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# TARGET ACHIEVEMENT AND FUTURE VIABILITY OF EXISTING CONCEPTS FOR SUPPLY CHAIN MANAGEMENT: AN EXPLORATORY STUDY

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***Abstract:*** *In an empirical survey the objectives associated with supply chain management are examined by company representatives. Afterwards it is analyzed how those objectives are met by existing supply chain management concepts and what kind of challenges toward supply chain management companies will face in the future. At the end the current and future need for innovative concepts in the area of supply chain management is deduced.*

***Keywords:*** *Supply chain management, future studies, innovation, management concepts*

## 1. INTRODUCTION

In developed industrial countries, supply chain management has been established as an influential philosophy as well as a basic design principle for the production of both material goods as well as services based on the division of labor. In general, only few companies can renounce the realization of inter-company potentials that are characteristic for supply chain management, especially with regard to the strong and growing intensity of competition. A variety of concepts and instruments (subsequently referred to as supply chain management concepts) are applied. Many of those concepts including Kanban, Just-in-Time (JIT) and Efficient Consumer Response (ECR) were developed more than two decades ago (ECR in the early 1990s, Kanban and JIT originated in the 1960s). In this regard a first question is posed: (1) How innovative are the existing supply chain management concepts actually (degree of innovativeness)? Since an analysis of the degree of innovativeness should not be carried out detached from the examination of the degree of target achievement (conventional concepts may as well show a high adequacy with regard to the respective objectives), a second question arises: (2) To which degree do the existing concepts support the achievement of the intentions currently pursued with supply chain management? These intentions change over time – established objectives are intensified, new objectives arise – so that the target adequacy is not to be interpreted as static but

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rather as dynamic with regard to new developments. An important prerequisite for this is existing knowledge (respectively the generation of knowledge) about upcoming challenges towards supply chain management that will, according to experts, occur in the near or more distant future. The answer to the third question – (3) Which are the future challenges towards supply chain management? – allows the deduction of conclusions about upcoming targets and thus the necessity of the development of new supply chain management concepts.

For the discussion and answer of the above mentioned research questions, the target achievement and degree of innovativeness of the existing concepts are analyzed. Afterwards, the need for new supply chain management concepts is derived. For this purpose, a combined approach of inductive and deductive reasoning is chosen. A specifically designed and conducted empirical study in the shape of a written questionnaire (sent to the top-1000 companies from ten relevant business branches) helps gaining scientific insight and demonstrates the practical relevance of the research questions and main theses.

## 2. LITERATURE REVIEW

Although the term supply chain management is discussed controversially in scientific literature, a broad consensus about particular aspects can be observed. Thus, the main purpose of supply chain management is the inter-company integration and hereby optimization of the flow of goods, information and capital; therefore it is distinguished by a long-term, cooperative character, that is supposed to lead to a high degree of target achievement for the companies involved. Moreover, supply chain management is to be aligned flow and process oriented in all cases (Christopher 2005, Cooper et al. 1997, Handfield/Nichols 1999, Larsson/Halldorsson 2002, Lummus/Vokurka 1999).

### 2.1. Targets of Supply Chain Management

The overall target of supply chain management can be described as long-term preservation or even improvement of the competitiveness of the entire supply chain by the development of inter-company success potentials (Bechtel/Jayaram 1997, Chandra/Kumar 2000, Christopher 2005, Cooper 1993, Göpfert 2013). As a result of a literature study (e.g. Christopher 2005, GCI/Capgemini 2008, Göpfert 2013, Skjoett-Larsen 1999, Vokurka *et al.* 2002) the overall objective can be divided into five more tangible main target categories which are not always completely overlap; however, due to the complexity of supply chain management, they are necessary for a complete description of the theoretical potential factors. The following categories are essential for supply chain management:

*(1) Increase of end customer value:* The end customer value is assigned a very important role within supply chain management; the whole approach is

consistently aligned with the needs of the end customer (Christopher 2005, Cooper *et al.* 1997, Lambert *et al.* 1996). Advantages in this category can be achieved for example by a high level of "product availability", "customer-specific individuality of the products" or a high degree of "logistics services".

