4. Supply Chain Management

During the course of this paper, several concepts and definitions are repeatedly presented. Nevertheless, repetition in this context is necessary in order ensure consistent and intelligible structure of the respective sections.

Since 1960, the image for the logistics sector has drastically changed. Whereas the emphasis was initially placed on storage and transport optimisation, this emphasis shifted in the direction of business logistics in the 70s and 80s. Thanks to new developments in the IT sector and its associated new opportunities, the sector was ready to consider the supply chain as a whole.[26] The origins of supply chain management stem from the USA. In the 80s, the consulting sector adopted the outsourcing trend in order to reduce vertical integration.[27] This new trend solidified at the end of the 80s in the USA with the creation of theoretical principles. By contrast, supply chain management in Germany was only established in the mid-90s.[28] It was driven by globalisation, which demands greater differentiation between increasingly reduced delivery times, stricter adherence to deadlines and flawless deliveries.[29] The widely used expression "Supply chains are in a mutual competition struggle" is especially apt within this context, since individual companies are no

[26]Cf. Corsten und Gabriel, 2004, p. 6
[27]Cf. Gleich und Daxböck, 2014, p. 23
[28] Cf. Werner, 2013, p. 3
[29] Cf. Pointek, 2013, p. 5

longer in a position to supply the services that customers and the market demand on their own accord. Such demands are only achievable through a consolidation of companies and services.

4.1. Definition of Supply Chain Management

In theory, there are various definitions for the term „supply chain management". The definition of supply chain management is essentially "management of chain of supply". In the sense of this version of a supply chain, flows of goods, financial resources and information are managed. The following are definitions based on this theory:

According to Beckmann, supply chain management relates to planning, control and monitoring flows of finances, information and materials along the supply chain.[30]

Packowski describes supply chain management in the process industry as the amalgamation of all activities pertaining to design, planning, implementation, and monitoring for materials procurement, production, and distribution along the end-to-end value chain, including the managed flow of information.[31]

Possibly the most comprehensive and most succinct definition from today's perspective is derived from Essig, Hofmann and Stölzle. They define supply chain management as a cooperative coordination of flow of finance, information and materials in company networks by generating integrative, cross-functional

[30] Cf. Beckmann, 2004, p. 1
[31] Cf. Packowski, 2014, p. 5

management and implementation processes with the objective of achieving a competitive edge with end clients and thereby raising absolute profitability for the entire network.[32]

4.2. Differentiation of Supply Chain Management Terms

The variety and associated complexity regarding the conceptual distinction between different approaches to supply chain management has grown significantly in recent years. For example, terms that have emerged within this framework include value added chain, logistic chain, supply network, supply pipeline, value chain, value stream and demand chain.[33] Some of these terms have no real added value and simply undermine a more precise implementation. However, the perspective changes when dealing with relevant supply chain management concepts. These concepts will be subsequently outlined.

Purchasing is traditionally divided into an operational area and strategic area. Both areas are closely linked and are mutually supportive. While operational purchasing is primarily concerned with raising purchasing efficiency (doing things right), strategic purchasing focuses on raising purchasing effectiveness (doing the right things). Purchasing is often equated with the term "Supply

[32]Cf. Essig et al., 2013, p. 41
[33]Cf. Bauer, 2011, p. 9

Management". [34] Nonetheless, purchasing activities are always restricted to the focal company.

The term materials management is more broadly defined than that of purchasing as a rule and includes the handling of goods in an economic sense. Materials management covers a wide scope of operation, including inventory management, in-house transports and material tracking, as well as supplying manufacturers. Compared to supply chain management, it comprises only a portion of the internal chain and has no activity outside the organisation.

The primary purpose of logistics is to guarantee product availability, that is, the physical flow of material within the company as well as between organisations and their environment. In this regard, it clearly differentiates itself from supply chain management and uses logistics for the purpose of physical transport processing.

The value added chain comprises value added and value destroying influence factors, which are reflected in the company's performance. These influence factors can also pertain to the company's image or design, which are not in agreement with supply chain management. In contrast to the value added chain, supply chain management encompasses product availability and the removal or utilisation of products. These activities are jointly conducted with the flow of money and information.

[34]Cf. Werner, 2013, p. 16

A logistic chain targets the internal and external horizontal connection of company operations. This is a chain in the literal sense as opposed to a network relevant to supply chain management.

Demand chain management focuses almost exclusively on customers. Supplier attributes are therefore only peripherally affected. Consequently, demand chain management can be viewed as a component of supply chain management.

In terms of collaborative customer relationship management, consolidating stakeholders' knowledge as well as adjusting marketing activities occupies the foreground. In contrast to supply chain management, upstream supplier activities are not taken into consideration.

The counterpart to customer relationship management is represented by supplier relationship management. [35] It monitors improvement of incoming supply flows and their interrelationship and can also be considered a segment of supply chain management.[36]

Supply chain relationship management is primarily concerned with establishing trust, promoting communication, increasing transparency as well as enhancing coordination. It concerns a special type of relationship management within supply chain management.[37]

[35] Cf. Werner, 2013, p. 15-21
[36]Cf. Essig et al., 2013, p. 110-111
[37]Cf. Werner, 2013, p. 22

Out of all of the various concepts mentioned, some exhibit common traits with supply chain management, although none are as comprehensive. Some concepts are an integral component, while others are ascribed to supply chain management, for example, in order to complement them from a social perspective.

4.3. Development and Trends in Supply Chain Management

The sphere of supply chain management is subject to ongoing adjustment. The catalyst is an increasingly rapid market shift, trigged by the continuous growth in globalisation. This raises ongoing demands on the supply chain and precipitates increasing complexity. Suffice it to say, it is obvious that this development engenders opportunities as well as dangers. This development also means that in the future only agile, flexible and forward-looking companies will become successful and be able to compete in the market for the long term.

Trends specified in the science of supply chain management have no claim to comprehensiveness, yet ought to indicate that the development in supply chain management is progressing rapidly and purposefully. It is therefore the endeavour of supply chain management to keep pace with the growing complexity and speed. There will be a closer examination of new trends that were developed for the various demands on a supply chain.

4.3.1. Sustainable Supply Chain Management (SSCM)

The following explanation can be applied in order to aptly define sustainable supply chain management: it is the integration of environmental and social aspects in traditional supply chain management.[38] The reasons to dispute sustainable supply chain management are manifold. The ever-increasing demand for flexibility in the supply chain prompts new forms of modern management, examples of which include Just in Time, Lean Production or ECR (Efficient Consumer Response). These innovative management styles helped companies raise their competitive edge in the global market. On the other hand, focus was increasingly placed on the company's production. Issues that took centre stage included: where can we produce most economically, how do we engineer our production to generate the best possible customer value. Although logistic costs played a certain role, it was not a decisive factor in light of present day freight prices. Conversely, growth in freight volumes has increased continuously. As a result, CO_2 emissions increased correspondingly. At this juncture, it was necessary to provide solutions in order not to jeopardise flexibility in the supply chain and sufficiently take sustainability into account. This is how sustainable supply chain management came into existence.[39] Integration of sustainability in a supply chain could be strategically designed in Figure 3 as follows.

