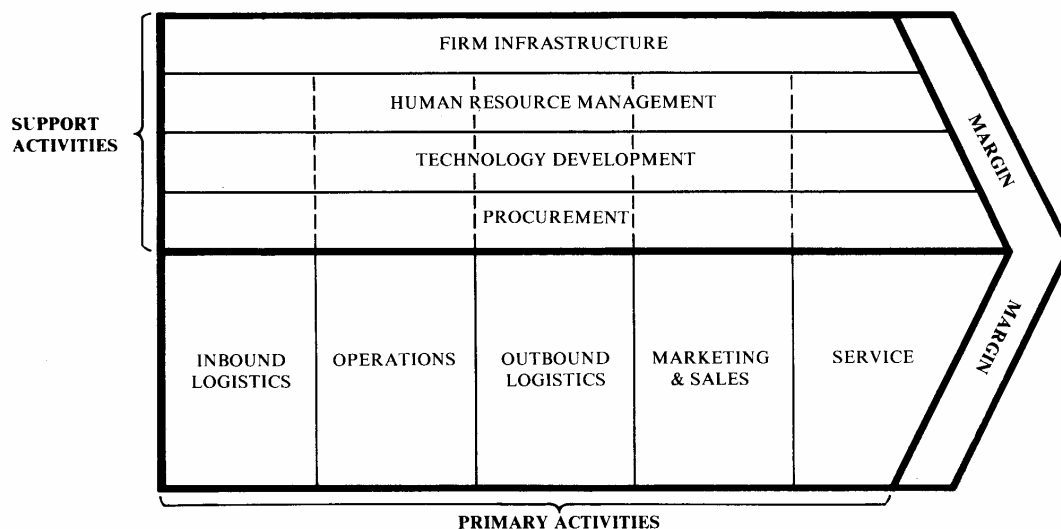


Figure 1: The Generic Value Chain

Source: Porter, M.E., *Competitive Advantage*, 1985, p.37

³⁹ See *Porter, M. E., Competitive Advantage*, 1985, p.38

These nine activities can be categorized into two types – primary activities and supporting activities. Primary activities are the activities involved in the physical creation of the product and its sale and transfer to the buyer as well as after-sale assistance.⁴⁰ The supporting activities are integrated functions that cut across the various primary activities within the firm.⁴¹

Another attempt to present a generic value chain – from the perspective of the internal business processes – is made by *Robert Kaplan and David Norton*. It is based on the statement that: “Each business has a unique set of processes for creating value for customers and producing financial results.”⁴²

The model encompasses the three principal business processes of innovation, operations, and postsale service.⁴³

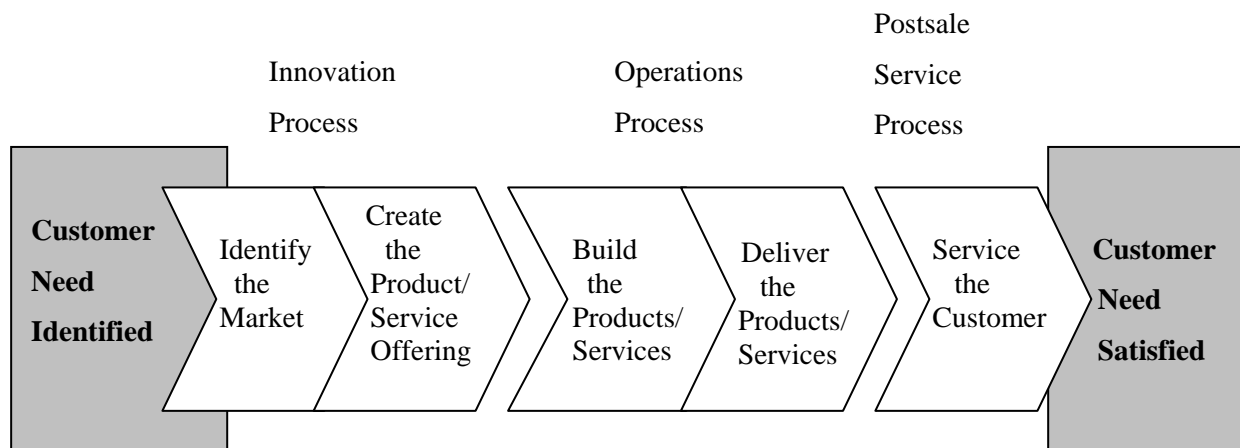


Figure 2: The Internal-Business-Process Value Chain

Source: See *Kaplan, R. S./Norton, D. P.*, *The Balanced Scorecard*, 1996, p.96

In the innovation process, the customer’s needs are identified and the products or services are created in order to meet these needs. In the operations process, existing products and services are produced and delivered to the customer. The third phase is concerned with the after-sale-service to the customer.⁴⁴

⁴⁰ See *Porter, M.*, *Competitive Advantage*, 1985, p.38

⁴¹ See *Christopher, M.*, *Logistics*, 1998, p.11

⁴² *Kaplan, R. S./Norton, D. P.*, *The Balanced Scorecard*, 1996, p.96

⁴³ See *Kaplan, R. S./Norton, D. P.*, *The Balanced Scorecard*, 1996, p.96

⁴⁴ See *Kaplan, R. S./Norton, D. P.*, *The Balanced Scorecard*, 1996, pp. 96-97

Peter Hines and *Nick Rich* go further into detail by looking at the value-adding processes within one single company (intra-company) and between more companies (inter-company). They differentiate between the traditional supply- or value chain and the value stream. The chain includes the complete activities of all the companies involved; the stream refers only to the specific parts of the firm that actually add value to the considered product or service. Logically, the value stream focuses much more on value-adding processes.⁴⁵

A simplified version of the value stream in the automotive industry is given below by *Peter Hines*, *Daniel Jones* and *Nick Rich* from the Cardiff Business School. According to the three authors, the value stream is a new and more useful way to analyze the flow of products, services and information.⁴⁶

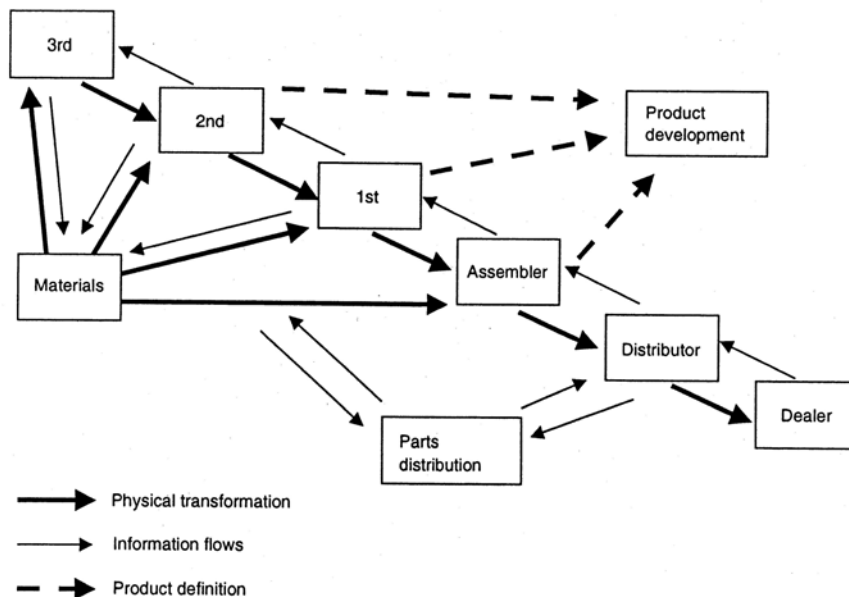


Figure 3: The Automotive Value Stream

Source: *Hines, P./Jones, D./Rich, N.*, *Lean Logistics*, 2001, p.174

⁴⁵ See *Hines, P./Rich, N.*, *Value Stream*, 2001, p.27

⁴⁶ See *Hines, P./Jones, D./Rich, N.*, *Lean Logistics*, 2001, pp. 173-174

2.2.3 The Management of Chains and Networks

There are a number of management-scientists who discuss whether it would be more accurate to use the term “supply network” or “supply web” to describe the structure of most supply chains. According to *Sunil Chopra and Peter Meindl*, most supply chains are actually networks as a *chain* implies that only one player is involved at each stage.⁴⁷

A similar statement is made by *Alan Harrison and Remko van Hoek*, who differentiate more precisely the term “chain” and “network”. They use the terms interchangeably, preferring *network* to describe a more complex structure, where many organisations can be cross-linked; *chain* to describe simpler sequences of only few organisations. The common attempt of both terms is to describe the linkage between the buyer and the seller.⁴⁸

Although the above mentioned arguments are logical and understandable, in this work the term “chain” is used since the literature mainly speaks about supply- or value chains instead of networks. This is due to the fact that a supply chain is commonly tiered up into the two sides of supply and demand including its various groups of organizations involved.

In essence, both, *chains* and *networks*, imply more than one organization linked together at each stage in order to create customer value by adding value to each business process-step involved.

Especially for manufacturing automobiles, the supply- and value chains are very complex, as the production of a car is based on multiple parts, technologies, and processes.⁴⁹

“Today, supply chains consist of potentially hundreds, or even thousand, of independently owned enterprises.”⁵⁰ For example, the *Ford Motor Company* has an assembly plant in Valencia which is the “operation”. This plant has many first-tier suppliers from *Goodyear* to *Motorola* which directly deliver major parts and subassemblies to the *Ford* plant. These suppliers are delivered by second-tier suppliers who have many suppliers in turn, and so on. In return, the supply chain is reversed. On the demand side, *Ford* supplies to the national sales companies as first-tier customers, who in turn supply to dealers as second-tiers, and so on.⁵¹

⁴⁷ See *Chopra, S./Meindl, P.*, Supply Chain Management, 2004, p.5

⁴⁸ See *Harrison, A./van Hoek, R.*, Logistics Management, 2002, p.9

⁴⁹ See *Monczka, R. M./Trent, R. J./Handfield, R. B.*, Supply Chain Management, 1998, p.5

⁵⁰ *Chopra, S./Meindl, P.*, Supply Chain Management, 2004, p.478

⁵¹ See *Harrison, A./van Hoek, R.*, Logistics Management, 2002, p.8

2.3 Elements and Business Processes

“SCM deals with the total business process excellence and represents a new way of managing the business and relationships with the members of the supply chain.”⁵²

This sentence implies the three basic elements - processes, management, and structure - which *Lambert* adopted from the Supply Chain Management framework of *Cooper/Lambert/Pagh*. The SCM-framework consists of the three major and closely interrelated elements, namely business process, management component and supply chain structure.⁵³

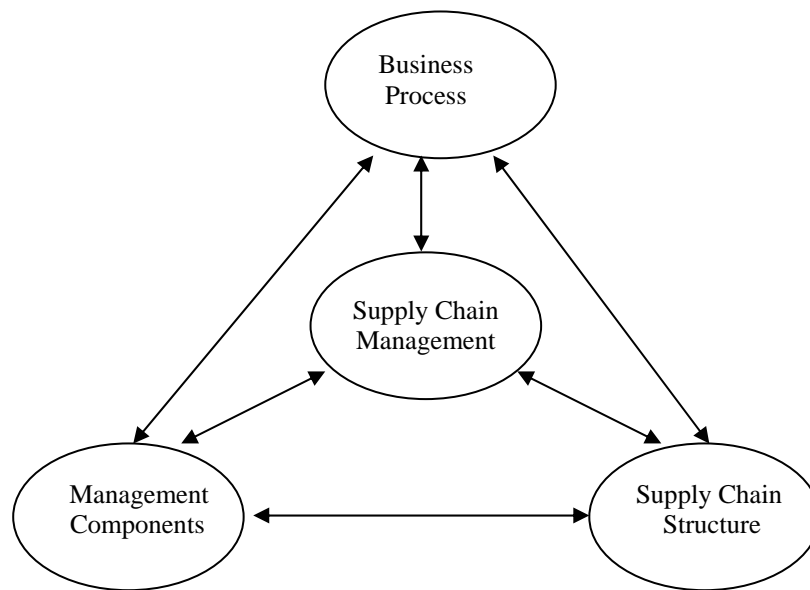


Figure 4: A Conceptual Framework of Supply Chain Management

Source: See *Cooper, M. C./Lambert, D. M./Pagh, J. D.*, Logistics 1997, p.6

In the *supply chain network structure* the key supply chain member firms and their linkage have to be identified. It is the configuration of companies within the supply chain and varies due to a difference in complexity of the product, in the number of available suppliers, and in the availability of raw materials.⁵⁴

The *supply chain business processes* include all key activities that increase customer value at each stage. The activities have to be linked with each of the key supply chain members

⁵² *Lambert, D. M.*, Logistics Controversy, 2001, p.99

⁵³ See *Cooper, M. C./Lambert, D. M./Pagh, J. D.*, Logistics 1997, p.5

⁵⁴ See *Cooper, M. C./Lambert, D. M./Pagh, J. D.* Logistics, 1997, pp. 9-10; *Lambert, D. M.*, Logistics Controversy, 2001, pp. 103-104

involved. The *supply chain management components* depend on the concepts which are chosen for implementing SCM. They give answer on the level of integration and management of each business process in the supply chain. Management components are e.g. planning and control, management methods, culture and attitude, and the work structure.⁵⁵

The *supply chain business process*-element is the most interesting element for this work as it is the one where value is created and added to the products and services for the customers.

Traditionally, the management was responsible for individual functions of their business, like for the purchasing or marketing department. Today, companies that adopt SCM are integrating their activities into key business processes in order to gain competitive advantage and to succeed in the market.⁵⁶ The key differences between the functional and the processing view are that the processes always focus on customer's demand and that the firm is organized around these processes.⁵⁷

The *International Centre of Competitive Excellence*⁵⁸ initially identified seven *key supply chain processes* visualised and enlarged to eight processes by *Cooper/Lambert/Pagh* in a graphic that is widely accepted and used by many management-scientists.⁵⁹

These eight key supply chain processes are:

- Customer relationship management: identification of customer segments, development of programs and realizing them for key customers
- Customer service management: supply of the customer with information of the actual process- and distribution status
- Demand management: coordination of the material and product flow according to customer's needs
- Order fulfilment: Processing of customer's orders
- Manufacturing flow management: organization of the production process according to

⁵⁵ See *Cooper, M. C./Lambert, D. M./Pagh, J. D. Logistics*, 1997, pp. 9-10; *Lambert, D. M., Logistics Controversy*, 2001, pp. 103-104

⁵⁶ See *Lambert, D. M./Stock, J. R./Ellram, L. M., Logistics Management*, 1998, p.531

⁵⁷ See *Cooper, M. C./Lambert, D. M./Pagh, J. D. Logistics*, 1997, p.6

⁵⁸ In 1996, the Centre members moved with Douglas Lambert to the Ohio State University and the Centre was renamed "The Global Supply Chain Forum".