*(2) Realization of costs advantages:* The objectives in this category can be divided into two sections. Aspects as an "optimization of transport costs", "reduction of stock (materials/goods)" or "efficient usage of resources" are directly related to the physical implementation of a flow-oriented production process. The "reduction of administration and planning costs", "transactions costs" as well as "research and development costs" are on the other hand more long-term, strategic oriented objectives particularly concerning the organization of the supply chain (Christopher 2005, Skjoett-Larsen 1999, Vokurka *et al.* 2002).

*(3) Realization of time advantages:* The lowest possible delivery time and other direct customer-related aspects have been considered directly under the point "logistics services" (end customer value); therefore in this category the focus is on the manufacturing process within the supply chain. Time savings can be achieved in almost all areas of basic functions, for example through reductions of "lead time", "time-to-market", "replenishment time" or "reaction time in case of demand changes" (Christopher 2005, Handfield/Nichols 1999).

*(4) Realization of quality advantages:* The quality management must be extended within supply chain management from a corporate perspective on the entire value chain. Each participating company has to make its contribution to a holistic quality assurance (Beamon 2008, Ross 2000, Vokurka *et al.* 2002). Since the process-quality in form of a high logistics service level is considered already in the first category, the quality advantages are related solely to the quality of the goods produced within the SC. The two main objectives are the general "improvement of product quality" as well as the "improvement of product innovativeness".

*(5) Realization of flexibility advantages:* Due to the increasing dynamics of environmental factors, the flexibility of the supply chain is becoming increasingly important (Göpfert 2013, Vickery *et al.* 1999, Vokurka *et al.* 2002). In addition to the passive adaptability – both "flexibility regarding external influences" as well as "flexibility regarding demand changes" – the "active development potential" of the supply chain plays a major role. An active and innovative behavior of the companies can help to develop solutions before the actual occurrence of changes (Göpfert 2013).

### 2.2. Supply Chain Management Concepts

To achieve the described targets, a high number of concepts can be found in scientific literature as well as in business practice. Supply chain management

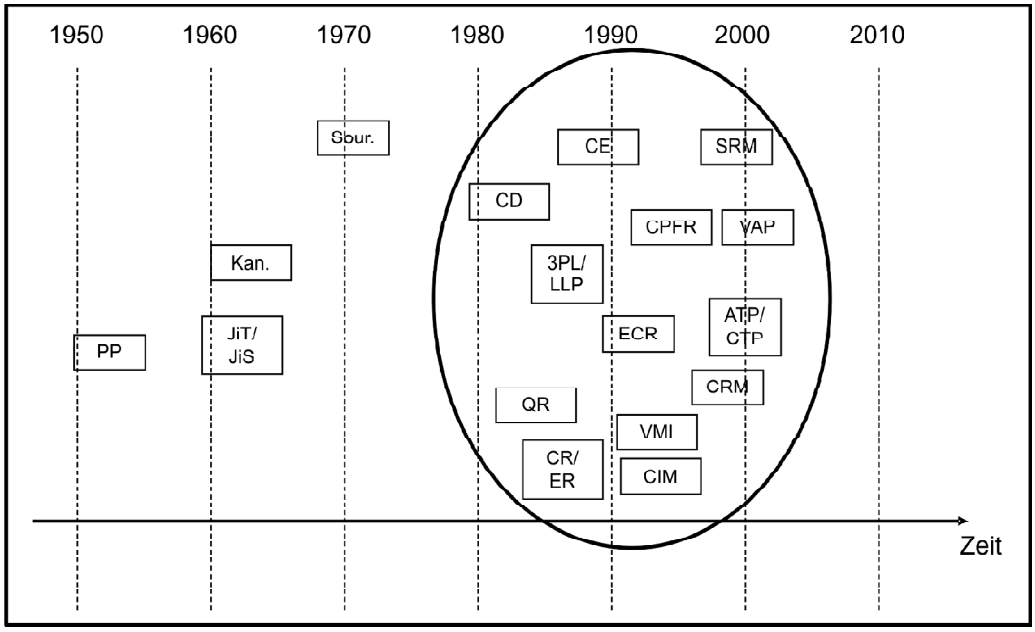
concepts are specific methods for an efficient design of the entire value creation process from the supplier to the end customer. Their consistent application is a fundamental requirement for the realization of a functioning supply chain. Based on the core processes of the supply chain operation reference (SCOR) model (Huan *et al.* 2004, Lockamy III/McCormack 2004, Simchi-Levi *et al.* 2008, Supply Chain Council 2008) a total of 17 existing concepts can be determined (cf. tab. I). The composition of these concepts is based on discussions with company representatives as well as a detailed literature analysis [e.g. Christopher 2005, Handfield/Nichols 1999, Skjoett-Larsen 1999).