[38]Cf. Harms und Klewitz in Bogaschewsky et al., 2013, p. 105
[39]Cf. Cetinkaya et al., 2011, p. 4-5

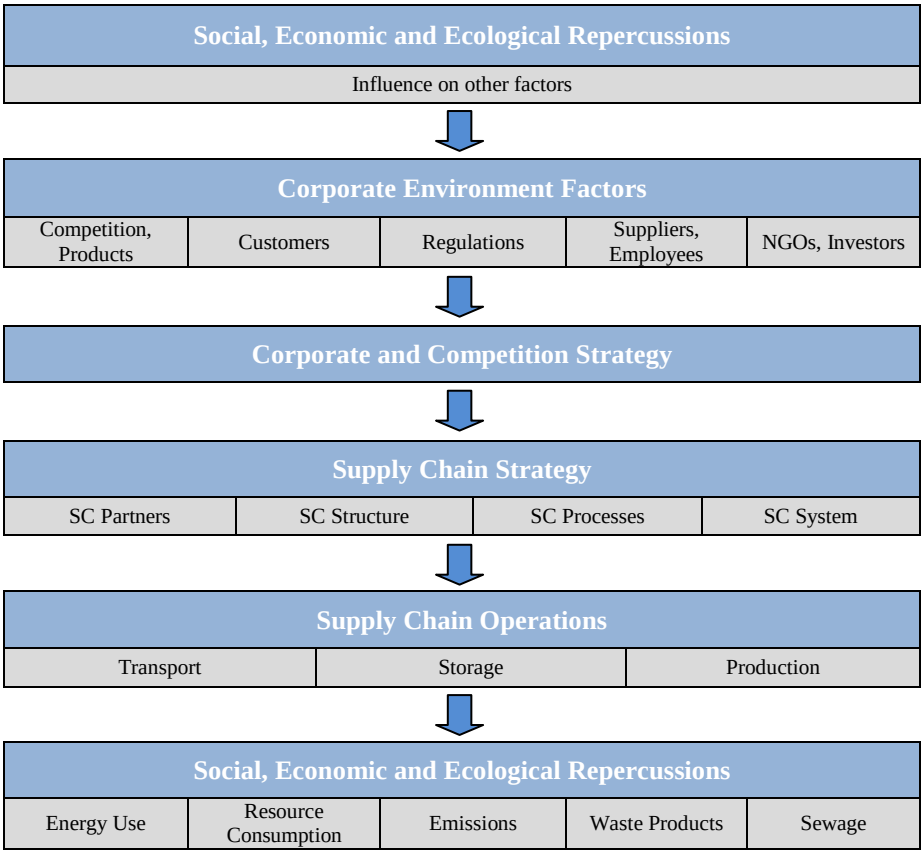

Figure3:Supplychainstrategyasabridgebetweencompetitive advantageandsustainability[40]

The process depicted begins and ends with social, economic and ecological repercussions. Ultimately, tangible measures that can be gauged and monitored remain at the forefront, which can subsequently be found in the feedback from Step 1.

[40] Source: Cetinkaya et al., 2011, p. 21

4.3.2. Supply Chain Event Management

Supply chain event management chiefly focuses on the ability of companies' vis-à-vis improving reaction time for short-term and unexpected developments (Advanced Planning and Scheduling Systems). This development also provides opportunities for logistics service providers who aim to expand their range of services. Some authors even entertain visions in which fourth party logistics providers (4PL) can be positioned in the range of the planning stage toward a channel master for the supply chain.[41] The basis for event recognition is the analysis and evaluation of status data. There are three types of status data to bring to the fore. Documented statuses include data from cargo manifests, delivery receipts, transportation damage reports, etc. The second group is formed by the observed statuses in the process operation, involving predominantly track and trace data. The last group assigns a name to the anticipated status in the process operation. In this instance, it does not concern the evaluation of received statuses, but rather the evaluation of statuses *not* received. For example, the data could indicate a potential late delivery. In this respect, it pertains to events that could prompt rash actions, to which one must react in order to proactively avert disaster. As a veritable decision support tool, an event management system can be understood when in the best-case scenario it reacts automatically to the occurrence of certain situations with proposals for action.[42]

[41] Cf. Beckmann, 2004, p. 146-147
[42] Cf. Beckmann, 2004, p. 150-152

4.3.3. Lean Supply Chain Planning

The springboard for developing lean supply chain planning involves current world market conditions and their characteristics. Packowski briefly describes this type of supply chain as VUCA World. VUCA stands for Volatility, Uncertainty, Complexity and Ambiguity.[43]

In present day planning concepts, volatility is intercepted solely by the security storage, which for the supply chain planner is regarded as inviolable. This procedure is strongly supported by ERP systems, although it leads to a deadlock, as far as the VUCA World is concerned. Last but not least, the procedure also has a negative repercussion on operational performance. In the lean supply planning approach, variability is controlled from two sides: production capacity on one side and inventory on the other. At this stage, the safety stock is actively incorporated into the planning process. Lean chain management includes the new planning paradigm for the end-to-end supply chain management in which the controls for variability, pre-parameterisation as well as synchronisation are grounded. Another component of LSCM is the transformation program, which comprises the organisational direction, performance measurement as well as add-on IT applications. Lean supply chain management improves customer service and raises supply chain agility by reducing the cycle time. Furthermore, LSCM collectively improves equipment performance with customised and clocked material flows, as synchronised by

[43]Cf. Packowski, 2014, p. xvii

customer demand. As a consequence, there is a noticeable reduction in working capital.[44]

4.3.4. Demand Sensing

Demand planning errors are staggeringly high for companies that manufacture consumer products. In fact, they amount to nearly 50%. This predicament is due to the manner of current planning methodology. Historical data is still used as the basis in attempting to plan for the future. In the bygone era when it concerned a demand variance of plus/minus 5%, this approach was certainly justified. However, in terms of the prevailing market conditions, this method is no longer equal to the task. New ideas are in demand, which could duly take this situation into account. This is the point at which demand sensing comes to fruition. In order to master this challenge and significantly reduce demand planning errors in the short term, access to current customer demand signals, orders, deliveries and other daily information within the supply chain is essential.

Typically, 80% of costs are associated with activities that take place within the next six months. This is where demand sensing comes into play. With a refined mathematical calculation over the six-week timeframe, the results are far more accurate. As a result, costs arising from demand planning errors can be greatly reduced.[45]

[44] Cf. Packowski, 2014, S. xxii-xxiii
[45] Cf. http://www.terratechnology.com/what-is-demand-sensing/ [surveyed on 29.03.2015]

4.4. Understanding the Supply Chain Management Concept

Supply chain management is, as previously outlined in Section 3, a relatively new approach. The term was first introduced in 1982 and is regarded as a segment of business administration even today. However, this designation is not without debate, since there is still no existing uniform nomenclature. There were certainly initial systematic attempts to develop supply chain management concepts which emerged in the 1990s. On the basis of existing supply chain management definitions at that time (a total of 50), Bechtel/Jayaram allocated these definitions into a so-called school of thought in 1997 and thus launched five supply chain schools of thought.[46] One such school is the Chain Awareness School and encompasses all supply chain management definitions, which designates supply chain as a chain that focuses on a continuous material flow of raw material up to the end customer. Another school of thought, the Integration School, is devoted to the redesign of companies to become virtual network structures, as well as the Future School of Supply Chain Demand, which signals a false concept comprehension.[47]

This enumeration partially reflects the definitions from the Supply Chain Schools of Thought. Be that as it may, the heterogeneous nature of the various explanations is evident. Therefore it is necessary to indicate the points that characterise the concept of the

[46]Cf. Tandler, 2013, p. 111
[47]Cf. Essig et al., 2013. p. 27-28

supply chain. Beckmann designates the following characteristics to this end:

- all processes along the entire supply chain are documented
- as an integrated system, it encompasses all parties concerned and logistic processes up to the end customer
- objectives of the supply chain include development, acquisition, production and distribution processes
- oversteps organisational boundaries
- coordination arises out of a continuous information system, accessible for all parties concerned
- the core objective is to establish customer value, arising from a positive relationship between costs and profit
- individual goals are achieved by means of the performance by the entire chain.[48]

The characteristics introduced concerning the concept of the supply chain do not correspond to any uniform structure. There are also designations from different levels of a corporate strategy, that is, different depths. Furthermore, some important points were obscured or only marginally considered. A greatly structured and comprehensive approach was developed by Essig, Hofmann and Stölzle. They created a catalogue of characteristics with seven characteristics that were derived from 41 various literary sources for the purposes of improved concept comprehension. This included flow, process, network, cooperation, objective, function and management orientation. These seven characteristics also form the

[48] Cf. Beckmann, 2004, p. 3

foundation for the preferred definitions of supply chain management in Section 4.1.[49]

4.4.1. Motives for implementing Supply Chain Management

Motives for implementing supply chain managements are attributed to many factors. One of the greatest triggers as of late is the rapid growth of globalisation and associated accompanying growth of "dynaxity", whereby dynaxity stands for dynamic and complexity. This impacts the need for increasingly shorter delivery times, tighter lead times as well as shorter model cycles. Moreover, products are becoming more complex, and product variety continues to grow.[50] Several business practises can be pointed out in detail that promote the development of supply chain management, such as companies that increasingly utilise the total cost of ownership approach to reduce costs (i.e. transaction costs) and to curtail maverick buying. Companies that are aggressively confronted with the impact of the bullwhip effect could avail from supply chain management. The competition environment within companies is vulnerable to increasingly rapid changes. Not to mention, customer demands are on the rise. Modern supply chain management is ideally equipped to handle this situation.[51]

[49] Cf. Essig et al., 2013, p. 30-40
[50] Cf. Beckmann, 2004, p. 5
[51] Cf. Werner, 2013, p. 36-50

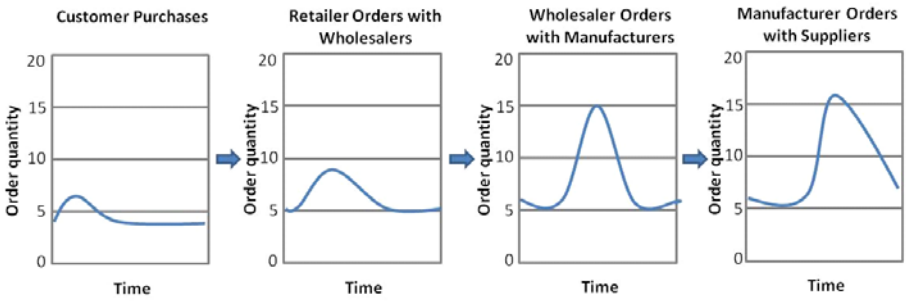

Figure4: Illustration of thebullwhip effect[52]

The figure impressively outlines the bullwhip effect. Slight consumer demand fluctuations could lead to increasingly greater fluctuations in demand at the various supply chain levels.

4.4.2. Objectives and Benefits

The primary objective is optimal supply chain alignment with customer demands. Customers ideally want the lowest possible costs, minimised risk and to simultaneously be able to focus on the core business.[53] Additional objectives include the ability to quickly adapt to market shifts, the guarantee of the security of supply and ultimately the avoidance of out of situations, the reduction of inventories and working capital, more efficient production control and capacity planning as well as shortened order lead times compared to competitors. [54] The benefits of supply chain management can be roughly divided into three categories: the

[52]Source: Essig et al., 2013, p. 7
[53] Cf. Blindzellner, 2011, p. 5
[54] Cf. Pointek, 2013, p. 7

market impact, internal impact as well as the supplier impact. Market impacts comprise the realisation of sustainable competitive advantages, heightened customer satisfaction, improved quality as well as accelerated innovation processes. Internal impacts provide transparency, increased warehouse operating efficiency and a reduced bullwhip effect, the opportunity for a made-to-order assembly and reduction in capital commitment. Lastly, supplier impacts facilitate the acquisition of new markets as well as save resources by means of streamlined procurement processes.[55]

4.4.3. SCM Frame of Reference

Essig, Hoffmann and Stölzle denote the frame of reference as a structured preconception of the supply chain management purview. It operates as a type of comprehensive overview that incorporates all functions and areas of operation. The seven criteria for the frame of reference are already explained in Section 4.4 and are arranged by frame of reference. These frames of reference are essentially arranged into five levels, the basis for which also comprises various approaches by different authors and have been developed sequentially for this model.[56]

[55]Cf. Beckmann, 2004, p. 12-15
[56]Cf. Essig et al., 2013, p. 41-45

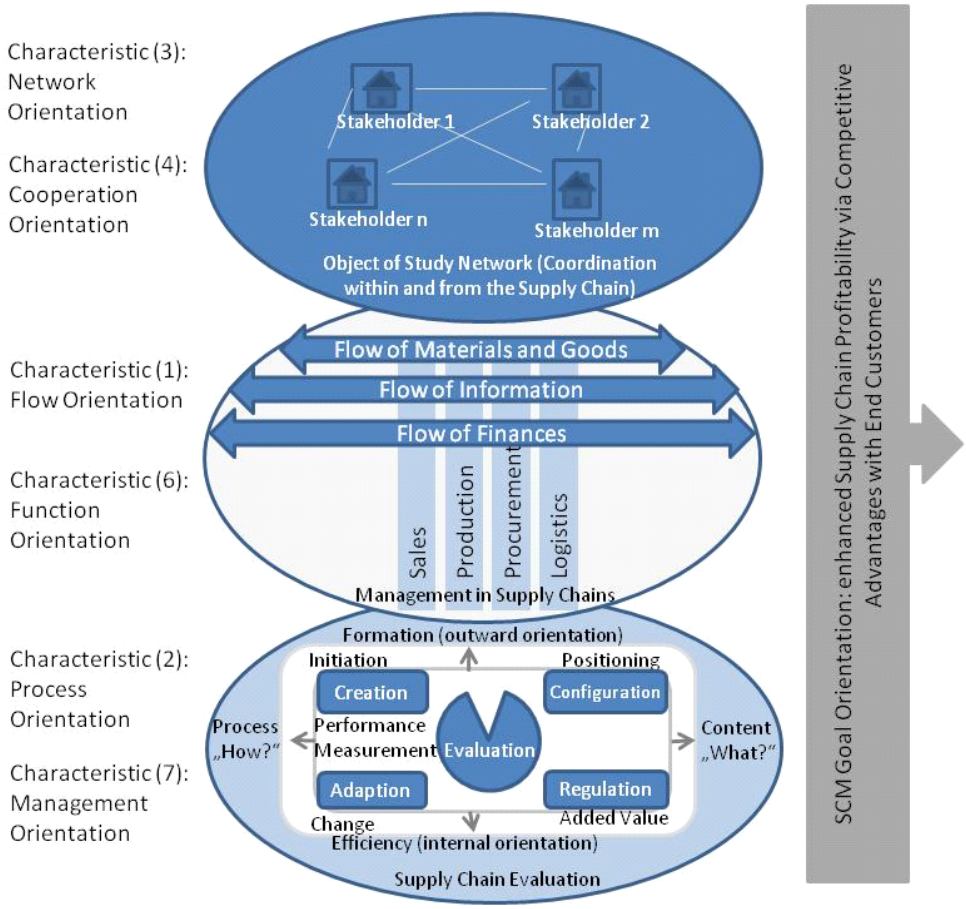

Figure 5: Supply chain management frame of reference[57]

The figure illustrates the fifth and final level of a development, which Essig, Hofmann and Stölzle compiled in their book, "Supply Chain Management". The development of the frame of reference grows more tangible with each level. This model is quite comprehensively designed and highlights the supply chain evaluation, starting from

[57]Source: Essig et al., 2013, p. 45

the bottom level. Level management for the supply change is featured at the centre. The internal configuration as well as the three corporate flows on this level consists of flow of materials and goods, flows of information and finances. The third and highest level is concerned with coordination in and from supply chains. At each stage, the corresponding criteria were also displayed. For example, the characteristic Process and Management Orientation is cited on the lowest level.

