Future scenarios 2030 – The impact on logistics and the contribution to a sustainable development

Christian W. Flotzinger, Hannelore Hofmann-Prokopczyk, Friedrich Starkl

FH OÖ Research and Development GmbH
LOGISTIKUM - Competence Centre for Logistics and Enterprise networks

christian.flotzinger@fh-steyr.at (0043 7252 884 3263)
hannelore.hofmann-prokopczyk@fh-steyr.at (0043 7252 884 3255)
friedrich.starkl@fh-steyr.at (0043 7252 884 3215)

Table of contents

Table of figures

Preface

Area of conflict: politics and business

Coordination between politics and business is a highly discussed theme when talking about sustainable development. Requirements of the domestic industry are rarely consistent with the framework of social, legal and regulatory policies. The setting of the general political conditions depends on the policy. Although there are often differences and discrepancies between the politically influenced framework and the industrial demand, both parties should be highly interested in a successful sustainable development of the domestic business location in an international context. Especially the discipline of logistics can play a major role and contribute considerably to a sustainable development, provided that the political framework is appropriate.

Trends and progress influence the economic system

Internationalization of markets and higher intensity of competition, extended requirements to quality and service levels as well as the individualization of demand can be seen as the main actual and future challenges. In order to deal with emerging trends and developments it is essential that political and entrepreneurial leaders are aware of micro and macro economical issues and the significance of logistics in this area.

A holistic approach

To allocate the assumptions mentioned above scientifically and empirically the Austrian Federal Ministry of Transport, Innovation and Technology, Department for Integrated Transport Management and Logistics, has asked the LOGISTIKUM – Competence Center for Logistics and Enterprise Networks, to compile a research study. The main objectives were to develop and analyze future scenarios regarding the impact on logistics and the contribution of logistics to an economic system. Furthermore the study aimed at working out strategic recommendations and policies for a sustainable development in a holistic approach in order to strengthen the position of Austria as a business location. This was done under involvement of nameable representatives of Austrian industrial sectors as well as experts specialized in macro economical disciplines.

The research study itself focused especially on Austria, whereas the scientific paper examines the topic in a general approach.

Steyr, June 2008

Christian W. Flotzinger
Hannelore Hofmann-Prokopczyk
Friedrich Starkl

1 Goals of the study

Future scenarios for the year 2030 are developed on the basis of general and logistical "determining factors" considering macro and micro economical developments and challenges. In this context the main challenges for the discipline of logistics and as a result the prospective potentials of logistics for a sustainable development of a business location are identified, analyzed and interpreted. The study focuses on Austria and should initiate a holistic discussion in terms of the three dimensions of sustainable development: economic growth, environment protection and social development. As a consequence political and entrepreneurial decision makers should place measures – based on the results of the study – for a long-term strategy to secure competitiveness of Austria in an international context until 2030 and should be aware of the potential of logistics to reach this goal. The center of attention of the underlying paper is the demonstration of future scenarios for the year 2030, and the way logistics will be influenced by future developments and how it can account for sustainability.

2 Scope of the study and definitions

For the purpose of the research paper terms are defined as follows: *"Logistics embraces all strategic and operative decisions and operations which directly or indirectly influence the flow of goods as well as the related information."*[1] Passenger traffic, non-motorized transport, pipeline transport as well as inbound logistics are out of scope.
The meaning of sustainable development follows the definition of Brundtland Report[2] and considers the three dimensions[3]: economic growth, environment protection and social development: *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

According to the objective of the research work the spheres of influence were categorized into the main fields of macro and micro economical spheres of influence (see fig. 1). In compliance with the definition of logistics, industrial sectors were selected, dealing directly or indirectly with the flow of goods, representing the domestic economy.