**Table I**
**Classification of Supply Chain Management Concepts**

| *Core processes of the SCOR model* | | | |
|---|---|---|---|
| *Planning & Controlling* | *Procurement* | *Production* | *Distribution* |
| • Available-to-Promise (ATP) / Capable-to-Promise (CTP) | • Just-in-Time (JiT) / Just-in-Sequence (JiS) | • Collaborative Engineering (CE) | • Quick Response (QR) |
| • Collaborative Planning Forecasting and Replenishment (CPFR) | • Supplier Relationship Management (SRM) | • Postponement (PP) | • Continuous Replenishment (CR) / Efficient Replenishment (ER) |
| • Kanban | • Sourcing Concepts | | |
| • Third Party Logistics Provider (3PL) / Lead Logistics Provider (LLP) | | • Value Added Partnership (VAP) | • Vendor Managed Inventory (VMI) |
| | | | • Consignment Inventory Management (CIM) |
| | | | • Cross Docking (CD) |
| | | | • Efficient Consumer Response (ECR) |
| | | | • Customer Relationship Management (CRM) |

The majority of the existing concepts were developed 15 years – in some cases even 60 years – ago (cf. fig. I). Nevertheless, concepts as "Efficient Consumer Response (ECR)" or "Just-in-Sequence (JIS)" are often still appeared as new solutions by company representatives as well as scientists. Therefore, the question arise, to what extent the existing concepts can contribute to the achievement of current objectives associated with supply chain management and to which degree they can be suitable reactions towards future supply chain challenges.

**Figure I: Development Times of Existing Supply Chain Management Concepts**




## 2.3. Future Challenges for Supply Chain Management

What are the future challenges supply chains have to respond to in the next five to ten years? By analyzing dedicated future studies from the field of logistics respectively supply chain management a total of ten challenges can be determined. Publications, both from scientific institutes as well as business companies, have been taken into account (cf. tab. II). The assessment of the individual challenges follows in chapter 4.

As shown in this chapter, a large number of articles on theoretical aspects of supply chain management as well as corresponding targets, challenges and concepts exist. However, there is a lack of scientific literature on the practicability of existing supply chain management concepts. To what extent do existing concepts contribute to the achievement of supply chain management objectives and to which degree are they suitable reactions toward future supply chain challenges? After a description of the research methodology chapter four is devoted to these open questions.

## 3. DATA AND METHODOLOGY

The foundation of the following analysis is a survey carried out by the Department for Logistics at the Philipps-University in Marburg among the 100 largest German companies by turnover in each of ten selected business branches.

**Table II**
**Meta-study on Future Challenges of Supply Chain Management (Excerpt)**

| *Authors* / *Future challenges* | *Beamon (2008)* | *Cohen et al. (2008)* | *GCI et al. (2006, 2008), GCI/ Capgemini (2008), CGF et al. (2011)* | *IBM (2009)* | *Ogden et al. (2005)* | *SMI/ PWC (2009, 2010a, 2010b, 2011)* | *SMI/EBS (2008)* |
|---|---|---|---|---|---|---|---|
| Climate change becomes a central problem | x | x | x | x | | x | x |
| Further increase in globalization | x | x | x | x | x | x | x |
| Rising power of new emerging markets (BRIC) | | x | x | | | x | x |
| Threats by industrial espionage, crime, and terrorism | | | | | | x | x |
| Rising demand for locally produced goods | | | x | x | | x | x |
| Rising customization (forecasting problem) | x | | x | | x | x | x |
| Rising inter-company data complexity | x | | x | | x | x | x |
| Increase of infrastructural bottlenecks | | | | | | x | |
| Rising significance of logistics services | | | | | x | x | x |
| Increase of transportation costs | x | | | | | x | |

The choice of branches[1] was made under consideration of both internally representing the entire supply chain as well as integrating the outside-in perspective from logistics service providers and consulting firms.