4.4.4. Potentials

Outcomes from the successful practical examples indicate an overall significant potential for supply chain management.

Author / Area of Improvement	Locker and Grosse-Ruyken[58]	Beckmann[59]
Inventory Reduction	50%	up to 60%
Increase in Delivery Reliability	40%	25 - 50%
Reduction in Overall Lead Time	27%	50%
Improvement in Inventory Turnover	Factor 2	
Out of Stock Reduction	9%	
Sales Increase	17%	up to 55%
Improvement in Prognosis Accuracy		25 - 80%

[58] Cf. Locker und Grosse-Ruyken, 2013, p. 1
[59] Cf. Beckmann, 2004, p. 15 and 17

Cost Reduction Potential Related to individual Supply Chain		3 - 25%
Profit Increase		up to 30%

Table 3: Comparison of supply chain management potentials[60]

According to the values shown in Table 3, potentials in supply chain managements vary greatly. If the area of improvement falls under the category Out of Stock Reduction, the value only indicates 9%. Conversely, if it appears in the Inventory Reduction category, the value is significantly higher at up to 60%. Depending on the type of Supply Chain used, even the potentials yield varying results.

4.4.5. Risks

In January 2012, the United States published its national strategy for global supply chain security. An important facet of this strategy constituted supply chain risk management. The report addresses the USA's competitive advantage, which is closely linked with managing risks associated with the physical structure of a supply chain.[61]

The topic of risks in supply chains is very important and is also taken into account by the different states. Grosse-Ruyken et. al. investigated 345 companies in 2012 for supply chain vulnerability. This investigation prompted the following ranking, which demonstrates the greatest triggers for vulnerability. Global sourcing

[60] Source: Own illustration
[61] Cf. National Strategy for global supply chain security, p. 1

(significance of 77%) took first place, followed by dependence on suppliers (72%), supplier concentration (68%), single sourcing (65%) and customer dependence (61%). [62] As a result, supply chain management can appreciate its great importance since considerable expectations concerning potential and competitive advantage are linked to it. The concept of supply chain management is certainly identified by a contingent dimension of a network and high level of complexity. These parameters pose the commensurate risk potential, which must be kept under control.[63] It is essential to distinguish whether the risk could emerge by implementing a supply chain management or within the scope of operation. Normative, strategic and operational aspects are differentiated for supply chain management implementation. Risk factors involved include a diverse corporate culture, diverging comprehension, lack of a common vision or lack of trust. Furthermore, a dissimilar purpose as well as emerging complications associated with the interface can also pose risks. In summary, it can be asserted that the key to implementing supply chain management can be manifested through the willingness and ability to cooperate.[64]

4.5. Critical Appraisal of Supply Chain Management

Supply chain management is one of the integral strategies that offer companies opportunities to increase yields and improve their competitive advantage. The competitive struggle is no longer

[62] Cf. Locker und Grosse-Ruyken, 2013, p. 182
[63] Cf. Beckmann, 2004, p. 17
[64] Cf. Beckmann, 2004, p. 17-18

restricted to rivalry among companies, but is also relevant to the entire existing supply network. Indeed there are also several points of criticism concerning supply chain management that provoke discussion. The complex nature of controlling supply chains is immense. Yet most companies operate in more than one supply chain. In most instances, it does not benefit the company to integrate all business partners within the supply chain since some partners are only sporadically present.[65] In many situations, it is not possible to incorporate network-wide planning and control through the focal company since this would otherwise threaten the breakdown of the market and competition. Nor is it feasible to even demand such a request if the proper authority is not in place. Moreover, there exists the need for basic precepts to which all parties concerned must adhere. Establishing precepts precludes opportunistic behaviour, thus manifesting absolute mutual trust. Information and communication technology also have great significance, which may be regarded as key factors. However, these technologies also strongly limit potential partners within a supply network, since they may not be in a position to establish an efficient IT infrastructure. Security risks, a common issue in the IT sector as a rule, must also be considered within this context. Types of associated risks include inadequate encryption technology or inadequate password management.[66] There are numerous obvious matters to resolve before opting to implement supply chain management.

[65] Cf. Stölzle Universität St. Gallen Präsentation, 2007, p. 16
[66]Cf. Brown, 2009, p. 41-43

4.6. Basic Types of Supply Chains

Supply chain design is a term often used in literature that predates types of supply chains. In this paper, the whole value network is specified and potential performance is determined. Supply chain design (strategic) forms the first level of implementation, followed by supply chain planning (tactical), by which the targeted application of performance potential is planned. The last level is represented by supply chain execution (operational). As the term already suggests, this involves the operational realisation of the performance program.[67] Since supply chain designs relevant to this paper were already outlined in detail in Section 3.2, the focus on the newest developments will be emphasised.

In previous years, there was a recognisable tendency for many mid-size companies to exhibit above-average growth. However, the associated difficulties could not be adequately resolved by the existing organisation. Consequently, an investigation was launched that elicited the formation of the supply chain. The investigation team defined a frame of reference tailored to a growth strategy for suitable supply chain design, taking the design fields of process, structure, collaboration and IT into consideration. Within this framework, the four various supply chain types could be defined. Lean supply chain corresponded to a market penetration strategy and international supply chain to a market development strategy, whereas the innovative supply chain found its application in the

[67]Cf. Brown, 2009, p. 44

context of a product development strategy as well as the hybrid supply chain for applications, for which a sharp distinction from the previously mentioned strategies is difficult.[68]

4.7. Exertion of Influence of SCM on Corporate Functions

It is difficult to create a clear influence on supply chain management based solely on the functions of the company, since the impact measures must be configured differently, depending on the choice of supply chain design (commensurate to customer demands). Examples cited for this purpose will include the various characteristics of a reactive and an efficient supply chain.

	Efficient Supply Chain	**Reactive Supply Chain**
Primary-Objective	Lowest possible costs	Fast reaction on demands
Product Design	Performance maximisation at a minimum of manufacturing costs	Creation of modularity for facilitating postponement
Price	Low margins	High margins
Manufacturing	Lower costs via high capacity	Creation of a flexible capacity
Inventory	Minimisation of stocks	Buffer stocks
Delivery Time	Reduction of delivery time without incurring costs	Reduction not contingent on rising costs

[68]Cf. Meiners und Buchholz in Bogaschewsky et al., 2014, p. 229-246

Suppliers	Selection according to costs and quality	Selection according to speed, flexibility, reliability and quality

Table 4: Comparison of reactive and efficient supply chains[69]

As is evident in Table 4, supply chain management has a continuous influence on the functions of purchasing, sales, marketing and production. It is indeed evident that its formation is very strongly controlled by the respectively predominant customer demands.