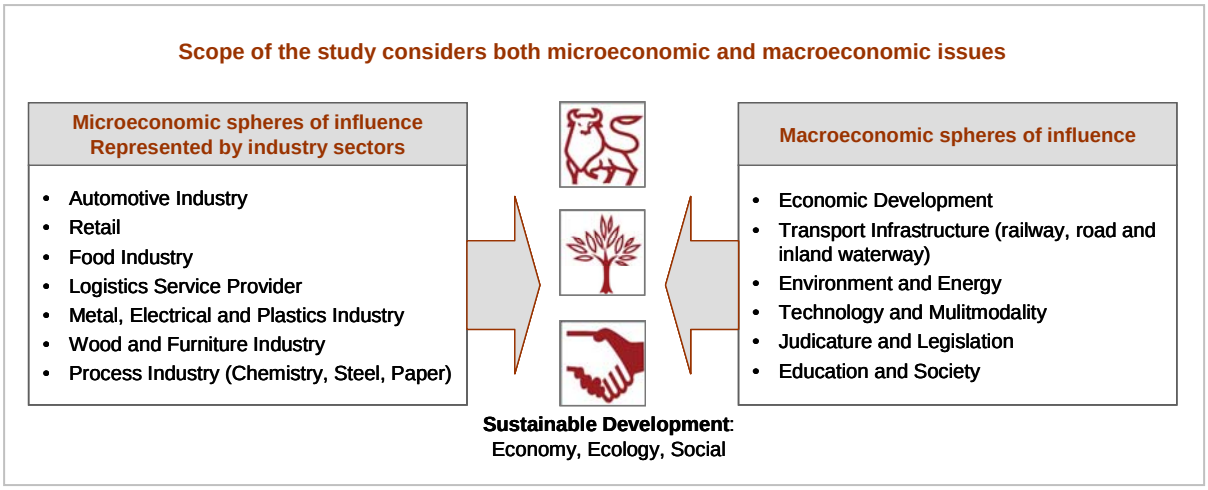

Fig. 1: Scope of the study (Flotzinger / Hofmann-Prokopczyk / Starkl 2008).

[1] Flotzinger / Hofmann-Prokopczyk / Starkl (2008).
[2] Brundtland (1987): p. 24-25.
[3] The United Nations Conference on Environment and Development (1992).

3 Scenario Methodology

To cope with future patterns the empirical scenario methodology has been selected due to the fact that the focus is put on the holistic research question and to a lesser extent to single influencing factors. Furthermore the method allows the consideration of complex interdependencies amongst quantitative and qualitative factors given by experts from different research areas and expertise. The scenario technique permits unambiguous and alternative projections as well as the underlying reasoning. The research study is based on the approach of Prof. Dr. Horst Geschka[4] by use of INKA 3 software, which finally creates the consistent future assumption bundles.

3.1 Approach

In order to analyze the contribution of logistics in 2030 for a sustainable development it is essential to create assumptions, so-called scenarios. The future scenarios are formed referring to the initial situation and are plausible and reasonable pictures of the future. The definition of scenario covers both the description of a possible future situation and the path leading there.[5] For this reason opinions of macro and micro economical experts as well as profound studies relevant for future development and logistics have been taken into account.