The determination of the largest German companies is based on the database "top 500 companies in Germany 2010" of the journal DIE WELT (N.n. 2011a). The missing companies were afterwards complemented using branch specific tables (e.g. BESTgroup Consulting & Software GmbH 2011, FoodProcessing.com 2011, N.n. 2011b) and detailed internet research. International and older rankings were continuously updated and adapted to the German market. Because of this thorough research the sample can be considered representative for the biggest companies in the examined business branches.

In all cases the questionnaire was sent to the head of logistics or supply chain management on a company level. The personal contact was either determined by internet research or request by telephone. The survey itself was carried out in four stages. At first, the questionnaire was created, validated in pretests with selected companies and further adjusted. In this area, the problem of differing term definitions was examined. It was shown that the supply chain management concepts – despite a partly diverging usage in literature – were still understood very similarly by intuition and thus the informative value of the study is guaranteed. Afterwards, the finished questionnaire was sent to the corresponding partners with the request to return it or to participate online (www.uni-marburg.de/scm-studie). In two subsequent rounds, each one after three weeks, an email was sent if the questionnaire was missing with a new reminder, so that in the end a return quota of 11.1% (111 participating companies) could be achieved.

The problem of a non-response bias has to be taken into account, too. It can be assumed that especially companies that have already implemented supply chain management were participating in the survey, while inexperienced companies can be expected to be represented to a lesser degree. However, this has no negative impact on the informational value of the study's results, since supply chain management relevant topics are thus mostly discussed by corresponding partners who have collected some experience with the distinct topics. This effect is also shown in the participants' distribution over the business branches. For example, in the industries "machine tools" or "metal production and metal working", supply chain management is often only a side issue, which also shows itself in low return quotas of only six per cent. During the analysis of the results, the fact that not all business sectors are represented equally has to be taken into account as well. However, with regard to the selected key indicators "need for innovative supply chain management concepts with regard to current problems" and "future problems", a normalized average – in the sense of equalized percentages of the respective branch average – leads only to negligible deviations of less than 0.3 per cent.

## 4. FINDINGS

As shown in the survey's results, supply chain management focuses mainly on objectives that are directly related to the implementation of a flow-oriented production process (cf. tab. III). In addition to an "increase in product availability" (4.33), an "efficient usage of resources" (4.30) and a "reduction of lead times" (4.25) are highlighted. The target categories "reduction of stock (materials/goods)" (4.07), "improvement of flexibility regarding demand changes" (4.06), "improvement of the supply chain's development potential" (4.05) and "reduction of reaction times in case of demand changes" (4.03) follow on the next ranks, as well scoring four or higher on a scale from 1 (very unimportant) to 5 (very important)[2]. Especially the

latter is gaining more relevance due to the increasing dynamics of environmental factors. Targets regarding activities in research and development, administration and planning costs, transaction costs and product quality are only of subordinate importance in comparison to the other categories.

**Table III**
**Evaluation of the Target Categories Associated with Supply Chain Management**
**(n = 111; scale: 1 (very unimportant) to 5 (very important))**

| | Target categories associated with supply chain management | AV (σ) | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| End customer value | Increase in product availability | 4.33 (0.89) | | | | | |
| | Increase in customer-specific individuality of the products | 3.35 (1.22) | | | | | |
| | Improvement of logistics services | 3.98 (0.98) | | | | | |
| Costs | Optimization of transportation costs | 3.83 (0.95) | | | | | |
| | Reduction of stock (materials/goods) | 4.07 (0.96) | | | | | |
| | Efficient usage of resources | 4.30 (0.76) | | | | | |
| | Reduction of administration and planning costs | 3.44 (0.99) | | | | | |
| | Reduction of transaction costs | 3.45 (1.08) | | | | | |
| | Reduction of research and development costs | 2.57 (1.19) | | | | | |
| Time | Reduction of lead time | 4.25 (0.88) | | | | | |
| | Reduction of time-to-market | 3.01 (1.25) | | | | | |
| | Reduction of replenishment time | 3.72 (0.93) | | | | | |
| | Reduction of reaction time in case of demand changes | 4.03 (0.98) | | | | | |
| Quality | Improvement of product quality | 3.67 (1.15) | | | | | |
| | Improvement of product innovativeness | 3.49 (1.24) | | | | | |
| Flexibility | Improvement of flexibility regarding external influences | 3.90 (0.92) | | | | | |
| | Improvement of flexibility regarding demand changes | 4.06 (0.98) | | | | | |
| | Improvement of the supply chain's development potential | 4.05 (0.86) | | | | | |