⁵⁹ See *Cooper, M. C./Lambert, D. M./Pagh, J. D. Logistics*, 1997, p.10

the customer's wishes

- Procurement: arrangement of the relationship to the key customers
- Product development and commercialisation: common product development with key suppliers and key customers, and
- Returns: taking back products and materials.⁶⁰

A good example of introducing key business processes in the automotive industry is *Ford Motor Company* where the managers of the Customer Service Department realized that their customer satisfaction ratings were not competing with the American and Japanese car manufacturer. Accordingly, the 6.2000-employee division was reorganized around four key processes: (1) avoiding failures in advance; (2) supporting dealers and handling customers; (3) considering customer's service in the engineering-process, and (4) providing a reliable, quick service. The reorganization resulted in dramatic changes in dealer relations. Through the introduction of field teams, the number of *Ford* people a dealer had to contact to resolve a customer problem dropped from 25 to three – a divisional operations manager, a field engineer, and a customer service representative.⁶¹

2.4 Strategies

The pressure on cost-reduction through globally competing manufacturers forces the business management to create and introduce new strategies in order to strengthen their position in its marketplace. These strategies should lead to competitive advantage to distinguish a firm from its rivals either by creating value or by differentiating their products and services.

A strategy represents the overall actions or approach to be taken to achieve the firm's goals and objectives.⁶²

Organizations still have difficulty implementing well-formulated strategies because the unique and sustainable ways by which organizations create value are changing, not so the tools for measuring them. Nowadays, the creation of value and the differentiation in the

⁶⁰ See Lambert, D. M., Logistics Controversy, 2001, p.108; with a short description of Zimmermann, K., Balanced Scorecard, 2003, p.35

⁶¹ See Jacob, R./Rao, R. M., Customer Service, 1995, pp. 90-99

⁶² See Porter, M. E., Competitive Advantage, 1985, p.3

market do not depend so much on the pure production process any more. Instead, the management has to focus on knowledge-based strategies that are concerned with the intangible assets of the organization. Intangible assets such as customer relationships, innovative products and services, high-quality, skills and motivation have become the major source of competitive advantage. For many companies, it is still a problem to handle their intangibles because they are difficult to be measured and to be controlled.⁶³

An organization's *mission* is the starting point for formulating, developing and implementing a business strategy and should give an answer why a company exists; accompanied by the *core values* the management believes in. The *vision* of a company defines where it wishes to stand in the future and helps individuals to understand why and how they should support the organization.⁶⁴

Having determined a mission and defined a company's position, most companies begin with a competitive strategy which should answer the following questions:

- How can customer value be created?
- How can products and services be differentiated from those of the competitors?⁶⁵

In the automotive industry, the product is often differentiated by the price-strategy.

For example, *Jaguar*, *Mercedes* and *BMW* offer a high-priced entry level car, *Hyundai Motor Company*, *Toyota* and *Mitsubishi* offer low-priced ones.

With the help of a competitive strategy, the management then decides what their supply chain strategy ought to be. The question here is how the supply chain should perform with respect to efficiency and responsiveness.⁶⁶

Defining a competitive strategy depends on the correct analysis and a realistic estimation of the company's market position. To gain this information, the three elements – time, cost and quality – have to be considered for formulating the right strategy. Meeting the external requirements on these three elements is the main indicator for a company's competitive advantage.

⁶³ See Kaplan, R. S./Norton, D. P., *The Strategy*, 2001, p.2

⁶⁴ See Kaplan, R. S./Norton D. P., *The Strategy*, 2001, pp. 72-73

⁶⁵ See Simons, R., *Performance Measurement*, 2000, p.28

⁶⁶ See Chopra, S./Meindl, P., *Supply Chain Management*, 2004, p.53

Therefore, a supply chain strategy should always answer the following questions:

- How to shorten *time* of purchase, production and delivery?
- How to reduce *costs* of production and transportation?
- How to improve *quality* of goods and services?⁶⁷

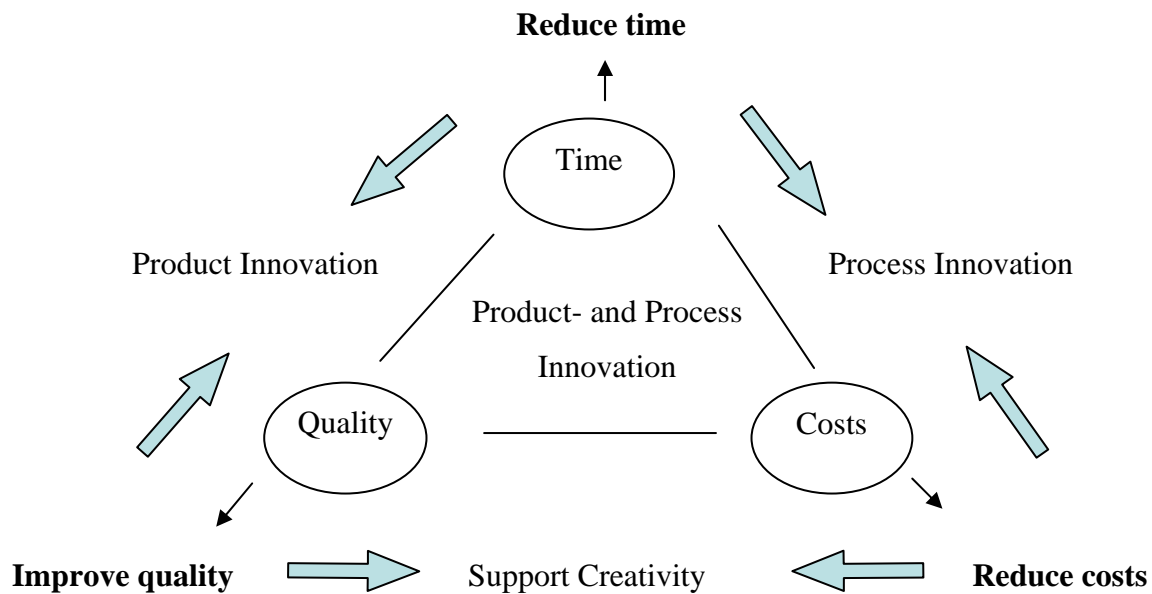


Figure 5: Strategic Elements in Supply Chain Management

Source: See Thaler, K., Supply Chain Management, 2000, p.12

A single-focused orientation on only one strategy like costs-cutting through labour-reduction is often not enough to stay competitive in the market, as other factors like product-innovation play an important role as well. Therefore, it is essential for a company to find new ways to create value for the customer by developing own individual strategies, depending on the company's market position.

Nearly all big automobile manufacturers in Japan, Europe and America have developed their own strategies to survive in global competition. Some companies like *Toyota* and *Ford* have focused strongly on a production-changing strategy; others like *General Motors* and *Rover* have focused more onto the customer's side.⁶⁸

⁶⁷ See Thaler, K., Supply Chain Management, 2000, p.12

⁶⁸ See Cooper, R./Slagmulder, R., Supply Chain Development, 1999, pp. 121-122

Although *Toyota* is the third largest automobile manufacturer in the world, in terms of employment, *Toyota* remains relatively small compared to *General Motors*. The smaller size reflects *Toyota's* strategy of sourcing many parts and modules from outside, allowing *Toyota* to concentrate on its core competencies of design and final assembly.⁶⁹

After the Asian financial crisis in 1996/1997, *Toyota* focused on redesigning its global assembling so that they became more flexible in order to supply multiple markets at any time. *Toyota* called this strategy *global complementation*. This additional flexibility helps *Toyota* to react more effectively onto changing global market conditions, such as fluctuations in demand, exchange rates, and local prices by altering production to maximize profits.⁷⁰

In January 1995, *Ford* implemented an integrated “Ford 2000” *procurement strategy* with the objective to design, manufacture, and purchases the components for automobiles worldwide, but integrate them into a common set of automotive platforms which are also assembled worldwide.⁷¹

One strategy relating to the customer-side is the “*make-to-order*” strategy where the car is built on customer’s demand rather than on “*make-to-forecast*”. In order to meet this objective, a car manufacturer can either reduce the customer’s choice through limiting the number of options available or to improve the management of stock-keeping and product-flow through the pipelines.

The British car manufacturer *Rover* for example has improved their inventory management. They have centralized the control of finished inventory of vehicles, rather than have the dealers keeping too many cars in their showrooms.⁷²

A customer-orientated strategy is also the one of *General Motors* who, in the past, made and designed products that consumers did not really want. Under CEO Jack Smith’s leadership, *General Motors* was transforming itself from a product-oriented “*make and sell*” philosophy to a customer-driven “*sense and respond*” strategy.⁷³

⁶⁹ See Cooper, R./Slagmulder, R., Supply Chain Development, 1999, pp. 121-122

⁷⁰ See Chopra, S./Meindl, P., Supply Chain Management, 2004, p.24

⁷¹ See Monczka, R. M./Trent, R. J./Handfield, R. B., Supply Chain Management, 1998, p.405

⁷² See Christopher, M., Logistics, 1998, pp. 210-211

⁷³ See Kaplan, R. S./Norton, D. P., The Strategy, 2001, p.340

2.5 Plans and Goals

As well as strategies, goals and plans can also focus on different aspects like costs, improvement in production or demand-fulfilment.

“Goals, as reflected in profit plans and operating plans, are the ends or results that management desires to achieve in implementing the business strategy.”⁷⁴ The goal of a supply chain strategy is to strike the balance between responsiveness and efficiency to meet the competitive strategy’s demand in the best way.⁷⁵

The two main goals of Supply Chain Management which are commonly found in the literature are based on *Porter’s* strategy of Competitive Advantage. It focuses on improving the service-level for the customer and on cost reduction throughout the whole value chain.⁷⁶

According to *Ingrid Göpfert*, a third goal should be added, that is the aim to increase the company’s ability to adapt and develop its supply chain. Due to the dynamical changes in our business-environment, this factor has become of increasing importance.

All specific goals of Supply Chain Management which are found in the literature are derived from the “bullwhip-effect” and have the objective to solve its key-problem of fluctuation in demand along the supply chain.⁷⁷

Robert Novack defines more precisely the goals that should be implemented into a company’s strategic plan at a minimum:

- Reduce channel cost through logistics operations e.g. by finding opportunities to eliminate costs in transportation facilities, inventories, and information systems
- Increase channel service e.g. by reducing the cycle time and increasing its reliability
- Improve firm- and channel partner revenue e.g. by initiate programs which help their upstream and downstream partners to increase profitability, and
- Improve channel satisfaction and loyalty e.g. by seeking for a long-term relationship the partners can rely on.⁷⁸

⁷⁴ *Simons, R.*, Performance Measurement, 2000, p.32

⁷⁵ See *Chopra, S./Meindl, P.*, Supply Chain Management, 2004, p.51

⁷⁶ See *Porter, M.*, Competitive Advantage, 1985, p.3

⁷⁷ See *Göpfert, I.*, Supply Chain Management, 2000, p.35

⁷⁸ See *Novack R. A.*, Supply Chain Management, 2000, pp. 151-153

The common practice in the automotive industry for setting an overall goal is to ask their suppliers to reduce the purchasing-price of their parts and modules, not specifying the areas within these reductions must be achieved. It is then up to the supplier's side to identify the opportunities to realize these improvements with a minimum effort possible.⁷⁹

The manufacturer's pressure on the suppliers to constantly reduce costs has also a positive effect. The supplier will try to develop new production-processes which will lead to an improvement in functionality or quality of their parts and therefore creates a win-win situation for both sides.⁸⁰

Ford, for example, had set a goal to hold its overall costs at 1995 levels until the end of the last decade. The car-manufacturer asked its 250 biggest suppliers world-wide to join in a "collaborate effort" to cut costs of 5 per cent a year from 1996 through 1999. The specific goal behind this effort was to reduce complexity by reducing the number of alternative components like horns or steering wheels used on vehicles.⁸¹

Toyota introduced a *Toyota Production System* (TPS) out of the need to develop a system for manufacturing small numbers of many different kinds of automobiles. A feature of the TPS is the concept of "*full daily mix schedule*". The goal is to produce at least some of every variant every day to achieve a "level schedule" with an optimum mix of variants so that demand can be met from the minimum of stock.⁸²

⁷⁹ See *Chopra, S./Meindl, P.*, Supply Chain Management, 2004, p.496

⁸⁰ See *Cooper, R./Slagmulder, R.*, Supply Chain Development, 1999, p. 136

⁸¹ See *Waller, D.*, Operations Management, 1999, p.470

⁸² See *Christopher, M.*, Logistics, 1998, pp. 210-211

3. Concepts of Supply Chain Management

Today, there exists a variety of concepts to achieve the goals of Supply Chain Management. This section will briefly discuss some of the more common practices used by manufacturers in achieving these goals.

Management scientists commonly claim for an inter-company view of the value chain. This is underlined by the statement, that competition takes places not between single enterprises any more but between their supply chains.⁸³

Therefore, a systematic coordination of the whole supply chain is needed which encompasses all chain members from the raw materials and component-part purchases, through production, distribution and sales, to the end-customer.

Driver of the SCM-development was mainly the automotive industry. It was using its` position within the supply chain in order to push the integration by optimising the steps of their supply chains. The concepts of SCM had been developing clearly differently. This especially depended on the fact whether the manufacturer (OEM) or the retailer was pushing the integration.

Concepts pushed by **manufacturers** are Collaborative Planning and Supplier Integration.

In contrary of OEM-pushed concepts, the inter-company concepts of retailers were grown out of a different historical context. Here, especially the food-industry pushed very early on the transparency of the information- and product flow. This is a result of the perishable nature of the goods. Therefore, especially for this industry-sector, meeting the customers` demand at the right time is a critical factor of success. Concepts pushed by **retailers** are *Efficient Consumer Response* (ECR) in the fast-moving consumer goods industry and *Collaborative Planning, Forecasting and Replenishment* (CPFR).⁸⁴

ECR is an umbrella term for a number of philosophies and techniques that seek to deliver goods in shorter time-frames at less cost.⁸⁵ CPFR is a further development of the ECR-concepts representing its second generation by using intensively the most modern information and communication technology.⁸⁶

⁸³ See Christopher, M., Logistics, 1998, p.16

⁸⁴ See Baumgarten, H./Darkow, I.-L., Supply Chain Management, 2002, p.97

⁸⁵ See Christopher, M., Logistics, 1998, p.237

⁸⁶ See Seifert, D., CPFR, 2002, p.41

In this chapter, I will discuss the manufacturer-pushed concepts as this work is based on examples of the automotive industry.

3.1 Supplier Integration

Two main changes of the market-condition strongly influence today's relationship between the supplier and the manufacturer.

The *change from a push- to a pull market* forces the manufacturer to react on the growing customers' requirements on delivery time and -flexibility.