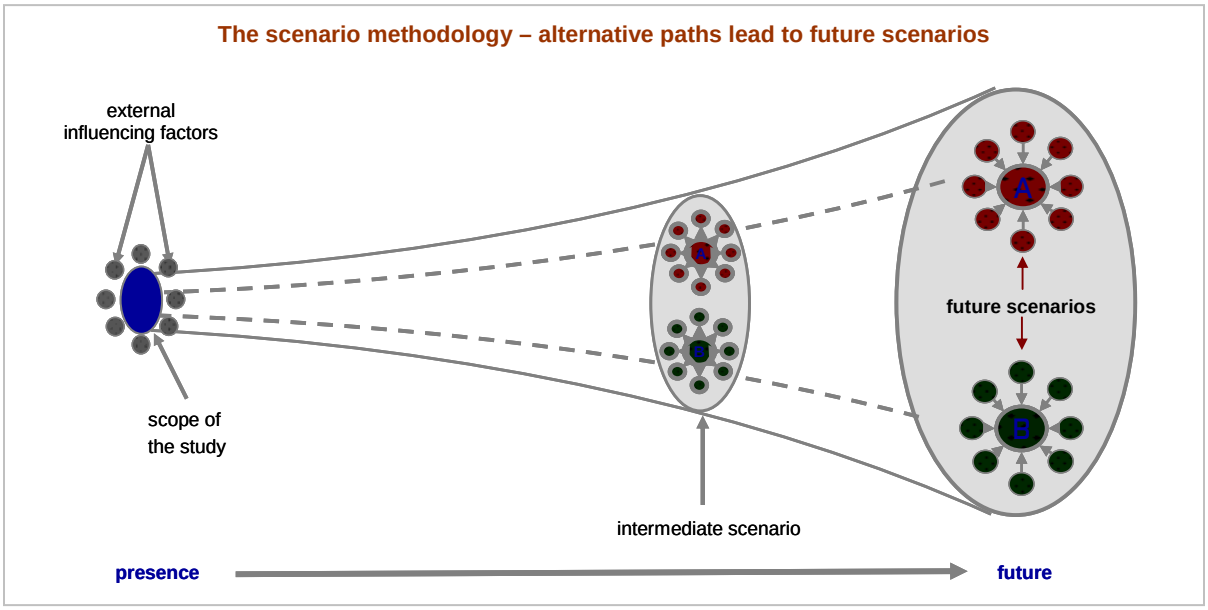

Fig. 2: Scenario methodology – alternative paths lead to alternative future scenarios (Geschka & Partner 2007).

3.2 Workshop Design

The experts' input has been elicited within 13 workshops according to the 13 spheres of influence described above (see fig.1). For these working groups 50 macro economical and 66 micro economical experts who represent selected public institutions, representation of interests and companies were acquired. When nominating the representatives the

[4] cp. Geschka / Hammer (1983): p. 224-249; Geschka / Winckler (1989): p. 16-23.
[5] cp. Gausemeier / Fink / Schlake (1996): p. 90.

research team tried to ensure a good balance between the different concerns. The selection of the companies representing the industrial sectors was based on the levels of turnover to guarantee a presentable sector screening. The workshops took place in September and October 2007, the number of participants varied from six to seventeen.

The input for the development, description and interpretation of the future scenarios was gained within the workshops through the following research questions:

1. What are the key success factors of the industrial sector / domestic business location?
2. What factors are logistically relevant?
3. How are these factors described today and in 2030?
4. Which factors may additionally appear until 2030?

The workshops started with a brainstorming to collect the factors, which afterwards where described in detail and forecasted until 2030. In order to avoid unrealistic, idealized images of the future the experts had to justify their projections reasonably. After a rework of the workshops' results 25 unambiguous and 64 factors with 2 or 3 alternative characteristics were identified.

3.3 Preparation and converting of the workshop results

Under involvement of experts the consistence of the 64 factors with alternative characteristics was evaluated by the means of a "consistence matrix". The evaluation provides the input for the technical realization by the INKA 3 software (version 1.2.1.). This was carried out for the alternative factors only as unambiguous tendencies are valid for any calculated scenario. In the following the algorithmic calculation bundled the factors to the most plausible und coherent combinations. As a result INKA 3 generated 27 plausible assumption bundles within 3 runs. According to the criteria consistence sum, consistence average and probability measure 3 basically different pictures of 2030 were selected. Another decision criterion was the number of different characteristics of the same factors among the scenarios. Special focus was put on the active and critical factors which have significant relevance for the development of the scenarios. The identification of the active and critical factors was done by an "impact analysis". For this purpose experts were interviewed again to receive essential information for the interpretation of the scenarios on the basis of the impact matrix.

4 Future scenarios 2030

Based on the methodology and the experts' input the following three scenarios have been identified. The graph shows the scenarios in relation to their contribution to a sustainable development. The focus in the research study was to support and to secure the realization of the "positive" and desirable scenario "Focus on logistics and innovation creates sustainability".