4.8. Supply Chain Finance

Supply chain finance is concerned with the interface of finances, purchasing and supply chain management. Its significance has sharply increased in recent years and this trend will continue to accelerate. Supply chain finance primarily affects the aspects of growing international trade, steadily increasing opportunities for electronic invoice processing, variances in national taxation as well as liquidity protection.[70]

4.8.1. Definition of Supply Chain Finance

Supply chain finance is concerned with reducing capital costs and optimising financing within the supply chain. The emphasis in supply chain finance is contingent on a more efficient organisation of

[69] Source: Chopra und Meindl, 2014, p. 58
[70] Cf. Locker und Grosse-Ruyken, 2013, p. 145-147

the cash conversion cycle as well as capital structure, financing fixed assets and working capital.[71]

4.8.2. Classification

Supply chain finance is an element of financial supply chain management. The interrelationship is visible in the illustration below.

Financial Supply Chain Management		
Supply Chain Finance	Financial Supply Management	Tax Supply Chain Management

Figure 6: Subdivisions of financial supply chain management[72]

The classification of financial supply chain management is a point of contention in technical literature. Additional terms such as supply finance, for example, are used. The figure above was developed as the basis for this paper.

4.8.3. Concept

Supply chain finance is concerned with options, particularly in the realm of working capital. In this regard, it has no great influence on EBIT, but is instead geared to shareholder value, that is, company value. It endeavours to optimise the relationship between customers,

[71] Cf. Metze, 2010, p. 32
[72] Source: Metze, 2010, S. 30-32 und Locker und Grosse-Ruyken, 2013, p. 148-149

suppliers and financial service providers through appropriate measures at all existing levels.[73]

The following concept matrix, designed by h&z Unternehmensberatung AG, effectively illustrates the variety of supply chain finance options.

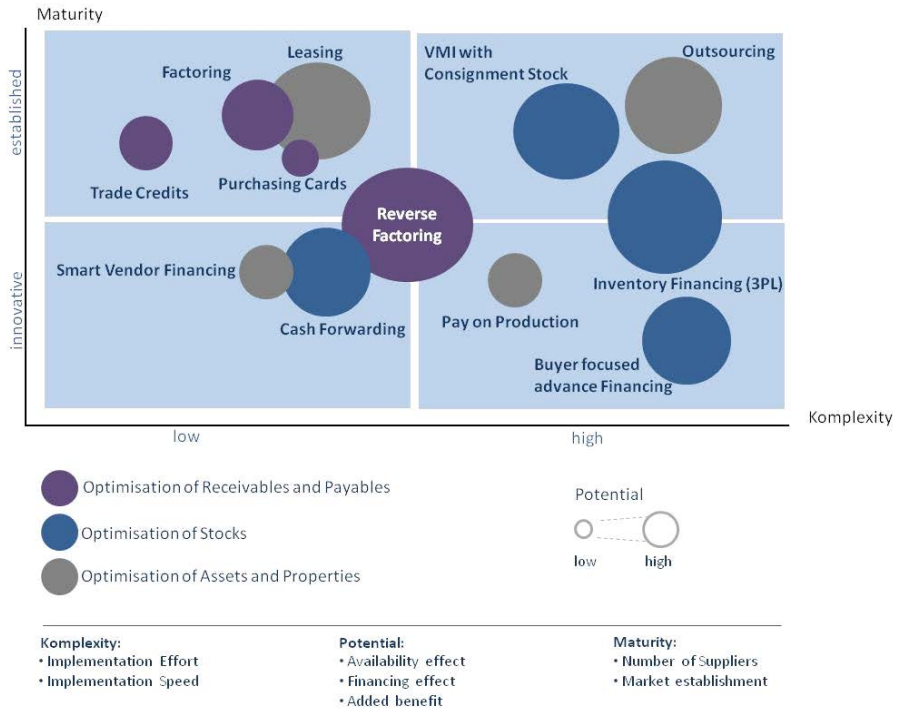

Figure 7: Supply chain finance concept matrix[74]

The supply chain finance concept matrix depicts an abundance of optimisation options, ranging from receivables and liabilities to inventories as well as assets and properties. The diameter of the

[73] Cf. Locker und Grosse-Ruyken, 2013, p. 153
[74] Source: h&z Studie, Supply Chain Finanzierung, p. 11

circle indicates the potential for the respective measures. Several of the terms used in Figure 7 will be subsequently outlined. Factoring means that a specialised company buys the receivables from another company (i.e. a production plant), which it has against third parties. In this manner, the production plant directly accrues liquid funds and the specialised factoring company receives an obolus, which it retains for bearing the contingency risk. Trade credits concern the relationship between the customer and supplier, in which there is a short-term financing for goods in stock. In this scenario, a financially sound customer could grant a financially weaker supplier a loan. Outsourcing in this context means that a service supplier assumes the complete financing and associated current service processes of a company. A production company does not actually buy the necessary equipment, but instead only pays for its usage. The manufacturer thus remains the equipment owner. This procedure is known as pay on production. Another option for reducing net working capital exists by applying what is known as buyer-focused advance financing. In this particular model, a bank obtains access to a manufacturer's information network, and thus the bank is capable of ensuring a dynamic financing that is adjusted to accommodate risk. To be sure, this method is strongly dependant on the solvency of the customer. Within the indirect commodities area there is the option of implementing purchasing cards. The specialised solution for the area of C-parts reduces operational costs. Credit card providers settle the payment and payment process for small invoice amounts by means of credit cards. In reverse factoring,

a bank assumes the interim financing from supplier receivables and thereby the supplier immediately receives its money at lower financing charges and the customer has the option to extend the term of payment. The last example is known as smart vendor financing, which represents a combination of various financing options. Its objective is to evenly distribute capital expenditure over the service life of the production plant.[75]

4.8.4. Working Capital Management

Working capital management has already long been a topic of discussion, not only in literature but also in practise. Yet in practise this topic still has not been lent the credence it deserves. However, funds are urgently required for investments in corporate added value, which are released through a proper and efficient working capital management. It is the only means by which sustainable growth can be guaranteed. According to a study by PricewaterhouseCooper, the companies investigated need approximately 309 billion Euros in the near future in order to be able to achieve a moderate degree of growth.[76] In peer-reviewed literature, working capital management is divided into three processes: the "order to cash "(income management), "forecast to fulfil" (supply management) and the "purchase to pay" (expense management) process.[77] The goal of working capital management is to raise capital turnover and thereby be in a position to reduce capital

[75] Cf. h&z Studie, Supply Chain Finanzierung, p. 14-15
[76]Cf. PWC, Cash for growth, 2014, p. 4
[77] Cf. Lies, 2011, p. 25

costs. Additionally, there is more financial flexibility in the company, which in turn has positive impacts on the profitability by the operating profit-enhancing application from the released funds.[78] From a fiscal point of view, working capital is also regarded as pure working capital. It also acts as liquid funds for the medium term and is the surplus of short-term circulating capital for short-term liabilities.[79]

4.8.4.1. Definition of DSI (Days Sales Inventory)

There is no consensus for the definition of inventory range in literature. It shall be referred to as days sales inventory in this paper yet is often also known as DIH, which stands for days inventory held. Less widely known terms include DIO, days inventory outstanding and ICP, inventory conversion period. Ultimately these different terms all have the same meaning. The timeframe used for measurement is the time between the supply of raw materials and the shipping of the end products.