Due to an *increase of global competition*, an intensive concentration on the company's key-business with the effect of a dropping self-production is taking place.

This leads to a high level of integration and cooperation between manufacturers and their producing suppliers with the results of growing development-, production-, and especially purchasing networks. Integrating upstream suppliers has become a major aim for the future.⁸⁷

Integration can either be vertical or horizontal. Concerning Supply Chain Management, vertical means the integration upstream with the suppliers and downstream with the distributors and customers. An indicator of how deep the supplier is integrated into the manufacturing process is the proportion of value achieved by purchasing parts from outside suppliers in comparison to the total value of a car.⁸⁸

Comparing the big car-manufacturers, we can see the enormous difference in the level of integration. In 1996, *General Motors* spent only 30% of its sales dollars on purchased components, while *Ford* spent 50% and *Daimler-Chrysler* 70%.⁸⁹ *Honda* even purchased 80% of the total cost of its car from outside suppliers.⁹⁰

Today, car-producers have all increased supplier-integration in many different ways to a certain extend, depending on their competitive strategy.

Many car-manufacturers like *Toyota*, *Daimler-Chrysler* or *Honda* actively manage first-tier suppliers by involving them into the production process to improve their performance and

⁸⁷ See Baumgarten, H./Darkow, I.-L., Supply Chain Management, 2002, pp. 96-97

⁸⁸ See Christopher, M., Logistics, 1998, p.231

⁸⁹ See Byrne, J., Modularity, 1996, pp.26-28

⁹⁰ See Monczka, R. M./Trent, R. J./ Handfield, R. B., Supply Chain Management, 1998, p.359

capability. This can either be realized by seeking for an intensified **Process Integration** or a more precise **Synchronous Production**.⁹¹

Among others, Process Integration is one answer to the complex global competition whereas Synchronous Production can be a solution for the above mentioned change to a customer-oriented market.

The key approach behind concepts of Synchronous Production like *Continuous Replenishment* (CR) and *Vendor Managed Inventory* (VMI) is “to transform from a push logistics down the supply chain towards a pull logistics up the supply chain driven by actual customer demand”.⁹²

An enhancement of Synchronous Production is the related *concept of modularity*.

Process Integration means a collaborative work between buyers and suppliers. This implies a joint product development through *supplier development teams* and *early supplier involvement in design* and shared information through *integrated information systems*.⁹³

The key idea is to reach the most efficient and effective production-systems by integrating the suppliers on a high level.

3.1.1 Synchronous Production

Continuous Replenishment and *Vendor Managed Inventory* seek to improve **synchronous** supply chain processes.⁹⁴

Traditionally, suppliers deliver on a forecast which generally implies either high safety-stock or stock-outs at an unexpected short-term demand. Both situations are connected with additional costs which can be avoided or at least minimized by managing the demand and replenishment in a revised way. The manufacturer no longer places orders but instead informs the supplier about the actual usage or sale of their products.

On the basis of this information, the supplier takes responsibility for replenishment of the producer's inventory. No orders are received, but instead the manufacturer prescribes an

⁹¹ See Harrison, A./van Hoek, R., Logistics Management, 2002, p.234

⁹² Hieber, R., Supply Chain Management, 2002, p.53

⁹³ See Christopher, M., Logistics, 1998, pp. 231-233

⁹⁴ See Harrison, A./van Hoek, R., Logistics Management, 2002, p.235

upper and lower limit of stock that they wish to keep in hand.⁹⁵

The goal is to establish a supply chain arrangement so flexible and efficient that the inventory is continuously replenished.

"The distinguishing factor between CR and VMI is who takes responsibility for setting target inventory levels and making restocking decisions."⁹⁶

When applying to CR, the manufacturer decides on replenishment, with VMI the supplier makes stock-decisions. Therefore, the VMI-concept is an even more integrated approach because the supplier is responsible for replenishing inventory in the required quantities, colours, sizes, and styles. This is only possible when the supplier receives daily transmission of sales and warehouse shipments and is informed about the manufacturer's forecast such as promotions and production rates. The supplier takes over the entire planning cycle and fulfils customer demand without receiving a formal delivery schedule.⁹⁷

The next figure illustrates the process of Vendor Managed Inventory and points out the main features of the concept.

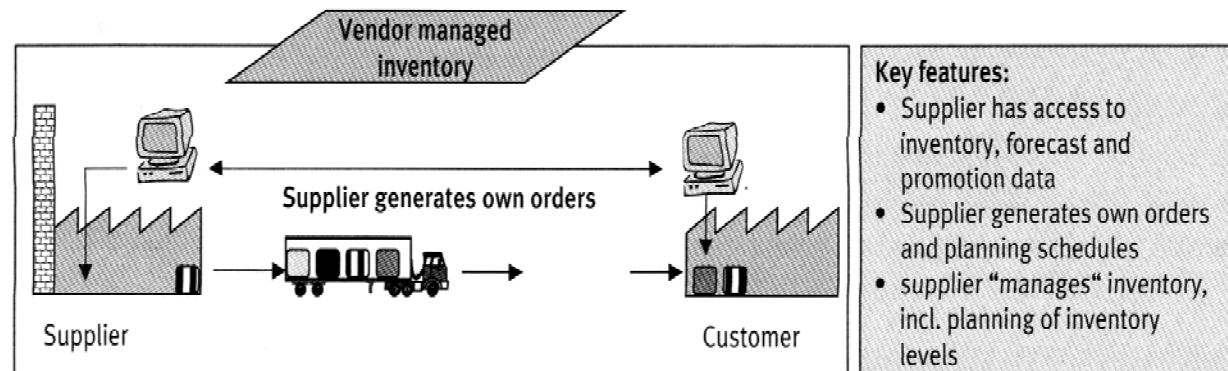


Figure 6: Vendor Managed Inventory

Source: *Hieber, R.*, Supply Chain Management, 2002, p.54

The advantage of implementing these concepts is that safety-stock can be significantly reduced due to less uncertainty through shared information while the risk of stock-outs diminishes.⁹⁸

⁹⁵ See *Christopher, M.*, Logistics, 1998, p.195

⁹⁶ *Bowersox D. J./Closs, D.J./Cooper, M. B.*, Supply Chain, 2002, p.318

⁹⁷ See *Hieber, R.*, Supply Chain Management, 2002, pp.53-54

⁹⁸ See *Christopher, M.*, Logistics, 1998, p.195

The results are cost-savings and a better matching of product-supply with the end-customer's demand. The manufacturer can either use the savings for investing them or they can be forwarded to the customer by reducing the final price for the product. The customer will take the cost-advantage into consideration when buying e.g. a new car in future.

Regarding this aspect from a value point of view, the customer's anticipation, due to a lower price, is increasing the customer value. In the reversed sense, keeping less stock in the warehouse means the reduction of non-value adding activities.

An example for Synchronous Production is the relationship of *Daimler Chrysler* to its assembly supplier *Johnson Controls*. For the production of the 2002 Jeep "Liberty", *Johnson Controls* integrates components from 35 suppliers for assembling *Chrysler's* cockpit. As soon as *Chrysler* notifies *Johnson Controls* of an order for a Jeep, they have 204 minutes in which to build and deliver the module.⁹⁹

"Modularity" is a further step in reaching Synchronous Production in the automotive industry.

Micro Compact Car (MCC) AG, a *Mercedes-Benz* Company, is a car-producer with a radical different approach to vehicle development and manufacturing.

MCC has built a car named *Smart* which is based on the *concept of modularity*. The suppliers assemble dozens of parts into modules like a dashboard unit and the manufacturer then assembles the various units into an integral body-frame.

"The car consists of five main modules: the platform, the powertrain, the doors and roof, the electronics, and the cockpit, containing submodules and components. The modules are supplied, in sequence for final assembly, by a small number of first-tier suppliers of which seven suppliers are fully integrated in the final assembly plant. These seven companies are located at the same site as *MCC* and supply 'supermodules' based on a postponed purchasing approach. Modules are bought by the OEM only when they are needed in the final assembly process (postponed purchasing). For example, a complete rear, including wheels, suspension and engine, is preassembled by one supplier which maintains the module in its possession until it is needed on the assembly line. The same is true for the doors and for the dashboard system. Together these seven suppliers deliver 50% of the total value of the purchased goods."¹⁰⁰

⁹⁹ See *Chopra, S./Meindl, P.*, Supply Chain Management, 2004, p.405

¹⁰⁰ *Harrison, A./van Hoek, R.*, Logistics Management, 2002, p.181

3.1.2 Process Integration

Especially in the automotive industry, Process Integration has been realized and its concepts introduced which lead to a change from single-focused business units to highly integrated and relationship-based supply chains. The relationship to the suppliers can be developed in a way that quality and service are improved. Achieving Process Integration through **supplier development** can take a variety of forms. These range from e.g. the creation of *supplier development teams*, *early supplier involvement in design*, and *integrated information systems*.¹⁰¹

Supplier development teams are cross-functional teams of specialists with the purpose to work closely with the suppliers to achieve process alignment by e.g., establishing a common “information highway“ between the manufacturer and its suppliers, or by working to establish common product-identification codes.¹⁰²

The overall objective of the supplier development team is to reduce the costs and increase the efficiency for both parties – in other words a “win-win” outcome.

There are many examples in the automotive industry of how suppliers can pass on benefits by providing full service from designing and producing to assembling.

Nissan Motors in the UK have reported that supplier development teams have been a key element of their approach to create a more responsive and efficient supply chain. Small groups of *Nissan*-specialists help suppliers to achieve the requirements that Nissan places upon them.¹⁰³

The early involvement of the suppliers into developing and designing “their” parts of the car has led to an increased innovation on the suppliers` side. Developments in the automotive industry, such as anti-braking systems (ABS), engine-management systems and improved suspension systems originate mostly from the company that produces them. The integration into new product development processes also resulted in creating simpler, more cost-effective designs.¹⁰⁴

¹⁰¹ See *Christopher, M.*, Logistics, 1998, pp. 232-233

¹⁰² See *Harrison, A./ van Hoek, R.*, Logistics Management, 2002, p.234

¹⁰³ See *Christopher, M.*, Logistics, 1998, p.244

¹⁰⁴ See *Christopher, M.*, Logistics, 1998, p.233

Ford, for example, is a car-producer that enforces Process Integration of their suppliers into the development of new product-design to achieve quality-related benefits.

Ford asked suppliers not only to manufacture the components and subsystems for the “Thunderbird”, but also to be responsible for designing them. The suppliers are provided with broad parameters of specifications about the functionality of a component or assembly. In opposite, *Ford* expects that the lowest total cost inputs are going to be achieved when designing, producing and assembling the required parts.¹⁰⁵

“Solid integration throughout the supply chain allowed Ford to bring the new model to market within thirty six months of program approval.”¹⁰⁶

A further step of integrating the supplier into the design of a product is the concept of *modular design*. Here, the supplier is not only involved in the design of one specific part but is responsible to develop an entire system or “module” like the entire wiring system for the original manufacturer.¹⁰⁷

The graphic below illustrates some of the assemblies or modules for which suppliers can take over responsibility when a new model is brought onto the market.

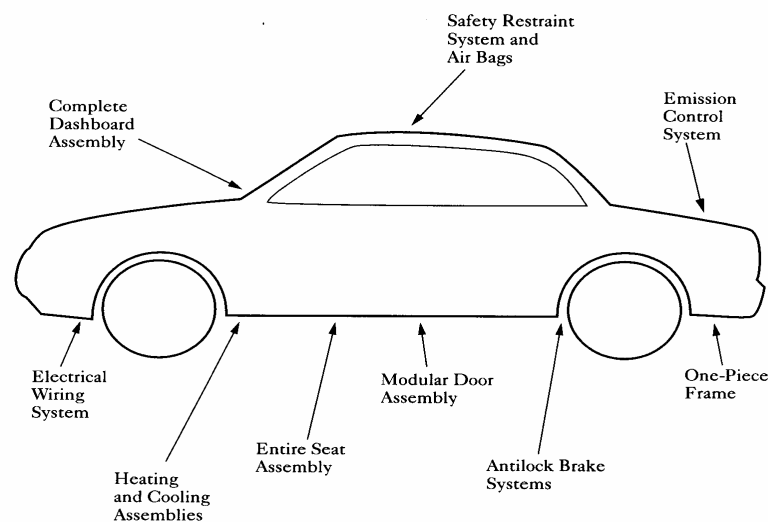


Figure 7: Examples of supplier-designed and manufactured Modules

Source: Monczka, R. M./Trent, R. J./Handfield, R. B., Supply Chain Management, 1998, p.337

¹⁰⁵ See Monczka, R. M./Trent, R. J./Handfield, R. B., Supply Chain Management, 1998, p.318

¹⁰⁶ Chopra, S/Meindl, P., Supply Chain Management, 2004, pp. 403-404

¹⁰⁷ See Monczka, R. M./Trent, R. J./Handfield, R. B., Supply Chain Management, 1998, p.335

In order to make supplier-involvement into new product design possible, a paperless flow of fully transparent information is needed.¹⁰⁸

The automotive industry has put significant effort in using information systems like Electronic Data Interchange (EDI) or the internet to make their supply chain more efficient. Nowadays, the integration of such systems is seen as the decisive factor for the success of a company.¹⁰⁹

Toyota, for example, especially created a *Toyota Supplier Association* as an organisational mechanism for giving supplier firms access to technological and managerial information of the OEM.¹¹⁰

Ford Motor Cooperation is using the Internet to ensure effective communication between their engineers and their suppliers. *Ford* requires them to be on the same software platform for design and opens in return all its` internal database to its suppliers. With this strategy, *Ford* brings together engineers from its operations all over the world to collaborate on projects with the goal to design basic components that can be used everywhere.¹¹¹

An early supplier involvement in the product-design represents only one aspect of the ways manufacturers can work with its` suppliers. Although it takes considerable resources on the manufacturer`s part to educate suppliers in an increase in efficiency, the benefits are positive. By allowing suppliers to develop designs based partly on their process or manufacturing capabilities, lowered overall costs, improved quality, reduced complexity and product development time, and greater coordination inside the supply chain are the results.¹¹²

Regarding the Process Integration enhanced by Supplier Development from the *value* perspective, it is referred to *Value Engineering*.

Value Engineering is a concept introduced at the early stage of product-design as it is involved with closely examining the material and components required for production.¹¹³

I will go into further detail of this concept in chapter four.

¹⁰⁸ See *Christopher, M.*, Logistics, 1998, p.233

¹⁰⁹ See *Steven, M./Krüger, R.*, Advanced Planning Systems, 2002, p.172

¹¹⁰ See *Cooper, R./Slagmund, R.*, Supply Chain Development, 1999, pp. 123-124

¹¹¹ See *Chopra, S/Meindl, P.*, Supply Chain Management, 2004, pp. 403-404

¹¹² See *Cooper, R., Slagmulder, R.*, Supply Chain Development, 1999, pp. 94-95

¹¹³ See *Bowersox, D. J./Closs, D. J./Cooper, M. B.*, Supply Chain, 2002, p.142

Because the cost of materials in an automobile can be as high as 85 %, the reduction of the costs for purchased components and modules has a significant effect on total costs.