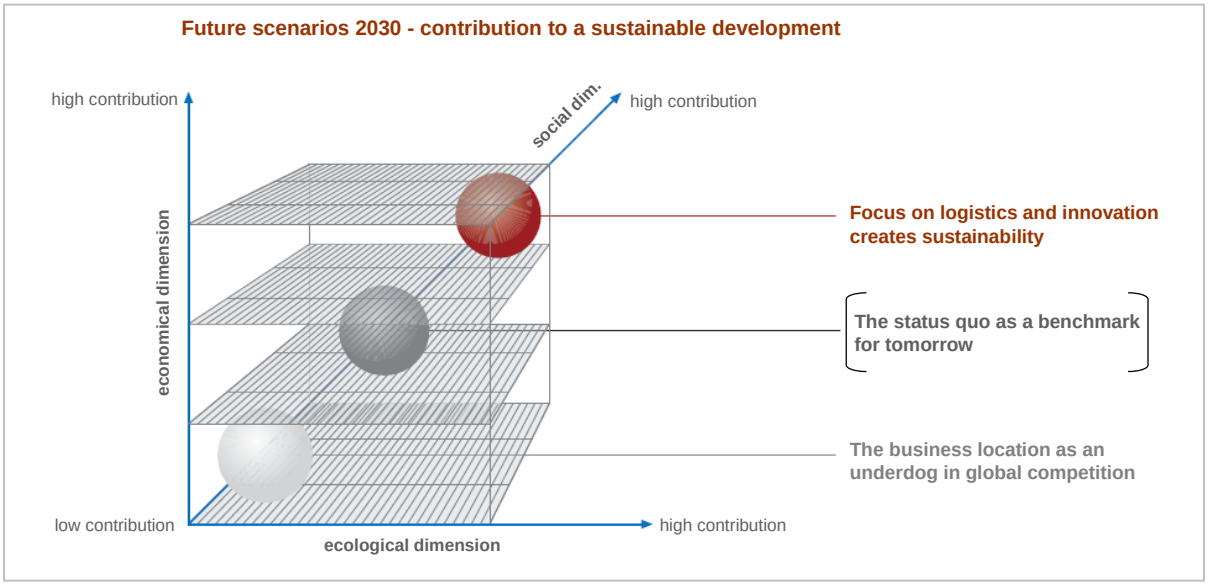

Fig. 3: Future scenarios 2030 (Flotzinger / Hofmann-Prokopczyk / Starkl 2008).

An important finding is that the discipline of logistics principally plays a major role in influencing the future development of an economic system. For this reason the following chapter deals with the identification and analysis of the contribution of logistics to a sustainable development of an economic system and furthermore represents the parameters of the discipline of logistics in 2030.[6]

5 Impact on logistics and the contribution to a sustainable development

Subsequently the explanations cover both the analysis of the secondary literature and the input of the expert workshops.

5.1 Globalization of logistics

The internationalization of business, for example Global Sourcing, the deployment of production and the international division of labor, causes greater distances, an increase in transport volumes and in the number of transports.[7] Under consideration of changing flows of traffic multimodal transport solutions will gain in importance. Decelerating verti-

[6] From a detailed description of the three different future scenarios is refrained in this scientific paper and referred to the research study "Logistik 2030 – Zukunftsszenarien für eine nachhaltige Standortentwicklung in Österreich" (Flotzinger / Hofmann-Prokopczyk / Starkl 2008: ISBN: 978-3-9501779-8-5).
[7] cp. Klaus / Kille (2006): S. 19f.

cal range of manufacturing in western industry countries as well as displacing core competences effect an escalation of intercontinental oversea container transports. The intensified interdependencies between western industry countries and the Asian market enable novel, innovative and global logistic concepts, which are essential to deal with rising complexity in supply chain networks. Thus, the importance of the discipline of logistics and the demand for experts will go up continuously.[8]
Logistics provides potential for rationalization and consequently for reduction of inventory respectively for effective management and bundling of transports and thereby non-productive return shipments can be diminished.

5.2 Innovative network structures and co-operations

Co-operations, strategic alliances and the enhancement of enterprise networks will be of utmost relevancy, whereas character will change and expected to be of superior quality. In this context a co-operation is defined as collaboration with different maturities, in which parties with mutual trust are involved. Reputation will play a major role as a well-functioning co-operation or strategic partnership will probably eclipse full integration of enterprises within the scope of Merger & Acquisition (M&A) as an alternative for consolidation.[9] Straube et al.[10] confirm that the concentration tendency in markets serves as an important driver for strategic competitiveness, especially in logistics. A growing number of partners and locations lead to increasing complexity within supply chain networks. Thereby the challenge is to connect actors and process in both counts of physical and informational matching.[11] Logistical collaborations predominantly center on classical and basic functions: procurement and distribution. To ensure successful and sustainable vertical partnerships between logistic service providers and their customers the coverage of the whole range of services is preconditioned. Horizontal co- operation opens up new chances when structuring international logistics and supply chain networks and generating synergies[12] especially in freight management, inventory management as well as in information and communication technologies.