DSI is calculated by dividing the stock on hand (average yearly stocks) by the material input (manufacturing or procurement costs) then multiplying the result by 365 (days).[80] Possible starting points for a company in reducing days sales inventory include the range design, for example, by reducing the spectrum. Improved planning, prognosis and control likewise facilitate the reduction of buffer

[78] Cf. Metze, 2010, p. 99
[79] Cf. Olfert, 2013, p. 491
[80] Cf. Metze, 2010, p. 105

supports. Production as well as warehouse management and distribution also offer leverage in reducing stock turnover.[81]

4.8.4.2. Definition of DPO (Days Payables Outstanding)

Days payables outstanding measures the time between the supply of raw materials and their payment. The higher this value, the more favourable it is for the focal company. The supplier acts as a financial institution and extends the loan term, in this case in the form of merchandise value. Days payable outstanding is calculated by liabilities from supplies and services (average over a time frame) divided by the cost of goods sold. This result is then multiplied by 365 (days).[82]There are still various simple options for optimising liabilities. One option in particular that is always negotiable is payment conditions. Conditions could define the time period for which payment should be received or, if time is a factor, the appropriate amount for a cash discount. Another option for discussion is collective invoices, since they serve to reduce operational costs and extend the term of payment.[83]

4.8.4.3. Definition of DSO (Days Sales Outstanding)

Days sales outstanding refers to the outstanding amount of the customer invoice and indicates the time frame between the recording of sales and money received according to customer payment. DSO is calculated by the average receivables (average

[81] Cf. Sure, 2014, p. 81-103
[82]Cf. Metze, 2010, p. 106
[83]Cf. Bleiber, 2015, p. 228-236

over a time frame) divided by the sales. The result is then multiplied by 365 (days).[84]A main component for receivables management can include a modern invoicing method as well as enhanced customer satisfaction via adequate process design. Additionally, implementing receivable management can simplify and expedite receivables liquidation (outstanding debts).[85]

4.8.4.4. Definition of CCC (Cash Conversion Cycle)

The cash conversion cycle is the average amount of time raw materials require in a bound monetary unit in order to generate monetary unit sales. In other words, it is the number of days required to pre-finance sales. This is also known as cash to cash cycle or cash flow cycle.[86]

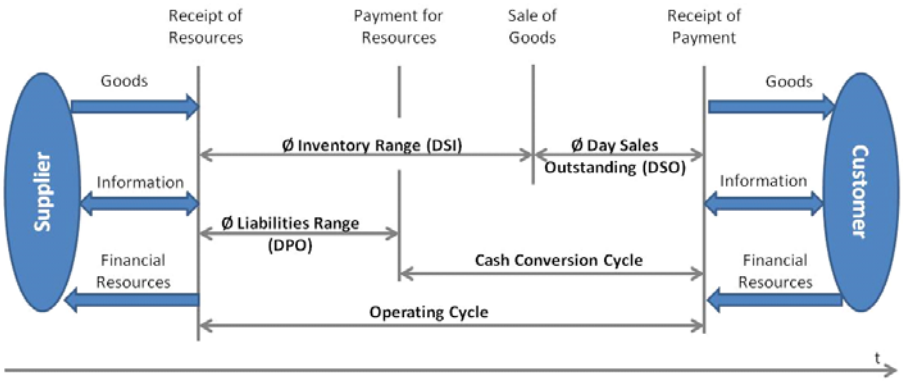

Figure 8: Depiction of the cash conversion cycle and operating cycle[87]

[84]Cf. Lies, 2011, p. 57-58
[85]Cf. Sure, 2014, p. 27-28
[86] Cf. Metze, 2010, p. 100-101
[87] Source: Metze, 2010, p. 102

The chart above visualises the cash conversion cycle calculation. The inventory range plus the days sales outstanding minus the liabilities range yield the cash conversion cycle in days.

4.8.4.5. Benchmark Outcomes

PricewaterhouseCoopers published a survey that evaluated the average working capital days (or cash conversion cycle). The following graphic impressively conveys the current status as well as the variation from the previous-year period.

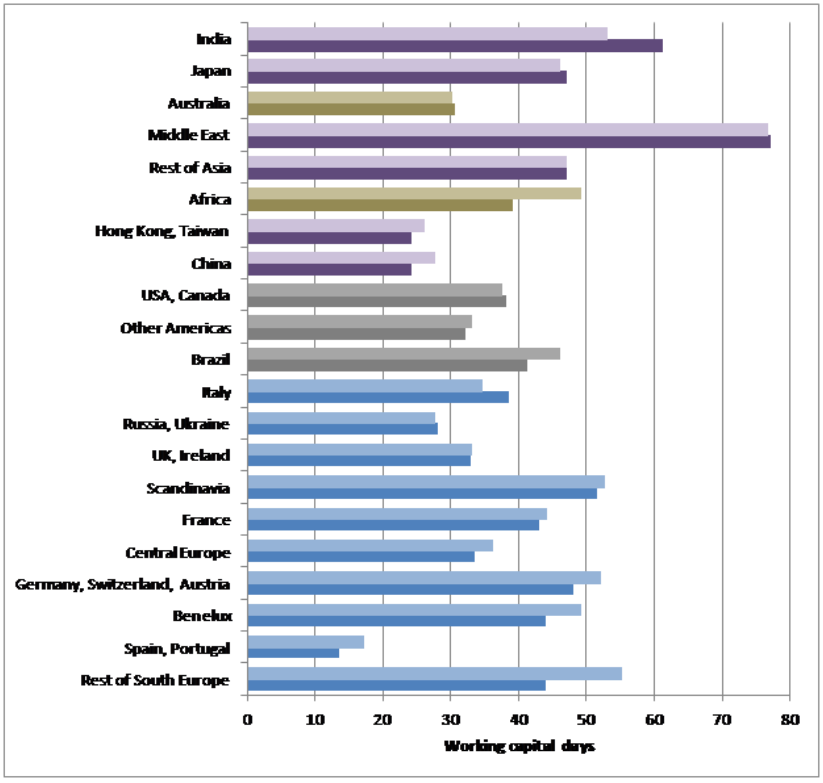

Figure 9: Average working capital days[88]

[88]Source: PWC, Cash for Growth, 2014, p. 9

In the average working capital days figure (calculated by inventory range plus average receivables term of payment minus the average supplier term of payment) [89] various countries and regions were compared with each other. Respective values in the slightly lighter colours are values for the year 2012 whereas the darker colours indicate values for 2013 in days. The cluster comprising Germany, Switzerland and Austria are comparable to USA, Canada and China in last place. An average of 50 days working capital days is the norm for the European cluster, while USA and Canada indicate 40 days and China only 30 days. However, only two clusters demonstrated an improvement of 8-10% from the previous year. USA and Canada's showed a decline of 1%.

4.8.5. Potentials for Supply Chain Finance

In order to raise the visibility of potentials of supply chain finance, a study by h&z Unternehmensberatung AG was reverted to. This study revealed the degree to which feasible savings potential (spectrum) can increase by implementing supply chain finance concepts.