## 4.1. The Degree of Target Achievement of the Existing Supply Chain Management Concepts

The further analysis is focused on the five overall target categories and it is examined to what extend the existing supply chain management concepts can achieve these categories. Tab. IV presents an overview of the degree of target achievement for all existing concepts. It is remarkable that a value above four points (high achievement) is only reached once in the categories "end customer

value", "costs advantages" and "time advantages"; apart from that, the results level off in the area of two (low achievement level) and three points (moderate achievement level). Especially in the categories "quality" and "flexibility" the highest values are very low with 3.56 points (Collaborative Engineering) and 3.55 points (Collaborative Planning, Forecasting and Replenishment).

**Table IV**
**Degree of Target Achievement for all Existing Supply Chain Management Concepts**
(Average (σ); n = 111; scale: 1 (very low) to 5 (very high))

| | *Final customer value* | *Costs advantages* | *Time advantages* | *Quality advantages* | *Flexibility advantages* |
|---|---|---|---|---|---|
| 1. | CRM | CE | JiT/JiS | CE | CPFR |
| | 4.05 (1.07) | 4.00 (0.85) | 4.05 (1.11) | 3.56 (1.10) | 3.55 (0.90) |
| 2. | ATP/CTP | Sourcing | CPFR | VAP | PP |
| | 3.99 (0.88) | 3.98 (1.01) | 3.70 (0.96) | 3.54 (0.97) | 3.49 (1.26) |
| 3. | ECR | 3PL/LLP | QR | SRM | 3PL/LLP |
| | 3.92 (1.01) | 3.70 (0.86) | 3.68 (1.09) | 3.51 (1.19) | 3.45 (1.07) |
| 4. | QR | JiT/JiS | CE | Sourcing | CIM |
| | 3.75 (1.10) | 3.60 (1.14) | 3.65 (1.01) | 3.14 (1.17) | 3.39 (1.29) |
| 5. | CPFR | VMI | ATP/CTP | CRM | Sourcing |
| | 3.70 (1.02) | 3.57 (1.06) | 3.58 (1.05) | 2.85 (1.20) | 3.38 (1.00) |
| 6. | CR/ER | CPFR | CR/ER | ECR | SRM |
| | 3.41 (1.16) | 3.56 (0.93) | 3.55 (1.01) | 2.65 (1.09) | 3.33 (1.01) |
| 7. | VAP | SRM | CD | QR | CE |
| | 3.32 (1.10) | 3.56 (1.03) | 3.51 (1.15) | 2.60 (1.10) | 3.28 (1.03) |
| 8. | CE | VAP | ECR | CPFR | ATP/CTP |
| | 3.31 (1.14) | 3.51 (1.11) | 3.43 (0.96) | 2.58 (1.26) | 3.28 (1.10) |
| 9. | SRM | CD | CIM | PP | QR |
| | 3.25 (1.16) | 3.48 (1.13) | 3.41 (1.23) | 2.52 (1.02) | 3.26 (1.10) |
| 10. | PP | Kanban | SRM | 3PL/LLP | CR/ER |
| | 3.18 (1.29) | 3.38 (0.97) | 3.33 (0.99) | 2.47 (1.14) | 3.25 (1.02) |
| 11. | JiT/JiS | CR/ER | PP | CR/ER | VMI |
| | 3.17 (1.41) | 3.36 (1.11) | 3.22 (1.05) | 2.40 (1.00) | 3.20 (1.12) |
| 12. | CIM | CIM | VAP | Kanban | VAP |
| | 3.10 (1.31) | 3.32 (1.22) | 3.17 (0.96) | 2.31 (1.06) | 3.13 (1.10) |
| 13. | KON | PP | Kanban | JiT/JiS | JiT/JiS |
| | 2.98 (1.46) | 3.22 (1.02) | 3.17 (1.12) | 2.27 (1.16) | 3.09 (1.42) |
| 14. | Sourcing | ECR | VMI | ATP/CTP | ECR |
| | 2.90 (1.03) | 3.08 (0.99) | 3.12 (1.17) | 2.24 (1.24) | 3.08 (1.17) |
| 15. | CD | QR | Sourcing | CD | CD |
| | 2.72 (1.29) | 3.00 (1.06) | 3.06 (1.03) | 2.22 (0.99) | 2.99 (1.06) |
| 16. | 3PL/LLP | ATP/CTP | CRM | VMI | Kanban |
| | 2.61 (1.02) | 2.77 (1.02) | 2.84 (1.06) | 2.19 (1.00) | 2.83 (1.00) |
| 17. | Kanban | CRM | 3PL/LLP | CIM | CRM |
| | 2.51 (1.08) | 2.68 (0.83) | 2.79 (1.22) | 1.99 (0.91) | 2.83 (1.13) |