5.3 Rising demand for superior logistic services

Rising customer requirements for best-in-class logistic services and demanded continuous improvement challenge providers within globalized markets.[13] Few fixed capital guarantees flexibility in designing transnational logistics processes. Flexible network structures are increasingly the key factor in dynamic markets. In order to ensure product availability worldwide at customer-defined conditions, enterprises are challenged to optimize their logistical concepts. This is essential to meet high requirements on flexibility due to necessary short-term reaction on customer orders, smallish order sizes and decreasing acceptance for delivery failures or delays.[14] The challenges cause adjustments of logistics strategies and have to be orientated towards the following competitive factors:

Customer service: The modern meaning of logistics takes up the position that the customer is the central point of all entrepreneurial activities. For this reason logistics is the ideal initial point for customer-binding measures[15] and the generation of competitive ad-

[8] cp Klaus / Kille (2006): p. 20ff.
[9] cp. Straube et al. (2005): p. 60, 100f; Weber et al. (2002): p. 121; Pfohl / Funzke / Köhler (2007): p. 147; ELA / Little (2007): p. 6,23.
[10] cp. Straube et al. (2005): p. 15.
[11] cp. ibid. p. 60.
[12] cp. Baumgarten / Walter (2000): p. 52.
[13] cp. Straube et al. (2005): p. 36f.; Weber et al. (2002): p. 30f.
[14] cp. Klaus / Kille (2006): p. 23.
[15] cp. Baumgarten / Walter (2000): p. 41.

vantages. Customer-oriented logistical measures do not have to be attended necessarily by customer-specific design of logistics concepts; product-supporting services[16] can generate customer value too.

Delivery performance: Rising quality requirements regarding delivery performance as well as the continuous optimization of logistic costs bring out a conflict of objective. Demanded superior logistic services, shorter periods to response on customers' requirements and other changes within the supply chain pose difficult challenges for companies. Kröber[17] summarizes as follows: "If product attribute and price does not differ significantly, logistic service will be the decisive purchase criterion as the customer will probably choose that product which is available for adequate conditions. In this case delivery time and reliability are the major competitive factors, crucial for the strategic success of the company."
In each field (B2B, B2C, etc.) customers require the personal and institutional perception of responsibility. This involves a new significance of the role of logistic service providers, evolving from typical task fulfillment to innovative and creative designing within a reliable partnership.[18]

5.4 Growing demand for customized logistics solutions

Standardization and Optimization within the management of customers and networks will be determining challenges for logistical processes as at the same time enterprises and logistic service provider have to meet requirements which apply specifically to a concrete problem, sector or customer ("standardized individuality").[19] Logistic solutions "ready-made" will not be viable in the future: all the more customized and efficient concepts focused on the customers' topics represent important success factors for companies to differ from competing companies. Furthermore the well directed application of logistics technology systems focused on customer-oriented product and service specifications will be indispensable.[20]
Complexity and cost pressure come second to robustness and security in supply chain management as concepts for stockless or low inventory (in times of uncertainty and risks in a worldwide turbulent environment) have to be reconsidered and new optima have to be defined. A return to a European-wide strengthened networking can not be excluded.[21]

5.5 Logistics as the key for cost reduction

A significantly important objective of logistics is the reduction of costs through optimization of the total system, especially of operational activities which come along with increasing market performance. The growing range of tasks would in fact lead to an increasing share of logistic costs on overall costs, although costs can be further reduced continuously by process optimization. The development of intelligent logistic solutions in mind with the efficient design of operational sequences enables companies to continue cost reduction.

5.6 Trend "Outsourcing" persists

Outsourcing of logistical relevant services stays attractive for companies, even though motives for industry and retail are changing. In addition to required concentration on core

[16] cp. Schary / Skjott-Larsen (2001): p. 125.
[17] cp. Kröber (2001): p.1.
[18] cp. Weber et al. (2002): p. 81ff; Straube et al. (2005): p. 78f; Spenner / Platt / Jung (2001): p. 126f, 136f.
[19] cp. Weber et al. (2002): p. 128f; Straube et al. (2005): p. 9; Graf / Lehmbach (2001): p. 126f, 136f.
[20] cp. Weber et al. (2002): p. 111ff; Graf / Lehmbach (2001): p. 129ff; ELA / Little (2007): p. 19ff.
[21] cp. Klaus (2008): p. 10.

competences, cost and quality aspects are centered. Single-sourcing strategies will gain importance in this context.[22]

5.7 Accumulated and intensified safety regulations

Accumulated safety regulations in global trade increase the complexity for logistic processes. Examples would be: (1) long waiting periods in already overloaded entrance ports, hence resulting in (2) demurrage costs for containers, incalculable turn-around times as well as (3) incomplete information availability and (4) an additional expenditure at administration and handling. Those parameters often entail unpredictable indirect costs and aspects of quality. The examination of „Worst Case "- scenarios allows to maintain the stability and operability of the supply chain and applies beside flexible processes and structures as a success criterion. A substantial contribution to increase attack security in supply chains is carried out by the information and communication technologies. In container traffic technologies like RFID, GPS and Smart Container enable consistent transmission pursuit and the identification of deviations and potential dangers. In the scope of sensor engineering the electronic seal is a possibility for the recording of incidents; the market penetration is inhibited because of the lack of standardization. The topic security in global supply chains does not require only the operational, but likewise the strategic viewpoint of all elements and parties, in particular the focus has to be put on the weakest member link in the chain. Due to the strategic importance and in the sense of prevention and response it is essential to place this topic on the level of management.