[89] Cf. Bleiber, 2015, p. 64

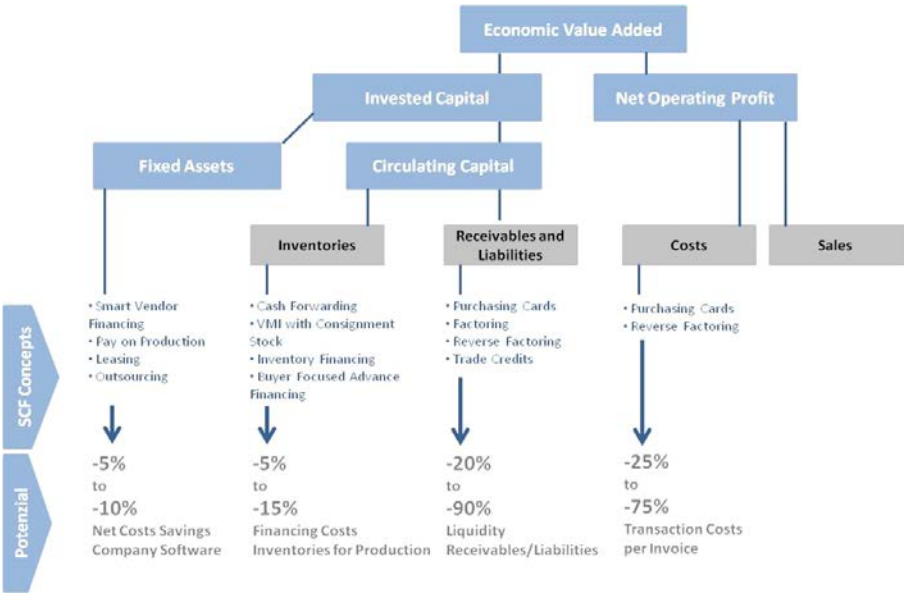

Figure 10: Potentials of supply chain financing[90]

By implementing purchasing cards or reverse factoring, it is possible to save up to 75% in operating costs, according to h&z Unternehmensberatung AG, and a potential of up to 90% for receivables and liabilities is ascertainable. That is, the liquidity associated with receivables and liabilities can be reduced by up to 90%. Even when taking only the respective smallest values into account, there is still considerable potential for supply chain financing.[91]

[90] Source: h&z Studie, Supply Chain Finanzierung, p. 7
[91] Cf. h&z Studie, Supply Chain Finanzierung, p. 7

4.9. Supply Chain Performance

Under present day competitive conditions, which are becoming more dynamic, rapid and complex, traditional indicator systems are not equal to the task of confronting these new demands. These timeworn systems lack a vision of the future as well as consideration of weak areas.[92] Furthermore, determining key figures and allocation ought not to be merely token gestures; rather, they should provide an accurate added value for the individual supply chain members as well the supply chain as a whole. This is the means by which supply chain performance measurement can encourage and improve the understanding and collaboration between supply chain partners, as well as raise the degree of integration for the supply chain.[93]

The most recent research results in this regard are concerned with the weak areas of supply chain performance. These weak areas were investigated (labour) in terms of to what extent the personal comportment of the decision-maker impacted the various supply contracts. Surprisingly, it could be ascertained that between the various test subjects various outcomes also ensued, which could subsequently prove that supply chain performance was 20% below its optimal performance.[94]

[92] Cf. Werner, 2013, p. 414
[93]Cf. Cetinkaya et al., 2011, p. 65
[94]Cf. Becker-Peth in Bogaschewsky et al., 2013, p. 131-145

4.9.1. Definition

Supply chain performance can be understood as the degree of profitability goals achieved within the existing supply chain management as specified at the network and stakeholder level. Supply chain performance appraises the efficiency, efficacy and performance of the entire supply chain.[95]

4.9.2. Target Values

Target values for supply chain performance were developed from the three dimensions of company achievement: efficacy, efficiency and agility. These dimensions are always the focal point for a supply chain. For these developed target values, a balanced relationship for the medium term should always prevail; otherwise they run the risk of undesired trade-off effects. For example, if the cost pressure is too strongly exerted, quality is compromised.[96] The following target values can be derived:

- increase efficiency
- improve quality
- improve speed
- increase adaptability
- enhance customer benefits
- embrace innovation
- reduce capital commitment
- collaboration.[97]

[95] Cf. Essig et al., 2013, p. 372
[96] Cf. Gleich und Daxböck, 2014, p. 46-47
[97] Cf. Gleich und Daxböck, 2014, S. 47 und Essig et al., 2013, p. 373

4.9.3. Instruments

In order to positively develop the target values laid out in the previous section, there is need for a set of methods and instruments to this end, some of which are outlined as follows.

In terms of making significant value added decisions, the total cost of ownership approach in a supply chain has the task of considering an overall perspective involving complete costs of a specific supplier, particularly in the purchasing of products. Total cost of ownership transparently and comparably designates the true costs.

Activity-based costing apportions the overhead costs according to the respective department to the individual cost-bearers. As a result, there is greater transparency and correspondingly the ability to clearly identify savings potentials.

Another instrument that is aimed at customer satisfaction is known as target costing. The objective of target costing is to ensure that a product complies with customer and market demands with respect to price, design, functionality and quality. The main issue at hand to ascertain is suitable product cost.

Open book accounting pertains to the disclosure of information and data concerning the internal accounting system between cooperation partners. However, this is only possible when there is a true relationship of trust between the parties and both strive for the

common goal of generating benefits. In open book accounting, discovering specific cost reduction potentials is the primary focus.[98]

4.9.4. Balanced Scorecard

Balanced scorecard is another instrument of supply chain performance. It was developed in 1997 by Kaplan and Norton and is the most prevalent performance measurement system today. In this system, a company's vision and strategy are converted to a performance system in a practical manner. Specifically, it involves breaking down a business strategy into uniform guidelines. Strategic objectives within a top-down approach are associated with these measures. The next step is to plan operational goals that are evaluated using the bottom-up approach. Levels of a supply chain scorecard can be variously designed according to the relevant company. However, as a rule they are restricted to the relationship or respectively potential level on the chain as well as the finance, customer, process and supplier levels.[99]

4.10. Profitability

It is not easy to discern the point at which the term „profitability" first appeared in economic literature. Yet it was a long time before it emerged in classic English and French literary works on the issue of

[98]Cf. Essig et al., 2013, p. 393-405
[99] Cf. Gleich und Daxböck, 2014, p. 50-55 und Essig et al., 2013, p. 409-411

national economy.[100] The concept of profitability is the ratio of profit from a fiscal period to the assigned capital (return on capital).[101]

This is also known as rate of return. For providers of equity and lenders, the rate of return - or more appropriately, profitability - is an important benchmark. On the one hand, equity providers expect reasonable gains and the associated profitability commensurate to their assigned capital. On the other hand, profitability is a significant value for lenders when assessing risks for their investments.[102] Investments are always demanded in order to be able to increase profitability in companies. This runs contrary to the goal of increasing in liquidity, since liquidity decreases with investment demand. Insofar as the necessary capital is available in the company, profitability is to be prioritised since it is better designed for the long term than liquidity and can greatly contribute in safeguarding a company's future.[103] Some of these performance indicators include return on equity, return on investment, return on sales, cash flow return as well as return on capital employment.