Even in the best rated categories "increase of end customer value" and "realization of costs advantages" 94.1% of all existing concepts do not reach a value above four points (cf. tab. V). In the first category "end customer value" every third concept was assessed only with a low to moderate achievement level. With regard to the "quality target" more than 70% of all concepts get a value below three points, which represents a low to very low degree of target achievement. At the category "flexibility" the situation looks a little bit better. The majority of the concepts achieve a value higher than three points; however the values are constant far below four points.

**Table V**
**Structured Overview of the Achievement Levels of Existing Supply Chain Management Concepts (n = 111)**

| *Scale: very low (1)* | *low (2)* | *moderate (3)* | *high (4)* | *very high (5)* | *total* |
|---|---|---|---|---|---|
| | | *Increase of end customer value* | | | |
| Quantity | — | 5 | 11 | 1 | 17 |
| Percentage | 0% | 29.4% | 64.7% | 5.9% | 100% |
| | | *Realization of costs advantages* | | | |
| Quantity | — | 2 | 14 | 1 | 17 |
| Percentage | 0% | 11.8% | 82.4% | 5.9% | 100% |
| | | *Realization of time advantages* | | | |
| Quantity | — | 2 | 14 | 1 | 17 |
| Percentage | 0% | 11.8% | 82.4% | 5.9% | 100% |
| | | *Realization of quality advantages* | | | |
| Quantity | 1 | 12 | 4 | —- | 17 |
| Percentage | 5.9% | 70.6% | 23.5% | 0% | 100% |
| | | *Realization of advantages in flexibility* | | | |
| Quantity | — | 3 | 14 | —- | 17 |
| Percentage | 0% | 17.6% | 82.4% | 0% | 100% |

This data results in the conclusion that the majority of existing concepts only contribute very limitedly to the targets associated with supply chain management. There are noticeable potentials of optimization in almost all categories that are preferably to be unlocked by new innovative concepts. Special attention should be paid to the categories "quality" and "flexibility".

### 4.2. Future Challenges towards Supply Chain Management

Aside from the degree of target achievement, which is an indicator for the current need for innovative concepts, upcoming challenges towards supply chain management are examined as well by which the future need can be derived.

The participating companies assume that the trend "increase of transportation costs" has the greatest relevance (cf. tab. VI). This effect, caused by rising oil prices and regulations, is rated 4.18 and thus noticeably higher than all other trends.

Following on position two and three are the "rising power of new emerging markets" and the "further increase in globalization". In the future there is expected a further increase in globalization of trade and value creating relationships; however, the focus of global economy is shifting more and more toward the so called BRIC-countries (Brazil, Russia, India, and China). The trends "rising customization" and "rising significance of logistics services" are also rated relatively high with a score above 3.7 points. The low significance of the climate change for supply chain management is surprising. However, in the future, this aspect will gain further relevance due to a noticeable increase in the number of natural disasters and other ecological problems. While the remaining trends are slightly above average, "threats by industrial espionage, crime, and terrorism" as well as "rising demand for locally produced goods" can be disregarded to some extend due to a rating of less than three points.

**Table VI**
**Future Challenges Towards Supply Chain Management**
(n = 111; scale: 1 (very low relevance) to 5 (very high relevance))

| *Future challenges toward supply chain management* | *AV (σ)* | *1* | *2* | *3* | *4* | *5* |
|---|---|---|---|---|---|---|
| Climate change becomes a central problem | 3.40 (1.13) | | | | | |
| Further increase in globalization | 3.91 (0.95) | | | | | |
| Rising power of new emerging markets (BRIC) | 3.96 (0.92) | | | | | |
| Threats by industrial espionage, crime, and terrorism | 2.79 (0.92) | | | | | |
| Rising demand for locally produced goods | 2.87 (0.97) | | | | | |
| Rising customization (forecasting problem) | 3.77 (0.99) | | | | | |
| Rising inter-company data complexity | 3.42 (0.99) | | | | | |
| Increase of infrastructural bottlenecks | 3.37 (0.95) | | | | | |
| Rising significance of logistics service | 3.73 (0.99) | | | | | |
| Increase of transportation costs | 4.18 (0.77) | | | | | |