5.8 Rising importance of intelligent information and communication technologies

The technological progress opens up new ways for process innovations within the logistical field. A possible and potential solution instrument for many logistics-relevant, in particular traffic related problems, is the Information and Communications Technology (ICT). Experts assume that in the future many vehicles will be equipped with Information and Communications Technology interfaces resulting in an eased implementation of additional options (e.g. improvement of the extent of utilization of the vehicles). Beyond that the future vehicles are interlaced and equipped with just-in-time (JIT) information services.[23] The customers will call for transparency and information availability at any time in the supply chain; fulfilling this customer demands will also be a competitive advantage for the companies. By the use of information and communication technologies as well as the integration of internet-based solutions, the speed and transparency can be ensured to enable cross-company planning and the control of complex logistics chains. To cope with the complexity of the supply chain and to integrate the partners and the processes of global cooperative networks and logistic operational sequences of international enterprise activities, intelligent information systems were required.[24] In logistics research in the field of self-monitoring is needed, namely the tracking of goods during the transport by systems reacting in case of deviations.[25]

5.9 Increasing requirements for the logistics staff

The global dimension of the flows of goods and information leads to higher and differentiated requirements to the logistics personnel. Apart from the cross-cultural competence special attention has to be put on the cooperative strategy, plan and target setting. Further the technological requirements will rise notably. To handle the complexity of logis-

[22] cp. Weisbrodt / v. Kessel (2001): p. 152ff; Straube et al. (2005): p. 74f.

[23] cp. Mícíc (2006): p. 179f.

[24] cp. Baumgarten / Walter (2000): p. 63.

[25] cp. Lang et al. (2005): p.1.

tics solutions in accordance with the requirements of the economy and the customers, technical and overall know-how, cross-company cerebration and acting as well as soft skills are necessarily. In the future on average better skilled qualified employees will operate in the logistics industry. Expert related further education in companies will become more important und amplifies the innovation in the range of logistics.

5.10 Improved flexibility of labor

In order to meet the design requirements of the logistics structures due to the flexible adoption of the capacities on fluctuating contract volumes as well as on grounds of the gain in importance of cost-efficiency as a decision criterion, a flexible adjustment of the employees' capacity will be essential. According to Straube et al.[26] companies can use overtime, job sharing and gliding time arrangements, outsourcing as well as employee pools as successful instruments for the needs-based transition of flexible staff.

5.11 Change of the economic structure from the logistical point of view

The transition to the post-industrial society and thus smaller quantity requirements slowed down the growth of industrial goods production. The principle of service orientation requires (1), according to the situation and appropriate to the requirements, customized logistics solutions with a high level of integration of the logistic service providers, (2) a constant adjustment of these solutions as well as (3) the offer of value-added-services, if necessary also on non-logistic services. Consequently industrial enterprises will concentrate increasingly on their core competencies. Thus Klaus and Kille[27] point out that concepts like holistic supply chain management, complexity reduction and outsourcing move more and more into the spotlight. By the use of modern logistics solutions these challenges can be managed and costs reduced.

5.12 Sustainable management of logistics systems

The consequences of a rising environmental sensitivity of the population for logistics should not be underestimated: increasing aversion against road transport could force companies to rearrange their transport-intensive delivery chains and change over to the carriers' rail and inland-water way or sea. However, this could not be the only reason for a restructuring of logistics. Today the cost analysis concentrates only on the indirect traceable costs, for example warehousing, transport and inventory costs. To a lesser extent considered are environmental costs caused by logistic activities. Because of the still missing methodical agreement of calculating the external costs and the lack of political willingness to internalize those, these costs and the resulting macroeconomic adversity can not be assigned to logistics.[28] In the future, the stronger environmental adjustment of the society, for example the regionalization of the transportation flows, will possible causes a decrease of transportation volumes. Undisputable is the fact that because of new legal requirements to reduce emissions and to save resources additional tasks to the supply chain management will be assigned. This requires detailed knowledge of the entire value chain, since each part can directly or indirectly generate or avoid emissions. The management itself has to act in line with long-term goals and to ensure the sustainable use of the potentials for success, not for short term profit maximization. Therefore indispensable conditions are the competence of the participants and the responsible perception of the management tasks according to customer wishes, employees, environment and society. The rising complexity confuses this task more and more. In this context the comments of the European Commission to the concept of the „Corporate