4.11. Competitive Advantage

According to Duden, competitive advantage is the ability to compete with other participants. Fundamentally, this definition can be considered particularly apt, since there is no consensus within economic literature for the term, „competitive advantage". It is also

[100]Cf. Arndt, 2014, p. 5
[101]Cf. Benesch und Schuch, 2013, p. 31
[102] Cf. Olfert, 2013, p. 58
[103] Cf. Pape, 2011, p. 20

deemed as the ability to sell, or to sustainably ensure or expand profitability for market shares.[104] Another interpretation goes beyond the previously cited definitions and describes competitive advantage as the potential of a company that can obtain, claim or expand upon a profitable position within an industry or market. This indicates that the company is able to recognise opportunities and risks in the competitive arena and use them for its own benefit. From a micro and macroeconomic standpoint, competitiveness is based on creating competitive advantages (the foundation for competitive strategy).[105]

4.12. Change Management

The importance of change management has grown substantially in the past two decades. What had initially only been considered a peripheral issue has since expanded into a vital and significant methodology for any company. Society and the economy alike are subjected to a permanent state of transformation reflected by profound and ongoing changes. Companies became more transparent through digitalisation and the mobile web, while networks and online communities comprised the focal point of innovations. Through the takeover of this leadership role for this social media, the transformation to the organisational model Enterprise 2.0 was levelled out. [106] For many sectors, this transformation prompts redefining successful positions while taking

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[104] http://www.wirtschaftslexikon24.com/d/wettbewerbsfaehigkeit/wettbewerbsfaehigkeit.htm [surveyed on 14.01.2015]

[105] Cf. Pirscher und Mothes, 1999, p. 2-3

[106] Cf. Capgemini, 2012, p. 3

an increasingly changing market and competition conditions into account. Consequently, rapid rationalisation effects are no longer sufficient in confronting today's market. Changes companies can adopt include strategic orientation, organisation, corporate culture as well as implemented systems and technologies. Bearing these factors in mind, change management has become a permanent challenge, which all members of an organisation must accommodate.[107]

4.12.1. Definition

Expressing change management in a single definition appears to be an impossible task due to its scope and high level of complexity. Experts in various studies attempted to briefly and succinctly describe this concept in a single sentence. The following sequence of answers could be determined, beginning with the ones most cited. Information must be both clear and credible, open communication must be fostered, the transformation must be understandable and comprehensive, individuals concerned must be included as participants and complex changes within an organisation must be actively controlled. This questionnaire included a catalogue of questions that all parties concerned were obligated to keep, since there would otherwise be varying answers that could no longer be logically allocated.[108] Despite the difficulties specified in arriving at a single meaning for the concept of change management, Vahs developed an appropriate and all-encompassing definition. He described change management as a targeted analysis, planning,

[107] Cf. Vahs, 2012, p. 283-284
[108] Cf. Classen, 2013, p. 50-51

realisation, evaluation and permanent advancement and integral measures for change in companies.[109]

4.12.2. Key Factors

In order to successfully initiate a change management project, various key factors must be considered. First of all, energy must be stimulated among the parties involved in adopting the change. This is achieved by including all parties as well as transparency in the task at hand, both of which serve to create the necessary trust. Of equal importance is reasoning in terms of processes as opposed to structures, a practise that must be permanently encouraged. Only through these measures can changes be clearly and understandably set out for all participants. The company must continually be attuned to its environment in order to establish that corporate measures yield their full effect and that no anomalies arise. Another key factor is interconnectedness via communication. Interconnectedness means that the necessary information within an organisation is on hand, yet does not reach the proper recipient. Last but not least, a company must advocate continuous learning.[110]

4.12.3. Strategy

In order to illustrate which strategy demonstrates a certain degree of potential for success in practice, a Capgemini study from 2012 will be highlighted. Within the study, 10 spheres of activity could be

[109] Cf. Vahs, 2012, p. 302
[110] Cf. Doppler und Lauterburg, 2014, p. 115-125

pinpointed that are necessary for a successful change movement design.

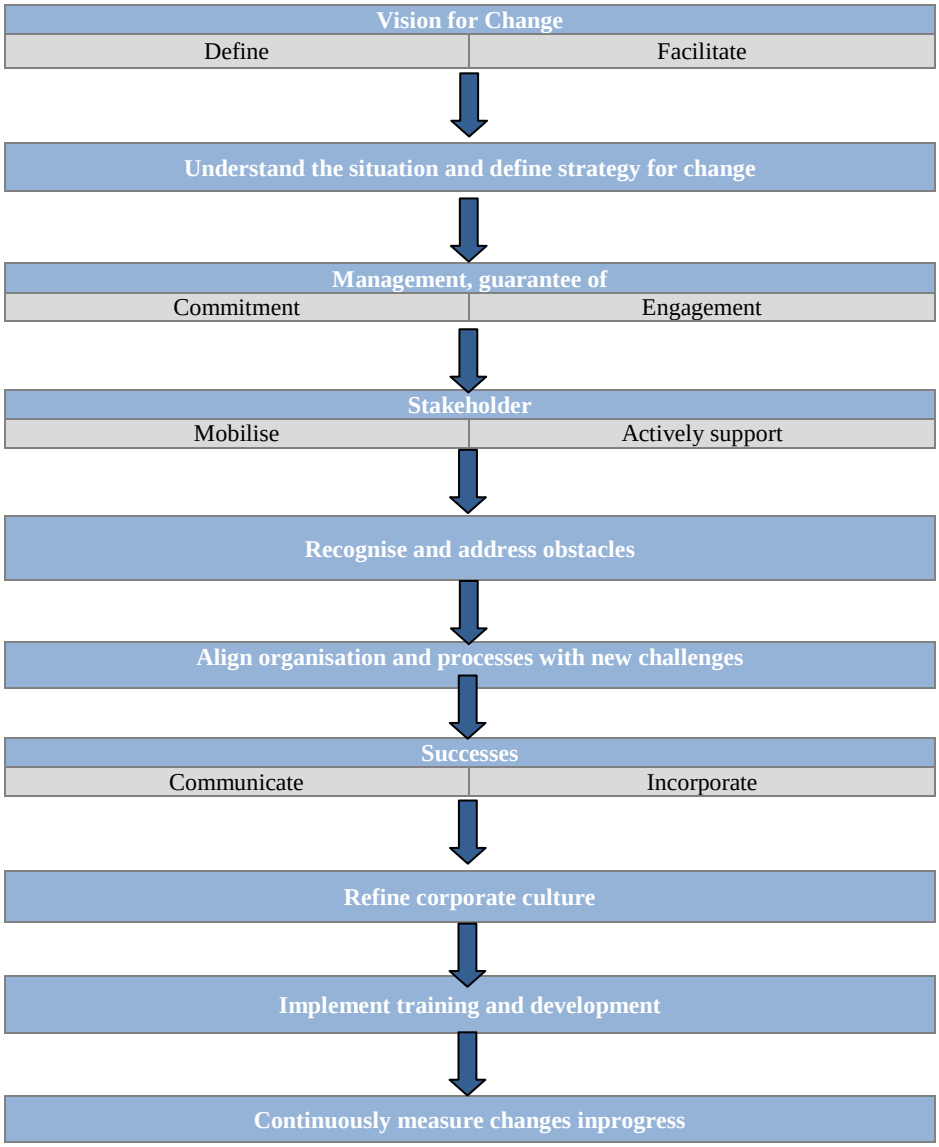

Figure11:Tenspheres of activityforsuccessfulchangemanagement design[111]

[111] Source: Capgemini, 2012, p. 26

Emphasis on the 10 spheres of action is very strongly influenced by the respective change objectives and can vary in their manifestations correspondingly. For example, when it concerns issues such as cost reduction or restructuring, the category of engagement and commitment by management is accorded a high priority. In terms of changes to the corporate or market strategy, definition and communication convey a clear vision.[112]

[112] Cf. Capgemini, 2012, p. 26-27