The figure below represents a not-untypical situation for a car- manufacturer. It shows how the costs for purchased material are split up when looking at the suppliers` side. This is important to know in order to understand that still approximately 12% ($85\% * 60\% * 80\% * 30\%$) of the vehicle`s total material costs are caused by the logistics costs of the supplier. It is therefore a great challenge to reduce the costs on the suppliers` side.¹¹⁴

Process Integration, as already been described above, and the collaboration and cooperation at all levels of the supply chain are possible ways to reduce these costs.

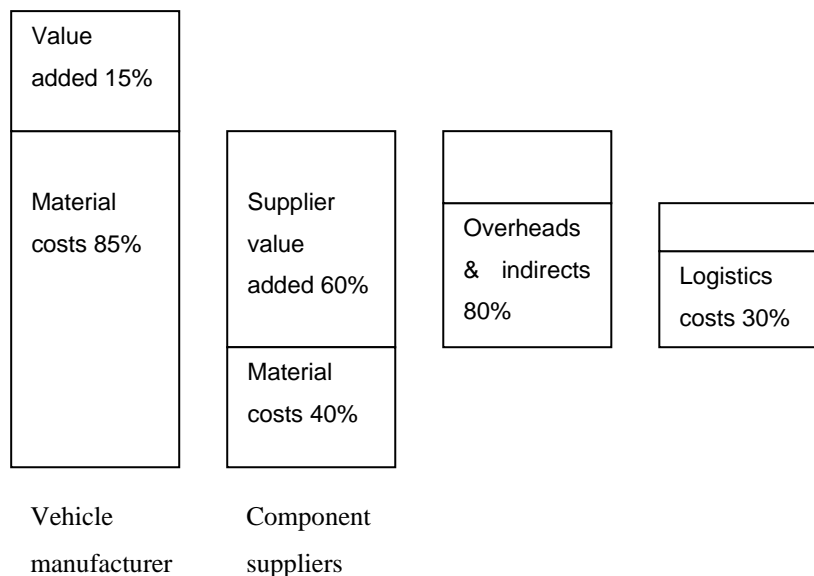


Figure 8: The Impact of Suppliers` Logistics Costs on the Costs of a Car

Source: See *Christopher, M.*, Logistics, 1998, pp. 244

3.2 Collaborative Planning

The goal of collaborative planning is to be able to meet customers` demand more precisely and satisfying the demand in a more profitable way. The trading partners work together by

¹¹⁴ See *Christopher, M.*, Logistics, 1998, pp. 244-225

embracing electronic collaboration at all levels: strategic, tactical and operational.¹¹⁵

Electronic collaboration is realized in a variety of business-fields and can be divided into three basic categories concerning:

- Information exchange, e.g. using Enterprise Resource Planning (ERP)-systems
- Collaborative decision-making, e.g. demand forecasting, replenishment planning, and
- Product change management, e.g. new product design and -development.¹¹⁶

To gain an overall competitive position in the automobile-market in the future, the introduction of the *Quick Response* (QR)-concept and the implementation of *Advanced Planning- and Scheduling* (APS)-systems are essential for the car-producers. By responding quickly, customers` needs can be better satisfied. The use of APS-systems lets the planning results become more accurate and makes input-data updates faster.

An example of collaborate planning in the automotive industry is given below.

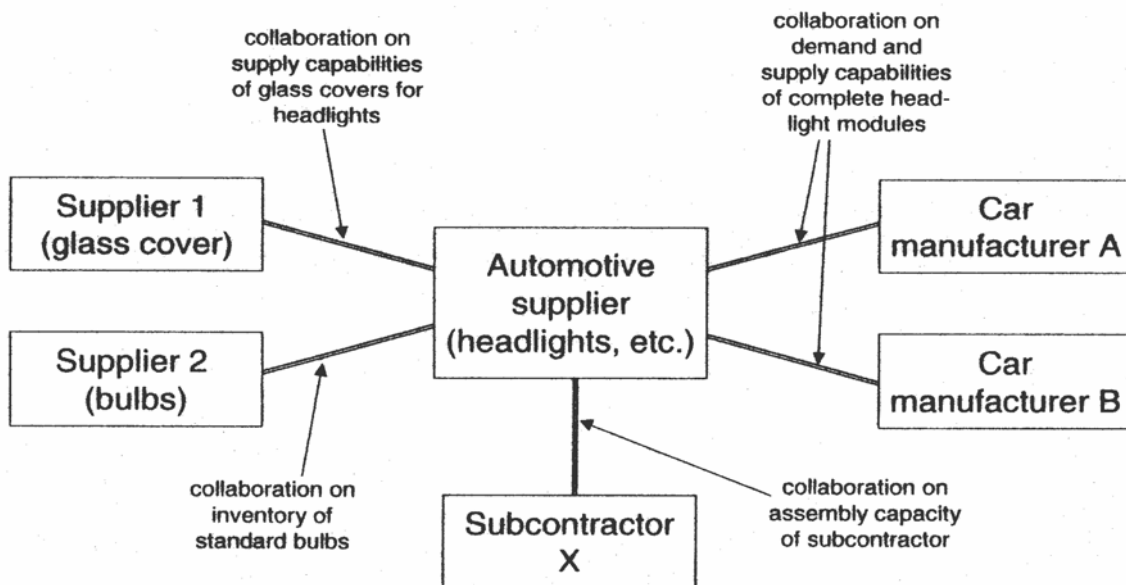


Figure 9: Collaborative Planning in the Automotive Industry

Source: Kilger, Ch./Reuter, B., Collaborative Planning, 2002, p.225

¹¹⁵ See Harrison, A./van Hoek, R., Logistics Management, 2002, p.197

¹¹⁶ See Lee, H./Whang, S., Supply Chain Integration, 2002, p.11

The car manufacturer provides his demand of complete headlight-modules to the headlight-supplier who commits to fulfil the demand forecast and who informs the car-producer about the maximum supply capabilities. The headline-producer and the supplier of glass covers collaborate on the planning process to plan the demand- and supply capabilities in advance. In comparison to the “make-to-order” glass covers, bulbs are standard products that are “made-to-stock”. The producer of glass covers and the bulb-suppliers are collaborating on the inventory level and the replenishment of standard bulbs. The subcontractor collaborates with the car-manufacturer on the use of the capacity at the subcontractor’s site.¹¹⁷

3.2.1 Advanced-Planning-and-Scheduling Systems

“The natural growth of enterprise information systems started with material procurement (MRP, material requirement planning), expanding to manufacturing (MRP II, manufacturing resource planning) and to intra-enterprise integration (ERP, enterprise resource planning).”¹¹⁸

It has now reached a new generation, the “Advanced-Planning-and-Scheduling (APS)-systems”.

In contrast to current ERP-systems, SCM-applications like APS are a new generation of business software, as they are analytical systems that use “advanced” planning engines¹¹⁹ which offer mathematical algorithms at a high-level for finding solutions and eliminating other system’s deficits. For implementing APS, basic information systems like ERP are necessary for the management of data. The advanced systems exist therefore in addition and not instead of other systems.¹²⁰

APS enables a much quicker and more effective reaction on changed market-structures and an earlier consideration of any disturbances in production or delivery.

The synchronization of the whole planning process along the complete supply chain supports and enables an optimal inter-company planning.¹²¹

These advantages are gained by simultaneously planning the demand and capacity and the

¹¹⁷ See *Kilger, Ch./Reuter, B.*, Collaborative Planning, 2002, pp. 224-225

¹¹⁸ *Lee, H./Whang, S.*, Supply Chain Integration, 2002, p.4

¹¹⁹ See *Hieber, R.*, Supply Chain Management, 2002, pp. 57-58

¹²⁰ See *Steven, M./ Krüger, R.*, Advanced Planning Systems, 2002, p.175

¹²¹ See *Kuhn, A./Hellingrath, B.*, Wertschöpfungskette, 2002, p.129

relevant figures of all supply-chain business processes, based on visualizing the complex logistical structures within the supply chain.¹²²

The result is a reliable fixation of the delivery-time which increases flexibility and speed in operations in real-time.¹²³

An example of successful implementation of APS is given by *Daimler Chrysler* for producing the Mercedes “E-class”. Starting point was a *Supply Chain Mapping* for analysing and documenting the supply chain of a certain part - the inside-surface of a car door. Even the first-tier supplier of this part was astonished that behind his product about 100 sub-suppliers were involved in up to seven levels along the supply chain. By a simultaneous and sensitive analysis, the manufacturer identified specific critical processes in the supply chain for car doors. One critical part was the supply chain of a special slot for leather-doors which is produced in South-Africa. The lead-time for the installation of this part into the car was 60 days. For reducing the lead-time, they used an information control-tool. The first-tier supplier runs a server which places all information about the actual orders simultaneously to all sub-suppliers up his supply chain. In the opposite direction, all daily information about stock- and capacity situation is generated and is made transparent for his supply chain. Through this undertaking, critical passes, as described above, are recognized in advance and can be avoided.¹²⁴

The successful realization of an APS implementation project, viewed from the *value* perspective, depends on what kind of APS- functions will help to improve the flow of the supply chain. Therefore, opportunities for a potential cost-reduction have to be identified first. With the help of feasible master plans considering all constraints, it can be communicated on where value-creating activities are involved and how they are going to be improved.¹²⁵

After the implementation of the system, a cost-oriented valuation of the planning results is necessary.¹²⁶

¹²² See Baumgarten, H./Darkow, I.-L., Supply Chain Management, 2002, p.95

¹²³ See Hieber, R., Supply Chain Management, 2002, pp. 57-58

¹²⁴ See Kuhn, A./Hellingrath, B., Wertschöpfungskette, 2002, p.155

¹²⁵ See Kilger, Ch./Reuter, B., Collaborative Planning, 2002, p.256

¹²⁶ See Kuhn, A./Hellingrath, B., Wertschöpfungskette, 2002, p.129

3.2.2 Quick Response

“Time has become a major competitive weapon in today’s competition.”¹²⁷

Being able to respond quickly and reliably to ever changing customer needs is a decisive factor for holding the customer or for gaining new customers.

The concept of „Quick Response“ (QR) was developed 1985/86 by the US-American consultancy *Kurt Salomon Associates* (KSA) for the textile-industry, especially for the garment suppliers. The reason for the introduction was a dropping productivity and loss of market-shares of the big textile-manufacturers due to the threat posed by overseas competitors from Far East.¹²⁸

The results of KSA’s investigation were revealing that the supply chains from the loop to the stores were too long, badly co-ordinated, and inefficient.¹²⁹

To solve this problem, the concept of Quick Response tries to reduce the reaction time by shortening the order cycle and replenishment time. In addition, it lowers the inventory level by a better predetermination and an improved time-planning concerning production and stock.¹³⁰

What has made QR possible is the development of new information technology, primarily EDI, the quick forwarding of the real demand by Point-of-Sale (POS)-data and barcodes to automatically identify products.¹³¹

“Essentially the logic behind QR is that demand is captured in as close to real-time as possible and as close to the final consumer as possible. The logistics response is then made directly as the result of that information.”¹³²

In comparison to the Quick Response-approach in the textile and food industries, where a standardized product unit exists, the approach is much more difficult in the automotive industry. For building a car, it is not sufficient to measure the quantities in ‘number of parts’, as this information is only relevant for the first-tier assembler. Therefore, the system complexity increases sharply, because every level of the chain not only represents a decision

¹²⁷ Kaplan, R. S./ Norton, D. P., *The Balanced Scorecard*, 1996, p.86

¹²⁸ See Alicke, K., *Logistiknetzwerke*, 2003, p.168

¹²⁹ See Fernie, J., *Retail Logistics*, 2001, p.380

¹³⁰ See Alicke, K., *Logistiknetzwerke*, 2003, p.168

¹³¹ See Hieber, R., *Supply Chain Management*, 2002 p.51

¹³² Christopher, M., *Logistics*, 1998, pp. 192-193

point, but also a standardized “product-unit” does not exist. For first-tier companies, the quantity of finished cars is the basis, for second-tier companies the number of modules is necessary and so on.¹³³ The aim is to include all the different scheduling systems found in a supply chain and to integrate them into one scheduling concept that displays demand visibility to all levels.¹³⁴

In addition to regarding the QR-concept from the manufacturer upwards the supply chain to his suppliers, a closer look at the other end of the supply chain, the customer’s interaction with the car showroom will be made.

A new form of order-processing should bring the automotive industry advantages in time-base competition through responding quickly on customer’s demand. Exactly speaking, the time from ordering to delivering a new car should be reduced by using EDI and the Internet. With the support of these information systems, the retailer can directly enter the customer’s order into the system of the manufacturing site and receives in opposite the date of completion. In addition, the retailer can always ask the manufacturer to inform him about the state of production.¹³⁵

The graphic below visualises the process of responding quickly to a customer’s order.

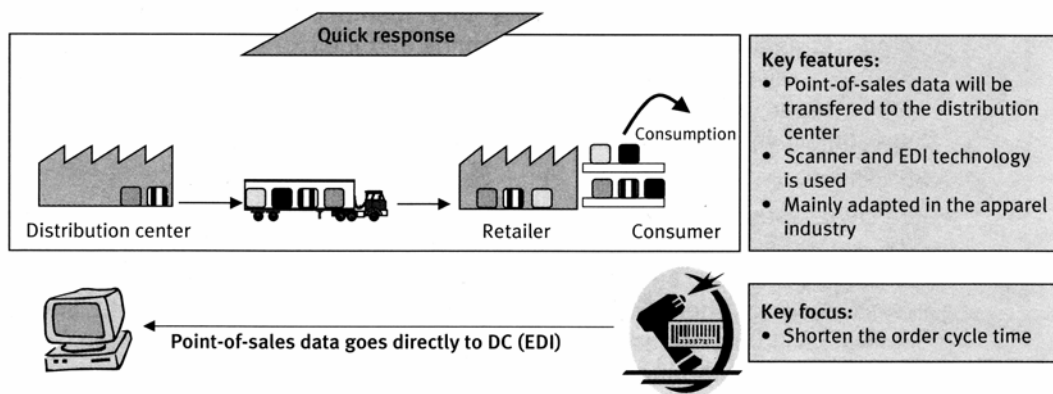


Figure 10: The Quick Response Concept

Source: *Hieber, R.*, Supply Chain Management, 2002, p.51

¹³³See *Hollweg, M.*, Dynamic Distortions, 2001, p.137

¹³⁴See *Hollweg, M./Bicheno, J.*, Supply Chain Dynamics, 2001, p.246

¹³⁵See *Kuhn, A./Hellingrath, B.*, Wertschöpfungskette, 2002, p.163

Besides of a shorter delivery time, nowadays the customer is more and more asking for a “built-to-order” car and becomes involved in the actual designing process. Not many customers are still willing to order a new car out of a showroom and to pay for equipment they do not really want.