[26] cp. Straube et al. (2005): p. 42.
[27] cp. Klaus / Kille (2006): p. 22, 28.
[28] cp. Seidel / Wolff (2007): p. 332.

Social Responsibility“ (CSR)[29] should be mentioned. The CSR-concept asks the companies to make a volunteer contribution for sustainable development beyond the legal requirements.

5.13 Integration of logistics in the business strategy

Referring to the companies the above listed and discussed macroeconomic trends require a strategic view of the logistics-relevant challenges. The logistics strategies and targets have to be integrated in the strategic plan and system of objectives of the companies.[30] Continuous changes and re-orientations within the logistic processes as well as global economic dynamics require both a company-wide and cross-company oriented approach and also flexible processes and structures.

5.14 Logistics enables competitive and locational advantages

Identifying and capitalizing the possibilities of logistics management for companies leads to optimization which allows to cope with the customer preferences. Therefore logistics can not only improve the flow of goods and information but also generate and achieve a holistic competitive advantage.

6 Conclusion: crucial factors for sustainable development of a business location

The “impact analysis” as an important part of the scenario methodology as well as the input of micro and macro economical experts, are the basis for the identification of critical factors for sustainable development of a business location (see chapter 3). Furthermore, these factors are essential to realize the desirable scenario “Focus on logistics and innovation creates sustainability” (see chapter 4). Below listed – also logistically relevant – parameters have to be taken into consideration as they are decisive in their future development and therefore have negative and / or positive influence on an economic system of tomorrow.

- Policy of traffic, infrastructure, environment and energy
- Cross-border planning of infrastructure
- Performance of transport infrastructure
- Interoperability of railways
- Intermodal traffic planning and control
- Innovation system
- Economic development
- Customer requirements
- Skills of employees
- Energy prices
- Greenhouse gas emissions
- Environmental laws

As pointed out in this paper the discipline of logistics can play a major role and considerably contributes to a sustainable development, under the provision that the political framework is appropriate. Essential for logistical processes within the domestic economy

[29] cp. European Commission (2001): p. 7.
[30] cp. Straube et al. (2005): p. 30ff.; Weber et al. (2002): p. 27; Göpfert / Neher / Jung (2001): p. 321ff.; ELA / Little (2007): p. 19ff.

is the infrastructure and transportation system, the relevant legal regulations and standards as well as ecological issues. In order to use the potential of logistics policy makers have to regard the discipline of logistics in a holistic interrelation and to comprehend its prospective contribution to a sustainable development.

Bibliography

Baumgarten H. / Walter S. (2000): Trends und Strategien in der Logistik 2000+ - Eine Untersuchung der Logistik in Industrie, Handel, Logistik-Dienstleistung und anderen Dienstleistungsunternehmen, Berlin.

Baumgartner J. / Hofer H./ Kaniovski S. / Schuh U. / Url T. (2006): Employment and growth in an aging society: a simulation study for Austria.

Brundtland G. (1987): Report of the World Commission on Environment and Development, Juni; http://www.anped.org/media/brundtland-pdf.pdf

ELA - European Logistics Association /Little A.D. (2007): Innovation in Excellence in Logistics – Value Creation by Innovation: Results of the ELA/Arthur D. Little Study, Brussels.
http://www.vlmnet.nl/files_content/InnoEx_Log_Study_ELA-ADL_final.pdf

European Commission (2001): Grünbuch Europäische Rahmenbedingungen für die soziale Verantwortung der Unternehmen, Brüssel.
http://eur-lex.europa.eu/LexUriServ/site/de/com/2001/com2001_0366de01.pdf

Flotzinger C.W. / Hofmann-Prokopczyk H. / Starkl F. (2008): Logistik 2030 - Zukunftsszenarien für eine nachhaltige Standortentwicklung in Österreich, Steyr.