## 4.3. Derivation of the Need for Innovative Supply Chain Management Concepts

In summary, the need for innovative supply chain management concepts can be determined on the one hand according to the current degree of target achievement of the existing concepts and on the other hand according to the evaluation of future challenges toward supply chain management. During the empirical study, the respective assessment of the survey participants was asked for explicitly. The need for innovative concepts with regard to current challenges is rated above average with a score of 3.34 and even very high (4.15) with regard to future challenges (cf. tab. VII).

**Table VII**
**Need for Innovative Supply Chain Management Concepts**
(n = 111; scale: 1 (very low) to 5 (very high))

| *Need for innovative supply chain management concept* | *AV (σ)* |
|---|---|
| with regard to current challenges | 3.34 (0.96) |
| with regard to future challenges | 4.15 (0.86) |

The high relevance of innovative solutions with regard to future challenges is closely related to the degree of innovativeness of the existing concepts. As shown in tab. VIII, the respective average over all supply chain management concepts is only 2.82 points, which corresponds to a low score. According to the company representatives, the concepts perceived as most innovative are "Value Added Partnership" and "Efficient Consumer Response", although even those scored only slightly above the value "moderate degree of innovativeness". As shown in chapter 2 most of the concepts were developed more than twenty years ago and were adjusted to the business environment at that time. Rising dynamics in company surroundings posed new challenges to supply chains that can only be faced with a completely new quality of supply chain management concepts.

**Table VIII**
**Degree of Innovativeness for all Existing Supply Chain Management Concepts**
(n = 111; scale: 1 (not innovative at all) to 5 (very innovative))

| | | *Degree of innovativeness AV (σ)* |
|---|---|---|
| Planning & Controlling | Available-to-Promise / Capable-to-Promise | 2.69 (1.05) |
| | Collaborative Planning Forecasting and Replenishment | 3.08 (1.03) |
| | Kanban | 2.13 (1.08) |
| | Third-Party-Logistics Provider / Lead Logistics Provider | 2.61 (1.02) |
| Pro-curement | Just-in-Time / Just-in-Sequence | 2.30 (0.99) |
| | Supplier Relationship Management | 3.01 (0.89) |
| | Sourcing Concepts | 2.93 (1.02) |
| Pro-duction | Collaborative Engineering | 3.15 (0.98) |
| | Postponement | 2.93 (1.06) |
| | Value Added Partnership | 3.16 (1.06) |
| Distribution | Quick Response | 2.97 (1.07) |
| | Continuous Replenishment / Efficient Replenishment | 2.98 (0.87) |
| | Vendor Managed Inventory | 3.09 (1.01) |
| | Consignment Inventory Management | 2.16 (1.02) |
| | Cross Docking | 2.71 (1.05) |
| | Efficient Consumer Response | 3.14 (1.19) |
| | Customer Relationship Management | 2.98 (1.14) |
| | Average | 2.82 |

## 5. CONCLUSIONS

Due to the rising relevance of innovation management in the area of supply chain management, scientists are increasingly working on future-relevant topics in this area as well. Especially the development of innovative concepts gains further relevance. New challenges are posed on supply chain management at all times due to the rising dynamics of environmental factors that can only be faced to a limit extent with conventional instruments. For this reason a new awareness is to create among company representatives that the preoccupation with future issues becomes increasingly important. The development of innovative solutions for supply chains will become a crucial competitive factor. Scientists should also get involved in the development process to create joint synergy effects (Göpfert/ Wellbrock 2012).

## NOTES

1. Distribution onto business branches: 18% consulting; 14% chemistry, pharmaceutical, medical and biological technology; 13% automotive industry; 12% retail; 9% textile, leather and clothing industry; 9% logistics service providers; 7% food industry; 6% machine tools; 6% metal production and metal working industry; 5% electric, electronic and optical systems. Almost 40% of the companies have more than 5,000 employees.
2. The scales in the study are always normalized in the range from 1 (very low, very unimportant, ...) to 5 (very big, very important, ...).

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