The *Mercedes-Benz* company *MCC*, producing the *Smart*, has geared their distribution system totally. The car is sold through a network of dealerships located in special lifestyle centres within shopping complexes and other highly frequented places in urbanised areas. These franchise organisations use multimedia systems to enable clients to configure an automobile on the computer screen from a series of choices which is then forwarded to the distribution centres.¹³⁶

“Built-to-order” cars are a great challenge for all car-manufacturers in the future as the customer demands “the right product in the right place to the right time”.¹³⁷

At the *Daimler-Chrysler* plant in *Sindelfingen* up to 75 % of the whole part-production depends on special wishes of the customer which makes it very difficult to forecast the demand for these special parts. Statistically, 2.2 of the 430 000 produced cars at *Daimler* in *Sindelfingen* are exactly the same model per year.¹³⁸

Successful built-to-order approaches are provided for example by the Japanese auto manufacturers like *Honda* who “can deliver a newly ordered customized car to a consumer’s driveway in less time (one week) than it takes the purchaser to obtain a valid parking sticker from government authorities”¹³⁹.

Considering the *value* point-of-view, it should be analysed if the additional costs for producing a “built-to-order” car are exceeding the long-term advantages of additional revenue. A growing turnover will only be reached when the customer’s decision of buying a new car strongly depends on meeting his individual wishes in a short time. The *cost analysis* does not only provide the manufacturer with an overall view of the total costs, but also gives information about the possible business processes where cost can be reduced. I will refer to this matter in the next chapter.

¹³⁶ See *Harrison, A./van Hoek, R.*, *Logistics Management*, 2002, p. 181

¹³⁷ *Christopher, M.*, *Logistics*, 1998, pp. 192-193

¹³⁸ See *Kuhn, A./Hellgrath, B.*, *Wertschöpfungskette*, 2002, p.163

¹³⁹ *Kaplan, R. S./Norton, D. P.*, *The Balanced Scorecard*, 1996, p.86

4. The Concept of Value Chain Management

In this chapter, I will look at the core questions, of what “value” really means and how to create it. According to *Michael Porter* and speaking in competitive terms, “value is the amount buyers are willing to pay for what a firm provides them”.¹⁴⁰

The creation of value has long been described by managers and academics in the physical world, often referring to the processes involved at each stage in a value chain.¹⁴¹

The interest in value has increased especially in logistics and supply chain thinking. Many organizations in different industry sectors, manufacturers, retailers or other service-providers, adopt the *concept of value*. It should give answers on the following two key questions: “Why does a business exist?” and “Why does it perform far better than others?”¹⁴²

The “Concept of Value Chain Management” is based on the *concept of value* and is concerned with *customer value* in particular. The *value chain* consists of value-adding activities that connect the company’s supply side with its demand side. At each stage of the chain, value is added to the product through e.g. manufacturing, branding, packaging, and display at the store. At the same time, at each stage cost is added in terms of production costs, branding costs, and overall logistics costs.¹⁴³

In order to improve their value chain’s efficiency and effectiveness, managers are redesigning their internal and external business processes. An analysis of all different stages of the value chain is the basic requirement for any improvements.¹⁴⁴

My understanding of *Value Chain Management* is the summary of all undertakings necessary to reach the above mentioned improvements. This includes the analysis and improvement of already existing business processes and of the processes concerned with the creation and development of new products.

The challenge is to manage this chain in a way that value is created for the customer at an acceptable cost.

¹⁴⁰ Porter, M. E., *Competitive Advantage*, 1985, p.38

¹⁴¹ See Rayport, J. F./Sviokla, J. J., *Value Chain*, 1999, p.36

¹⁴² See Brewer, A. M., *Value*, 2001, p.127

¹⁴³ See Fernie, J., *Retail Logistics*, 2001, p.379

¹⁴⁴ See Rayport, J. F./Sviokla, J. J., *Value Chain*, 1999, p.36

4.1 The Concept of Value

Two theoretical pathways have been developed by management-scientist in the past.

They see “value” from two perspectives. The industry organization perspective is based, among others, on *Michael Porter*’s ideas of Value Chain and Competitive Advantage. The second one is the resource-based view of the enterprise which is based on the theories of *Birger Wernerfelt* and *Jay Barney*.¹⁴⁵ *Wernerfelt* developed economical tools for analysing a firm’s resource position, its strengths and weaknesses.¹⁴⁶ *Barney* analyzed the potential of a firm’s resources for generating sustained competitive advantage.¹⁴⁷

The industry perspective is concerned with the value chain and key concepts such as *value added*, *value analysis*, and *vale creation*.¹⁴⁸

The next figure represents the two perspectives of the “Concept of Value” and its key components.

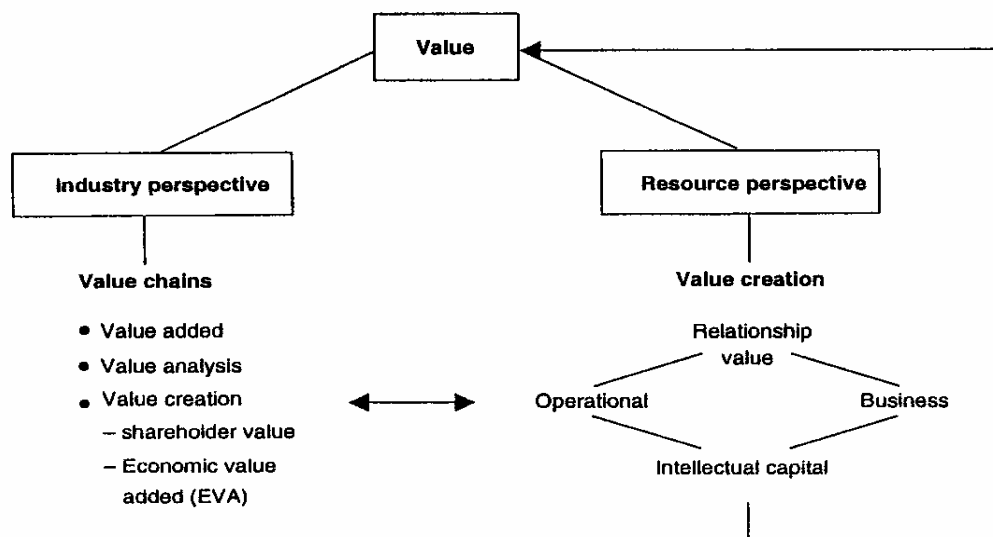


Figure 11: The Concept of Value

Source: *Brewer, A.*, Value, 2001, p.128

¹⁴⁵ See *Brewer, A. M.*, Value, 2001, p.128

¹⁴⁶ See *Wernerfelt, B.*, Resource-based View, 1984, p.171

¹⁴⁷ See *Barney, J.*, Competitive Advantage, 1991, p.99

¹⁴⁸ See *Brewer, A. M.*, Value, 2001, p.128

In this work, only the industry organization perspective based on the theory of *Porter* will be examined as this is the one which is concerned with value chains.

From the 1980s onward, attention to the link between value and competitiveness has been strengthened especially by *Michael Porter* formulating an overall *Competitive Strategy* in 1980. This was the basis for his theory about *Competitive Advantage* in 1985 in which he introduced the Concept of *Value Chain*. He describes how a firm can actually create and sustain a competitive advantage in its industry – how it can implement the broad generic strategies.¹⁴⁹

A firm gains competitive advantage over its rivals by performing these value chain activities more cheaply or better than its competitors or by performing these activities in a unique way that creates greater differentiation.¹⁵⁰

Gaining and sustaining competitive advantage depends on understanding not only a firm's value chain which is described in chapter 2.2. It also depends on how the firm's value chain fits into the overall "value system" which *Porter* describes as a "large stream of activities".¹⁵¹

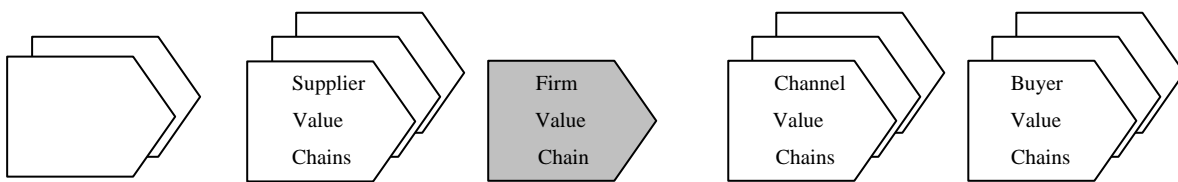


Figure 12: The Value Chain System

Source: See *Porter, M.*, *Competitive Advantage*, 1985, p.35

The upstream value chain of the suppliers encompasses the creation and delivery of the parts which the manufacturer is purchasing for his production. Depending on the depth of his integration, the supplier can influence a firm's performance in many ways. On their way to the buyer, the product is passed through the value chains of channel members who add services to the product which increases the value to the customer. When a product has reached the buyer, it becomes part of its buyer's value chain.¹⁵²

¹⁴⁹ See *Porter, M.*, Introduction, 1998, p. XV

¹⁵⁰ See *Christopher, M.*, *Logistics*, 1998, p.11

¹⁵¹ *Porter, M.*, *Competitive Advantage*, 1985, p.34

¹⁵² See *Porter, M.*, *Competitive Advantage*, 1985, p.34

Further developments of *Porter's* ideas have been made by *Martin Christopher* who added new aspects to the Concept of Value Chain. Due to the rapidly changing nature of the business-world, he developed the idea of the “extended enterprise”. In *Christopher's* concept one overall value chain encompasses all its supply chain partners. It overcomes the deficit of *Porter's* value system in which four value chains exist as separate units within the system.

According to *Christopher*, the business has become ‘boundaryless’ meaning internal cross-functional business barriers are breaking down in order to introduce modern, horizontally managed businesses. From the external perspective, the supply chain members are not regarded separately any more but are seen as a whole. This is underlined by the fact that nowadays, competition is taking place between value or supply chains, not between single companies any more. Therefore, the redefined and extended value chain includes the value chain of upstream and downstream partners.¹⁵³

The figure below illustrates the concept of “the extended value chain” with the business processes involved from the supplier’s value chain to the customer’s value chain.

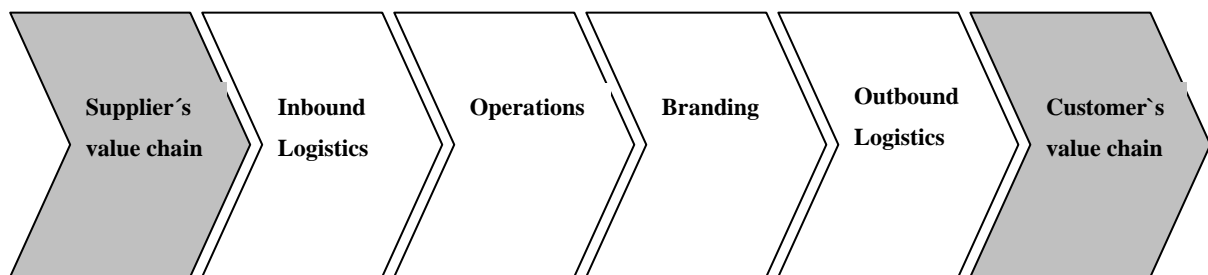


Figure 13: The Extended Value Chain

Source: See *Christopher, M.*, Logistics, 1998, p.271

Christopher's graphic has not the objective to show and describe the business processes within the extended value chain – the message of this graphic is rather that the firm's value chain is extended by the supplier's and customer's value chains in order to become one overall value chain including all channel members from one end to another.

“In the extended enterprise the aim is to create seamless, ‘end-to-end’ processes so that the innovative products are created and delivered to market at higher levels of quality, in shorter

¹⁵³ See *Christopher, M.*, Logistics, 1998, p.265-266

time-frames but at a price which in real terms is significantly less than it has been in the past.¹⁵⁴

The concept of the extended value chain has also found interest in the automotive industry. In order to better respond to their customer's needs and wishes, *Chrysler Corporation* adopted the concept of "Extended Enterprise", which seeks for tighter integration of all members involved throughout the whole supply chain. This concept resulted in major changes in the way *Chrysler* manages its supply base.¹⁵⁵

4.1.1 Value-Added Processes

To survive on the market nowadays, for many companies it is essential to seek for making the supply chain as a whole more competitive through the value it adds and the costs that it reduces overall.¹⁵⁶ Value-added is described as "the amount by which the value of an article is increased at each stage of its production by the agent or agents producing it, exclusive of the cost of materials and bought-in parts and services".¹⁵⁷

Activities that add value to the final product or service make them more valuable for the end customer than otherwise it would have been.

A company can either make money by increasing revenues through raising the price and increasing the volume or it can make money by decreasing costs.

One way that organizations are seeking to reduce costs is through process-reengineering because processes can have a certain amount of non-value-adding activities associated with them.¹⁵⁸

According to *Monden*, business activities in an internal manufacturing context can be divided into three categories:

- Non-value-adding (NVA): pure wasteful activities that should be eliminated completely as they involve unnecessary actions like waiting time or double handling

¹⁵⁴ Christopher, M., Logistics, 1998, p.232

¹⁵⁵ See Monczka, R. M./Trent, R. J./Handfield, R. B., Supply Chain Management, 1998, p.18

¹⁵⁶ See Simchi-Levi, D./Kaminsky, P./Simchi-Levi, E., Supply Chain, 2000, p.205

¹⁵⁷ Brewer, A. M., Value, 2001, p.129

¹⁵⁸ See Monczka, R. M./Trent, R. J./Handfield, R. B., Supply Chain Management, 1998, pp. 180-181

- Necessary but non-value-adding (NNVA): activities that are necessary under the current operating procedures but where time is wasted e.g. by walking long distances to pick up parts or unpacking deliveries, and
- Value-adding: all activities that convert the raw materials or semi-finished products through the use of manual labour into a final product, like the sub-assembly of parts.¹⁵⁹

In order to reduce the wasting time, major changes in the process procedure have to be realized. Arranging for suppliers to deliver unpacked goods is one example of how wasting time can be reduced, but usually, changes like this can not be realized immediately.