Geschka H. / Hammer R.(1983): Die Szenario-Technik in der strategischen Unternehmensplanung, in: Hahn D. / Taylor B. (Hrsg.): Strategische Unternehmensplanung. Würzburg-Wien, S.224-249.

Geschka H. / Winckler B.(1989): Szenarien als Grundlage strategischer Unternehmensplanung, in: Technologie & Management, Nr. 4, S. 16-23.

Geschka & Partner (2007): Seminar Szenariotechnik, Darmstadt, S. 16.

Gausemeier J. / Fink A. / Schlake O. (1996): Szenario-Management, Planen und Führen mit Szenarien, 2. bearbeitete Auflage, München.

Göpfert I. / Neher A. / Jung K.P. (2001): Stand und Entwicklung der strategischen Logistikplanung – Ergebnisse empirischer Untersuchungen von 1999 und 2000 im Vergleich, in: Göpfert I. (2001): Logistik der Zukunft – Logistics for the future, 3. Auflage, Wiesbaden, S. 315-333.

Graf J. / Lehmbach J. (2001): Die Entwicklung der Logistik im Einfluss von Visionen, in: Göpfert I. (2001): Logistik der Zukunft – Logistics for the future, 3. Auflage, Wiesbaden, S. 117-140.

Pfohl H.C. / Frunzke H. / Köhler H.: (2007): Innovationsgenerierung in kontraktlogistischen Beziehungen aus Dienstleister- und Kundensicht. Konzeption und empirische Ergebnisse, in: Pfohl, H.-Chr.(Hrsg.): Innovationsmanagement in der Logistik – Gestaltungsansätze und praktische Umsetzung, Hamburg, S. 106-160.

Klaus P. / Kille Ch. (2006): Die Top 100 der Logistik – Marktgrößen, Marktsegmente und Marktführer in der Logistikdienstleistungswirtschaft, 4. Auflage, Hamburg.

Kröber J.(2002): Gestaltung europaweiter Distributionsnetzwerke – Distributionsstudie als Grundlage erfolgreicher Logistik, in: Miebach Logistik.

Lang W. / Jedermann R. / Behrens C. / Sklorz A. / Benecke W. / Laur R. (2005): Intelligente RFID – mehr als Identifizierung, Vortrag gehalten im Zuge des Mikrosystemtechnik Kongress 2005, 10.-12. Oktober, Freiburg
http://www.sfb637.uni-bremen.de/pubdb/repository/SFB637-B6-05-004-IIC.pdf.

Micic P. (2006): Das Zukunftsradar. Die wichtigsten Trends, Technologien und Themen für die Zukunft, Offenbach.

Schary P.B. / Skjott-Larsen T. (2001): Managing the Global Supply Chain, Second Edition, Copenhagen Business School Press.

Seidel T. / Wolff S. (2007): Ökologie & Logistik – umweltgerechte Lösungen. Auf dem Weg zu Green Logistics – Messbarkeit ist der Schlüssel, in: 24. Deutscher Logistik Kongress Berlin – Kongressband 2007, Hamburg, S. 333-363.

Spenner B. / Platt J.H. / Jung K.-P. (2001): Electronic-Shopping – Die Zukunft des Versandhandels? Eine vergleichende Betrachtung empirischer Untersuchungen von 1997 und 2000, in: Göpfert I. (2001): Logistik der Zukunft – Logistics for the future, 3. Auflage, Wiesbaden, S. 223-250.

Straube F. / Pfohl H.-Ch. / Günthner W.A. / Dangelmaier W. (2005): Trends und Strategien in der Logistik – Ein Blick auf die Agenda des Logistik-Managements 2010, Hamburg.

Weber J. / Schmitt A. / Engelbrecht Chr. / Knobloch U. / Wallenburg C.M. (2002): E-Commerce in der Logistik: Quantensprung oder business as usual? Ergebnisse einer explorativen Marktuntersuchung; aktuelle Trends in der Logistik unter dem Einfluss von E-Commerce, Bern.

Weisbrodt B. / v. Kessel F. (2001): Die zukünftige Entwicklung von Distributionsstrukturen und –prozessen im Spannungsfeld zwischen Handel und Industrie, in: Göpfert I. (2001): Logistik der Zukunft – Logistics for the future, 3. Auflage, Wiesbaden, S. 141-158.

The United Nations Conference on Environment and Development (1992): Rio Declaration on Environment and Development, June 1992, Rio de Janeiro.