A simpler way to describe the use of business activities is done by *Christopher* who does not consider the necessary but non-value-adding activities. *Christopher* develops the idea of “value-adding time” versus “non-value-adding time”. Value-adding time is spent when a benefit is created for which the customer is prepared to pay. In the opposite, non-value-adding time results from activities whose elimination would not lead to any reduction of benefits for the customer.¹⁶⁰

Firms such as *Toyota*, *Ford*, and many others have identified significant non-value-adding processes by mapping their processes throughout the logistics pipeline and by introducing strategies which lead to time-reduction and improvements to complete these processes. Such strategies can imply for example a system simplification, standardization, or variance control.¹⁶¹

A main part of the value-adding activities belong to the value-adding services that “refer to unique or specific activities that firms can jointly develop to enhance their efficiency and/or effectiveness”¹⁶². Among others, they involve the coordination of warehouse activities to customize the product, such as packaging, labelling, quality control, or kitting.¹⁶³

¹⁵⁹ See *Monden, Y.* Toyota Production System, 1993

¹⁶⁰ See *Christopher, M.*, Logistics, 1998, p.110

¹⁶¹ See *Monczka, R. M./Trent, R. J./Handfield, R. B.*, Supply Chain Management, 1998, pp. 180-181

¹⁶² *Bowersox, D. J./Closs, D. J./Cooper, M. B.*, Supply Chain, 2002, p.88

¹⁶³ See *Christopher, M.*, Logistics, 1998, p.189

Concerning the assembling process, the manufacturers may require from their suppliers that components should not only be received on time but also be sorted and sequenced in a particular manner. The handling and inspection of incoming components could be improved significantly.

4.1.2 Value Analysis and Value Engineering

Factors such as changing customer requirements, market conditions, and new technology offer opportunities to benefit from applying *Value Analysis* (VA) to existing products, even those that have already gone through *Value Engineering* (VE).

“Value Analysis is the organized and systematic study of every element of cost in a part, material or service to make certain it fulfils its functions at the lowest possible cost.”¹⁶⁴

Value Analysis encompasses the *cost structure analysis* for all major stages of the value chain up to the final assembly of a particular module, component or system. It is followed by the investigation of non-value-adding activities which are driving up costs without adding value to the customer. Examples are over-specification of materials, prototype policy, and product complexity. The identification of such factors can generate ideas for improving the cost structure. These ideas may refer to any partner within the value chain or to the interfaces between them. The ideas must then be put into an action plan which is the basis for implementing cost-improving processes. After a certain time, results of the changing processes have to be evaluated.¹⁶⁵

VA is applied during the manufacturing phase of a product's life and should reduce costs while maintaining the functionality of existing products and processes. Because the functionality of the product cannot be changed, the only way to increase value is to decrease costs. Apart from VA, Value Engineering should also be used to continuously improve and add value to the customers. The difference to Value Analysis is the product-phase it is involved in. VE is applied during the product-development time and analyses the functions of goods and services. It is a multidisciplinary, team-based approach where employees from different functional areas, such as design, engineering, marketing and manufacturing are

¹⁶⁴ Clark, L. J., Value Analysis, 2000, p.586

¹⁶⁵ See Kajüter, P., Cost Management, 2002, pp. 43-45

cooperating and participating.¹⁶⁶

As Value Engineering is applied earlier in the design process, it offers two ways to increase a value of a product. It either increases its functionality but not simultaneously the costs or it decreases its costs without a significant decrease in functionality.¹⁶⁷

The lean management approach in the automotive industry has led to an immense time-reduction in producing a car. Then why is the car stored in the distribution pipeline or in dealer outlets for weeks, if not months? An analysis of the supply chain's warehousing and distribution pipeline might lead to the result that the manufacturer has an inefficient distribution system or is badly coordinating with its dealers. This is not so at *Toyota*.

Although *Toyota* is capable of manufacturing a car in five days, it has decided not to do so in the current market circumstances. *Toyota* has analysed that the expected increase in revenues would not outweigh the additional costs which occur by putting too much pressure on its supply- and distribution side.¹⁶⁸

In essence, many manufacturers are able to produce a car in a very short time frame. The limiting factor in today's operating environment is not the technology, but economics. It is simply too costly to realize the minimum production time.¹⁶⁹

4.1.3 Value Creation

Still within the industry perspective, the third part of the *Concept of Value* is Value Creation. According to *Porter's* model of Competitive Advantage, higher profit can be achieved by creating more value based on two key strategies: Cost-leadership and differentiation.¹⁷⁰

Value Creation is regarded as the modern challenge where logistics should achieve customer satisfaction at the lowest total cost.¹⁷¹

From the internal company's perspective, value is based on costs which are measured and

¹⁶⁶ See *Cooper, R./Slagmulder, R.*, Supply Chain Development, 1999, p.61

¹⁶⁷ See *Clark, L. J.*, Value Analysis, 2000, p.587

¹⁶⁸ See *Harrison A. van Hoek, R.*, Logistics Management, 2002, p.115

¹⁶⁹ See *Bowersox, D. J./Closs, D. J./Cooper, M. B.*, Supply Chain, 2002, pp. 34-35

¹⁷⁰ See *Porter, M.*, Competitive Advantage, 1985, p.3

¹⁷¹ See *Bowersox, D. J./Closs, D. J./Cooper, M. B.*, Supply Chain, 2002, p.34

classified by the company's account department. However, it is important to consider value and its concepts from the customer's point of view. From the shareholder's perspective, investing in a company's share is the best alternative of his investment at that moment.

In other words, shareholder value is created when the shareholder gets a better return on investment by buying shares from a particular business instead from its competitors. Value is therefore greatest where the return on investment is highest.¹⁷²

Today it is a common practice to evaluate "what is the company worth?" by looking at the shareholder value. The amount of individual shareholders and the shareholder demands (especially among institutional shareholders like banks) have increased tremendously which leads to the fact that their expectations heavily influence decisions on Value Creation.¹⁷³

Two commonly used ways of measuring shareholder value are "Return on Investment" (ROI) and "Economic Value Added" (EVA).

ROI is measured as profit before interest and tax as a percentage of capital employed ($ROI = \text{Profit} / \text{Capital employed}$). EVA shows a more precise picture of the company's performance because it considers the perceived risk of the investment and the opportunity cost of the investor's capital. Both together produce the "true cost of capital employed" and, subtracted from ROI, leads to EVA ($EVA = ROI - \text{True cost of capital employed}$). In essence, EVA balances ROI with the true cost of financing that capital.¹⁷⁴

From the shareholder's perspective, EVA has become an increasing popular indicator for financial performance because it monitors the level of value created by a firm and allows shareholders to determine whether management is creating or destroying value.¹⁷⁵

From the company's management perspective, EVA is an important instrument that helps the strategic and operational management to make decisions, but it represents only one financial measurement among many performance indicators. Therefore, EVA has to be embedded into a balanced set of measures that provide a total framework of performance.¹⁷⁶

The balanced scorecard approach can be one answer to the boosting shareholder value and will be discussed in chapter five.

¹⁷² See Harrison, A./van Hoek, R., Logistics Management, 2002, p.51

¹⁷³ See Brewer, A. M., Value, 2001, p.130

¹⁷⁴ See Harrison, A./van Hoek, R., Logistics Management, 2002, pp. 52-56

¹⁷⁵ See Bowersox, D. J./Closs, D J./Cooper, M. B., Supply Chain, 2002, p.594

¹⁷⁶ See Brewer, A. M., Value, 2001, pp.130-131

4.2 Customer Value

Value Creation can be achieved by either driving down overall costs or by adding value for the customer. *Customer Value* is defined as “the way the customer perceives the entire company’s offerings, including products, services, and other intangibles”¹⁷⁷ such as skilled, motivated employees and customer information systems.

The “Customer Value Proposition” describes how these intangible assets become transformed into tangible outcomes such as revenues from new products and services.¹⁷⁸

The goal of Customer Value Proposition is to create loyalty and satisfaction for the customer through providing the customer with the company’s products and services.¹⁷⁹

Robert Simons goes further into detail and describes the *attributes* of the company’s products and services that are: “Price, product features, quality, availability, image, buying experience, and after-sales warranty and services”.¹⁸⁰

According to *Bowersox/Closs/Cooper* customers have at least three perspectives of value.

The traditional perspective of value is *economic value* build on the principles of economy of scale with the main focus on the efficiency of a product or service to reach high quality at a low price. A second perspective is *market value* build on the principles of economy of scope with the aim to present an attractive assortment of products and services at the right time and place. The success of a business also depends upon a third perspective of value referred to as *relevancy*. It involves the customization of value-adding services and depends on whether a company offers the right products and services, as reflected by market value, at the right price, as reflected by economic value, in a modified way that makes a real difference to the customer. In summary, relevancy value involves customization, diversification and positioning of products and services. The simultaneous achievement of all three types of value is known as the *integrative management value proposition* because it requires total integration of the overall business processes.¹⁸¹

¹⁷⁷ *Simchi-Levi, D./Kaminsky, P./Simchi-Levi, E.*, Supply Chain, 2000, p.200

¹⁷⁸ See *Kaplan, R. S./Norton, D. P.*, The Strategy, 2001, p.11

¹⁷⁹ See *Kaplan, R. S./Norton, D. P.*, The Balanced Scorecard, 1996, p.73

¹⁸⁰ *Simons, R.*, Performance Measurement, 2000, p.172

¹⁸¹ See *Bowersox, D. J./Closs, D. J./Cooper, M. B.*, Supply Chain, 2002, p.161

Market value represents the highest, most aggregate, measure of Value Creation because it represents the price at which a share is traded on the open market by their owners.¹⁸²

In the context of manufacturing and assembling a car, *relevancy* is achieved by integrating a special component like a navigation-system into the car. This is done explicitly on the customer's desire and will increase the functionality of the car.

The *market value* can be increased when a car-manufacturer offers a selected variety of models which covers the actual market demand. *Volkswagen* does this by offering a range of cars from small ones like the "Polo" up to big ones like the "Touareg".

Economic value is created by making the products and services more efficient. In connection with the automotive industry, there is a great variety of actions which can increase efficiency, for example the reduction of purchasing- and production costs through eliminating non-value-adding processes such as waiting time or double handling.

¹⁸² See *Simons, R.*, Performance Measurement, 2000, p.175

5. Performance Measurement

To ensure that performance goals and objectives are achieved, the management must design measurements which can be either financial or non-financial.

The term “Performance Measurement” refers to techniques for distinguishing various levels of a business organization’s performance. Typically, these techniques focus on a particular aspect of performance, such as quality or customer satisfaction, and are for example qualitative or quantitative; absolute or relative. Some aspects of supply chain performance like the valuation of services are hard to quantify, making it difficult to establish a common performance standard and standards for comparison.¹⁸³

However, the precise knowledge about the productivity of services is the basis for identifying deficits. Therefore it must be the aim to develop new ways and instruments for a Performance Measurement to gain structural, standardized procedures and to contribute more to an integrated and collaborative network-perspective approach.¹⁸⁴

Traditionally systems of indicators have been based on financial data received from the cost accounting, simply because they always have been widely available.

These performance systems have a narrow- and single dimensional focus because they are not always measuring and optimizing intra-firm and inter-firm performance.¹⁸⁵

Financial indicators do not provide answers to critical questions concerning an effective and efficient SCM as they measure events of the past, not the investment in the capabilities that provide value for the future.¹⁸⁶ This problem can be overcome if a company adopts a *balanced set of measures* which considers more appropriate (non-financial) measures of supply chain performance. Customer orientation, the integration of organizational units, and the coordination of these units are examples for non-financial indicators which give a good description of the as-is situation of the process to be considered.¹⁸⁷

¹⁸³ See Lambert, D. M./Stock, J. R./Ellram, L. M., Logistics Management, 1998, p.528

¹⁸⁴ See Darkow, I.-L./Richter, M., Supply Chain Controlling, 2004, p.120

¹⁸⁵ See Ackermann, I., The Balanced Scorecard, 2002, p.4

¹⁸⁶ See Kaplan, R. S./Norton, D. P., The Balanced Scorecard, 1996, p.18

¹⁸⁷ See Meyer, H. et al., Supply Chain Analysis, 2000, p.29

The advantage of non-financial measures is that they do not need necessarily cost allocation for their calculation. This makes it easier to quantify them. Besides, they give a more precise picture of the company's business processes as they turn attention to physical processes more directly. The primary application of non-financial indicators is in *operational controlling*.¹⁸⁸

“As a general rule, *effective* measures should have the following characteristics.

- simple to understand;
- no more than 10 in total number;
- representative of a significant causal relationship;
- have an associated target;
- capable of being shared across the supply chain.”¹⁸⁹

In this chapter, I will have a closer look onto two measurement systems. First the *Balanced Scorecard* (BSC) as an appropriate instrument for setting common performance standards and secondly the *Supply-Chain-Operations-Reference* (SCOR)-model for being able to use common performance standards for benchmarking with competitors.

5.1 The Balanced Scorecard

The challenge of today's management is to balance the diverse interests of different groups of a company's stakeholders such as shareholders, employees, customers, suppliers, the local community and government, and other parties involved.

In recent years, the Balanced Scorecard developed by *Robert Kaplan* and *David Norton* has created enormous interest as it supports a company's overall performance across a whole range of short- and long-term objectives.¹⁹⁰

The idea behind the Balanced Scorecard is that the management is provided with a number of *key performance indicators* (KPI's) – most of them probably non-financial measures – that will give guidance by meeting the company's strategic goals.¹⁹¹

¹⁸⁸ See *Meyer, H. et al.*, Supply Chain Analysis, 2000, p.32

¹⁸⁹ *Harrison, A./van Hoek, R.*, Logistics Management, 2002, p.213

¹⁹⁰ See *Miller, T.*, Hierarchical Planning, 2002, p.224

¹⁹¹ See *Christopher, M.*, Logistics, 1998, p.123

This is done by using quantitative, but non-financial measures such as cycle time, market share, innovation, and competencies which allow the value-creating processes to be described and measured.¹⁹²

The intention of implementing the Balanced Scorecard is that the management can see where critical areas of the business exist which must be eliminated in order to achieve the company's goals.

5.1.1 The Balanced Scorecard by Kaplan and Norton

At present, the probably best known Performance Measurement framework is the Balanced Scorecard developed by *Kaplan* and *Norton* in 1992.¹⁹³

According to these two authors "the Balanced Scorecard translates an organization's mission and strategy into a comprehensive set of performance measures that provides a framework for strategic measurement and management systems".¹⁹⁴

It is based on the idea that managers have to evaluate their business from at least four major perspectives: *Financial* perspective, *customer* perspective, *internal business process* perspective, and *learning and growth* perspective. In each perspective, *objectives*, *measures*, *targets*, and *initiatives* are described.¹⁹⁵

The Balanced Scorecard supports the management in its approach to gain competitive success which depends on the realization of the company's vision and strategy.

The concept seems to be a valuable basis for describing, communicating, and evaluating strategies and it helps the management and the employees to achieve a common goal.

Kaplan and *Norton* translated the strategy into the logical architecture of a *strategy map* which is the basis for designing a Balanced Scorecard. The strategy map and its corresponding BSC measurement program provide a tool to describe how shareholder value is created from intangible assets.¹⁹⁶

¹⁹² See *Kaplan, R. S. / Norton D. P.*, *The Strategy*, 2001, p.11

¹⁹³ See *Hieber, R.*, *Supply Chain Management*, 2002, p.85

¹⁹⁴ *Kaplan, R. S./Norton, D. P.*, *The Balanced Scorecard*, 1996, p.2

¹⁹⁵ See *Kaplan, R. S./Norton, D. P.*, *The Balanced Scorecard*, 1996, pp. 8-9

¹⁹⁶ See *Kaplan, R. S./Norton, D. P.*, *The Strategy*, 2001, p.10

The aim of the Balanced Scorecard is not to “value” an organization’s intangible assets but to measure these assets and translate them into tangible customer- and financial outcomes, using units other than currency.¹⁹⁷

“Furthermore, the scorecard tries to minimize information overload and information shortage by focusing on a handful of indicators that are most critical for describing the performance of a company.”¹⁹⁸

According to *Kaplan and Norton*, the Balanced Scorecard is not a controlling system for the tactical or operational management of business processes. Instead, it should be used as a communication, informing, and learning system and should support the strategic management.¹⁹⁹

The following figure shows a Balanced Scorecard developed by *Rockwater*, a global engineering and construction company, specialized on underwater-equipment.²⁰⁰

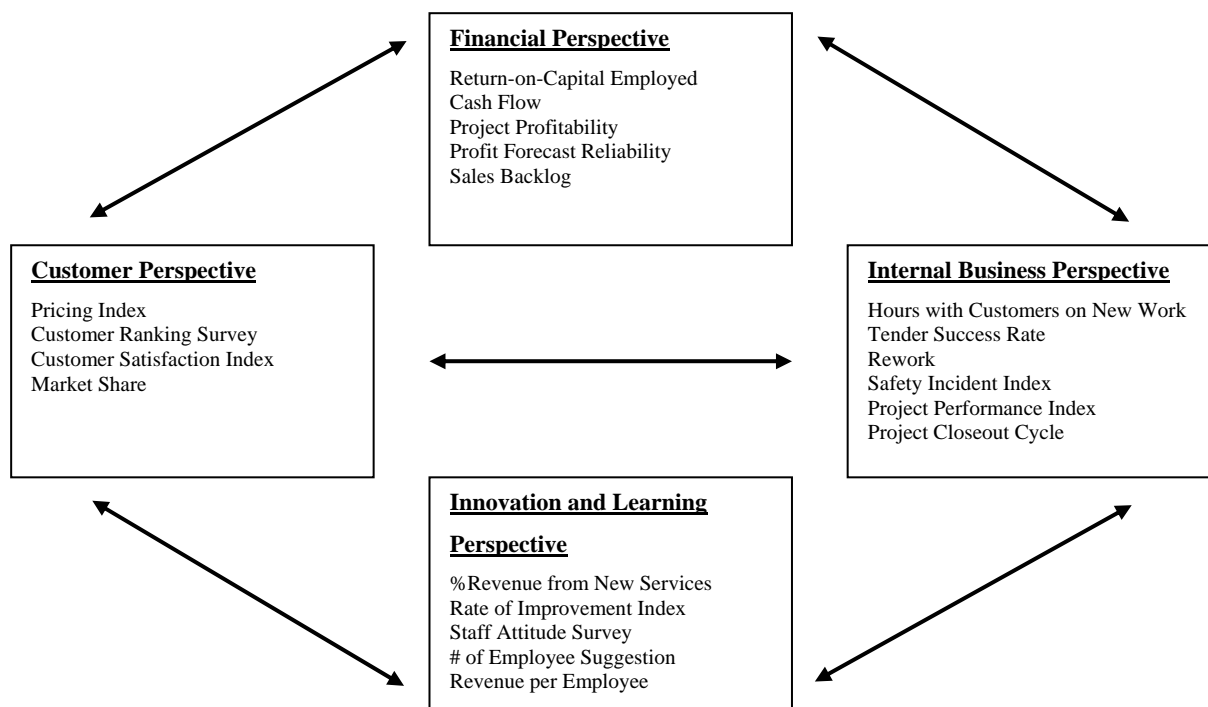


Figure 14: Rockwater`s Balanced Scorecard

Source: See *Kaplan, R. S./Norton, D. P.*, *The Balanced Scorecard*, 1993, p.135

¹⁹⁷ See *Kaplan, R. S./Norton, D. P.*, *The Strategy*, 2001, pp. 67-69

¹⁹⁸ *Hieber, R.*, *Supply Chain Management*, 2002, p.87

¹⁹⁹ See *Kaplan, R. S./Norton, D. P.*, *The Balanced Scorecard*, 1996, p.25

²⁰⁰ See *Kaplan, R. S./Norton, D. P.*, *The Balanced Scorecard*, 1993, p.135

In the financial perspective, performance indicators like ROI or EVA show whether a company's strategy, implementation, and execution are contributions to bottom-line improvement. These indicators should give an answer on how the firm appears to its shareholders. They focus on the objectives and measures in all the other scorecard's perspectives which are linked to a cause-and-effect relationship.

In the customer perspective, managers identify customer- and market segments in which the business unit will compete and identify indicators of these business unit's performances, e.g. customer satisfaction and acquisition or the market share. It enables a company to identify and measure, explicitly, the value propositions it will forward to the customers. This perspective should answer the question of how the customer views a firm.

In the internal business process perspective, the organization identifies the critical internal business processes in which the organization must excel to satisfy the customer. These processes are e.g. cost and quality, response time, and new product introduction.

Here, the question arise what business processes the firm must improve and exceed at.

Finally, the fourth perspective, learning and growth, identifies the infrastructure that the organization must build to create long-term growth and improvement e.g. by employee satisfaction or IT-system availability. The question in this perspective is whether a firm can continue to learn, improve, and thereby create value. Objectives in this perspective are responsible for the success of the first three scorecard perspectives.²⁰¹

There is no absolute 'right' set of performance measurements that every firm should employ because they depend strongly on the market a company is positioned in and on the strength of this position.²⁰²

Kaplan and *Norton* have observed two other scorecard types frequently used in practice: the Stakeholder or Constituent Scorecard and the Key Performance Indicator Scorecard. They have come to the conclusion that their strategy-focused Balanced Scorecard is the only scorecard that can create a 'Strategy-Focused Organization'.²⁰³

²⁰¹ See *Kaplan, R. S./Norton, D. P.*, The Balanced Scorecard, 1996, pp. 24-29

²⁰² See *Miller, T.*, Hierarchical Planning, 2002, p.224

²⁰³ See *Kaplan, R. S./Norton, D. P.*, The Strategy, 2001, pp. 102-104

5.1.2 Integrating the Balanced Scorecard into Supply Chain Management

A company's performance is heavily influenced by effectiveness and efficiency of its supply chain. The opinion is wide spread whether the BSC-system can be used to ensure an entirely network controlling approach.²⁰⁴

Although the BSC is highly integrated in the business practice, only a few authors are concerned about an adjustment of the BSC as a controlling-instrument for the supply chain.²⁰⁵

As already mentioned, *Kaplan* and *Norton* did not regard the BSC as a controlling instrument. The BSC is designed for individual enterprise performance measures and therefore has to be modified for an application in the context of SCM. It needs to incorporate inter-enterprise performance measures for an overall supply chain and it needs a stronger emphasis on non-financial measures.²⁰⁶

First thoughts about the conceptual linkage between the supply chain framework and the Balanced Scorecard framework came from the American authors *Peter Brewer* and *Thomas Speh* and the German speaking author *Hartmut Werner*. They took over the four dimensions of *Kaplan and Norton's* Balanced Scorecard and just added some aspects of supply chain to it without changing the structure according to inter-company wide cooperation's.²⁰⁷

Brewer and *Speh* took their elements, proposed for a supply chain framework, into consideration and integrated the two aspects of "Supply Chain Improvement" and "Supply Chain Goals" into the traditional Balanced Scorecard.²⁰⁸ They differentiated the measurements into non-integrated and integrated ones. The objective of non-integrated measures is to find inter- and intra-company deficits. The objective of the integrated ones is to show the success of the whole supply chain.²⁰⁹

²⁰⁴ See *Kaczmarek, M./Stüllenberg, F.*, Decision Support, 2002, p.286

²⁰⁵ See *Weber, J.*, Supply Chain Controlling, 2002, pp. 222-223

²⁰⁶ See *Ackermann, I.*, The Balanced Scorecard, 2002, p.12

²⁰⁷ See *Weber, J.*, Supply Chain Controlling, 2002, pp. 222-223

²⁰⁸ See *Brewer, T./Speh, T.*, Using the Balanced Scorecard, 2000, p.85

²⁰⁹ See *Zimmermann, K.*, Balanced Scorecard, 2003, pp. 115-116

Werner classified the various different concepts of Supply Chain Management and put them in relation to the traditional BSC. For example, the concept of Continuous Replenishment has been put into relation to the Customer Perspective.²¹⁰ Therefore, the suggested Balanced Scorecard is an instrument for the Supply Chain Management of the companies involved; it is not an instrument for measuring supply chains.²¹¹

Some authors like *Wolfgang Stölzle* suggest a structural modification by *integrating the suppliers* as a fifth perspective into the BSC framework.

The objectives are to consider the advanced services of the suppliers within the supply chain in order to show separately all activities from the manufacturer's suppliers to the end-customers and reversed.²¹²

An integration of the supplier's perspective into the BSC should provide the company with an effective stakeholder management which is able to separately regard the interests of upstream and downstream stakeholder.²¹³

According to *Stölzle/Heusler/Karren* the main problem for supply chain controlling are *dynamic, complexity* and *transparency* and therefore a higher demand of coordination and control is necessary. These problems can much better be resolved by installing a supplier perspective, because:

- *Dynamic* environmental changes in the supply chain can faster be sent upstream, and
- *Complexity* and *low transparency* can be attenuated by separately visualizing the cause-and-effect relationships.²¹⁴

The common organizational separation of purchasing and sales can better be displayed in the Balanced Scorecard with the corresponding supplier and customer perspectives.

An approach of a value-oriented BSC based on an "Innovation Strategy" has been developed by the two business management-scientists *Jochen Pampel* und *Alexander Sasse*. The two

²¹⁰ See *Werner, H.*, Die Balanced Scorecard, 2000, p.9

²¹¹ See *Zimmermann, K.*, Balanced Scorecard, 2003, p.115

²¹² See *Weber, J.*, Supply Chain Controlling, 2002, pp. 222-223

²¹³ See *Ackermann, I.*, The Balanced Scorecard, 2002, pp.12-13

²¹⁴ See *Stölzle, W./Heusler, K. F./Karren, M.*, Supply Chain BSC, 2001, p.81

authors suggest to modify the commonly used structure of the BSC by *Kaplan and Norton* and to differentiate between the following perspectives: *Value* perspective, *customer* perspective, *process* perspective, and *potential* perspective. The objective of the value-based BSC is the identification of a company's KPI's which can be planned and controlled.²¹⁵

The KPI's shown in figure 15 have been identified as being especially significant for implementing an innovation-strategy. As well as in the traditional BSC, four perspectives are put into an interdependent relationship to each other. The three non-financial perspectives are connected to the value perspective. The main objective in the value perspective is the Shareholder Value.

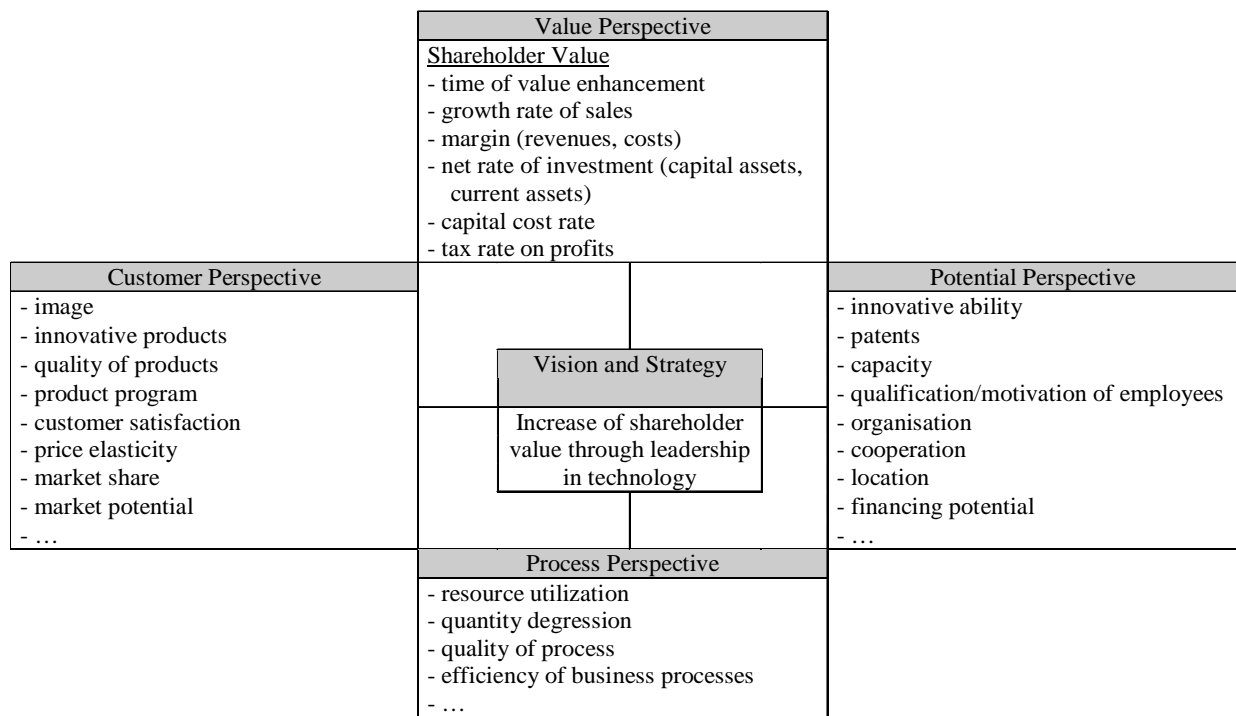


Figure 15: A Value-Based Balanced Scorecard

Source: See Pampel, R./Sasse, A., Value-based BSC, 2001, p.77

In the following, two examples of introducing the Balanced Scorecard in the automotive industry are given by *General Motors* and by *Chrysler Cooperation*.

²¹⁵ See Pampel, J. R./Sasse, A., Value-based BSC, 2001, p.76

The Balanced Scorecard was introduced to *General Motors* (GM) in its` European Information Technology (IT)-department, a shared-service function that had a good reputation in changing processes and adapting other systems very quickly. The IT-project team initialized its first Balanced Scorecard with the focus on their business unit`s strategies. After a first success was realized, the team was then asked to pass on their knowledge about the BSC-initialization towards all eight *General Motors* business units and towards eleven functional units in Europe. The IT-team supported the new project teams to choose the right measures. In order to ensure that the strategic and not the operational objectives were considered, they taught the project teams about cause-and-effect linkages. By the end of 1998, the BSC had been developed for most of the functions and business units in Europe and the management system based on the scorecard was operating. The European IT-team was then asked to assist in developing and deploying scorecards worldwide, starting with the IT-group in North-America migrating upwards to GM`s North America operations. In 1999, plans were made to introduce the scorecard to the business-units in Latin America and Asia/Pacific. The implementation of the BSC in the European shared-service department has actually lead to a corporate worldwide implementation.²¹⁶

At *Chrysler Cooperation*, an `Internal Balanced Scorecard` was introduced at their logistics organization in 1995 with the aim to primary focus on those objectives and activities that generate more customer value. The process of defining the right measurements was supported by so called `Scorecard Classes` which provided a general instruction for the user how to develop and implement the Balanced Scorecard. The performance measurement-system was introduced at three different manufacturing-sites of *Chrysler Cooperation*. By putting them into practice, concrete experiences could have been extracted from these three sites. The aim was to search for system`s failures in order to improve further implementations in other sites when necessary. Especially for the consolidation-process between the logistics organizations of *Daimler Benz AG* and *Chrysler Cooperation* in November 1998, it was necessary to develop standardized methods for an effective Performance Measurement.²¹⁷

²¹⁶ See Kaplan, R. S./Norton, D. P., *The Strategy*, 2001, pp. 340-341

²¹⁷ See Häse, S., *Daimler-Chrysler*, 2002, pp. 251-252

5.2 The Supply Chain Operations Reference (SCOR)-Model

The growing pressure on globally competing companies has led to a new emphasis on not just measuring performance of single entities, but rather on how a company performs relative to their competitors, and beyond that to ‘best-practice’.²¹⁸

“*Best Practice* is a recognized best management method and/or application for designing and performing a process.”²¹⁹

In order to benchmark against other organizations, a cross-industry framework, the SCOR-model, has been developed and endorsed by the *Supply Chain Council* (SCC).

The SCC was founded in 1996 and is a non-profit trade association of about 1000 cooperate members world-wide, with the aim to improve the supply chain efficiency of its practitioner’s members. Since the module’s introduction in 1996, it has been revised eight times up to the current version of 6.1 and is used as a common model for evaluating, positioning, and implementing supply chain applications.²²⁰

The reference-model is the most advanced tool in the area of supply chain performance measurement and provides a general documentation of *best practices* within a special (business) domain. Unlike optimising models, the SCOR-model does not rely on any mathematical formal description of a supply chain and does not refer to optimal or heuristic methods for solving a problem. Instead, a general description of supply chains is given by a terminology of common business practices. The SCC has developed a standard glossary of terms, management processes and common *key performance indicators*, named *metrics*. By providing *best practices*, companies are able to benchmarking against the standards of best competitors who are recognized as leaders.²²¹

Ballou gives a comprised description of the SCOR-model that “provides a way of defining supply chain activities in a standardized format, analysing the supply chain inter-organizationally at the product level, and comparing performance with statistics derived from the council’s membership companies”²²².

²¹⁸ See *Christopher, M.*, Logistics, 1998, p.103

²¹⁹ *O’Dell, C./Grayson, J. C.*, Best Practice, 1998, p.167

²²⁰ See *Supply Chain Council*, Homepage, 2004, www.supply-chain.org

²²¹ See *Meyer, H./Rhode, J./Stadtler, H.*, Basics, 2002, p.54

²²² *Ballou, R. H.*, Business Logistics, 2004, p.753

The standard processes are divided in four hierarchical levels from top to down, shown in figure 17. The first three levels are supported by SCOR; the fourth level is company specific.

Level 1 defines the scope and content for the SCOR model and covers the key supply chain activities from identifying customer demand to delivering the product and collecting the cash. At this stage, the supply chain is viewed in terms of the overlapping management processes *source, make, deliver, and returns*. An integrated *planning* framework coordinates the four elementary processes. The SCOR-model's level 1 is illustrated in the next figure.²²³

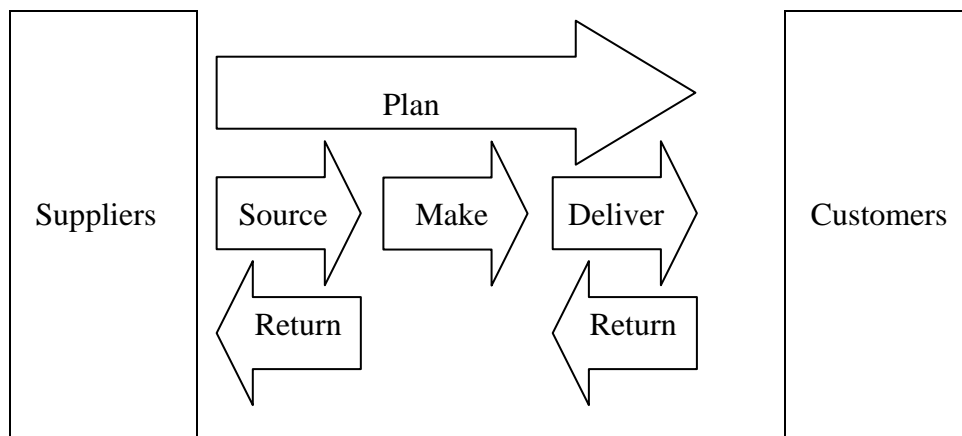


Figure 16: The SCOR-Model's Level 1 (Version 5.0)

Source: See *Supply-Chain-Council*, SCOR, 2002, p.9

Plan activities balance demand with its supply side and provide integration between activities and organisations, e.g. long-term capacity and resource planning.

Source activities are associated with acquiring raw materials, components and modules and connect organisations with their suppliers, e.g. vendor certification and vendor contracting.

Make activities transform raw materials and components into finished goods.

Deliver activities comprise the order and warehouse processes and delivery of finished goods.

Return activities origin when raw materials or components are returned to suppliers (source return) or when finished goods are returned from customers (delivery return).²²⁴

²²³ See Hieber, R., Supply Chain Management, 2002, p.48

²²⁴ See Ballou, R. H., Business Logistics, 2004, p.753

At **level 2**, the five management processes are divided into 26 core process categories²²⁵ that are possible components of a supply chain. At **level 3**, the process categories are decomposed into process elements – the supply chain is tuned. At **level 4**, each company has to define their own specific management practices to put improvements into play.²²⁶

For the above listed management processes of SCOR-model’s first level, the SCC defined five categories, called the ‘SCOR Performance Attributes’. These attributes are divided into two groups. The “customer-facing”-group includes *reliability*, *responsiveness*, and *flexibility*; the “internal-facing”-group includes the categories *costs* and *assets*.²²⁷

The next figure shows the SCOR-model’s version 3.1²²⁸ as a hierarchical approach.

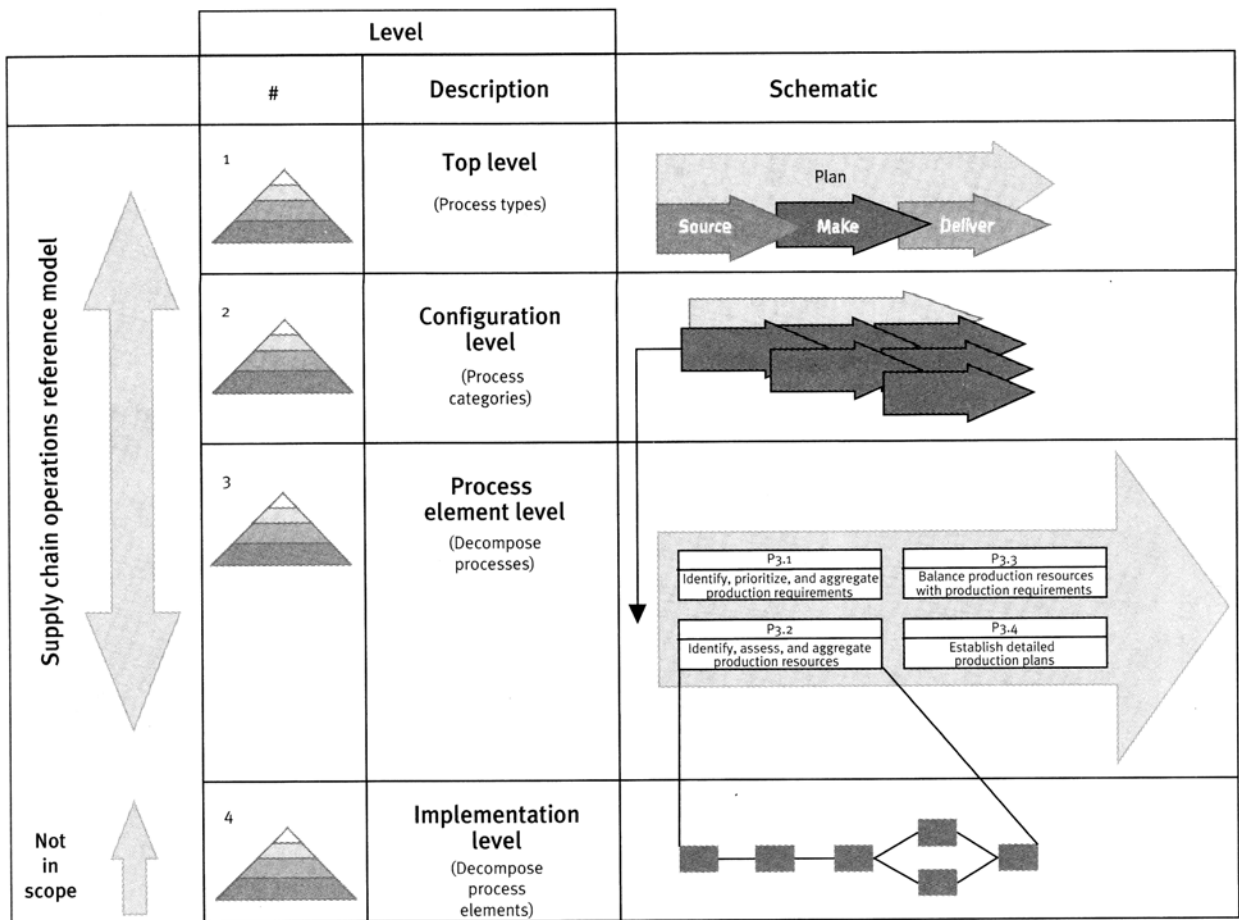


Figure 17: SCOR as a Hierarchical Approach

Source: See *Supply-Chain-Council*, SCOR, 2000, p.3

²²⁵ the number refers to the SCOR-model’s version 4.0

²²⁶ See *Harrison, A./van Hoek, R.*, Logistics Management, 2002, p.72

²²⁷ See *Zimmermann, K.*, Balanced Scorecard, 2003, p.105

²²⁸ in SCOR-model’s version 3.1, the returns had not been integrated

The SCOR-model encompasses the whole supply chain from the sub-suppliers to the final end-customer. Not included in the model are, for example the research department for new product development and design, marketing and sales, and some aspects of the after-sale service.²²⁹

The homepage of the *Supply Chain Council* is divided into a public and non-public sector. Only the Council's members have access to former, and the current version of the SCOR-model.

In order to include the SCOR-approach into this work, information about the model origins from various different authors which are mentioned in the footnotes.

The public site of the Council's homepage lists a variety of companies who made some case-studies on the SCOR-model or who introduced the SCOR-model in one or another way.

Among these companies, car-manufacturers like *Ford Motor Company* and *Daimler-Chrysler Cooperation* are found. Concerning *Ford*, the following information is published: "The North American Parts Supply & Logistics organization at Ford implemented a SCOR-based Supply Chain Monitoring & Alert System that has allowed the organization to reduce inventories, reduce overall-cycle time, and improve service levels to the 5200 Ford Authorized Dealers it supports."²³⁰ Examples of other automobile-manufacturer have not been made public, yet.

²²⁹ See Zimmermann, K, *Balanced Scorecard*, 2003, p.107

²³⁰ *Supply Chain Council*, SCOR, 2004, www.supply-chain.org

6. Conclusion

In this work an effort has been made to investigate the management of the automotive industry's value chain. This implies to look at the supply chain and its concepts because value is created by performing activities within the supply chain. In other words, the physical flow of products and information is the basis for considering the chain from a value driven point-of-view. The Value-Adding Processes and their impact on Customer Value represent the two building blocks of Value Chain Management.

When analysing what "Supply Chain Management" and "Value Chain Management" really means, it became clear that there is no common definition, but that management-scientists interpret the concepts and chains very differently. This made the investigation problematic as some authors use "value chain" and "supply chain" synonymous or interchangeably, depending on the perspective of their view.

It can be summarized, that the aspect of *value* has become a decisive factor in our business world. Meanwhile, for many public limited companies the overall aim is to improve their *shareholder value* - reached by an internal effort to cut costs and to make business processes more valuable. The value-based management with the aim to make a company more profitable to compete and survive on the global market is indispensable; stakeholders, like dismissed employees in high-wage countries such as Germany are the reversed side of the medal.

The examples in this work show that there has been great attempt to introduce new SCM-concepts in the automotive industry. Especially the approach to produce "built-to-order" cars has increased in recent years and will be further developed in future. Another development which plays a significant role in the automotive industry today, is the car-production based on "modularity". The "built-to-order" strategy represents the increasing customer-integration; the "modularity" strategy the supplier-integration.

What could not be ascertained is whether the introduction of the Performance Measurement-instruments like the *Balanced Scorecard* is successful on a long-term basis. There exists information about "how" the *Balanced Scorecard* is introduced in the car-manufacturers`

management, but little about the results of controlling them. It will perhaps take some more years to receive well-substantiated results.

Concerning the *SCOR-model*, it can be stated that many well-known and world-wide operating companies of all branches are members of the *Supply Chain Council*, but that information about a SCOR-approach is not made public.

Today, the competition in the automotive industry is dominated by the dynamic changes of the automobile-market referring to the changing customer's behaviour and the global sourcing from different suppliers world-wide. The only manufacturer who will keep its leading position is the one, who can bring new cars onto the market with highest flexibility and speed to satisfy the customer's wishes. The increasing competition among car-producers is leading to a concentration of only a few big "Original Equipment Manufacturers", who already took-over many smaller ones, as mentioned in the introducing chapter. On the supply-side, the development is similar, as the manufacturers are constantly reducing the number of their first-tier suppliers. Certainly, in the upward supply chain, value creation is not diminished but only passed on to sub-suppliers. A good cooperation between producer and supplier is what is most essential in today's automotive industry.

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Erklärung zur Diplomarbeit

Ich versichere, dass ich diese Diplomarbeit selbständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt habe.

Hamburg, den 08. November 2004

(Unterschrift)

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