ARGUMENTA OECONOMICA
No 1 (22) 2009
PL ISSN 1233-5835

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LOGISTIC POLICY IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT OF AN INDUSTRIALIZED REGION

As the foremost objective of this thesis, the author suggests a concept of logistic policy that improves physical and information flows among supply chain participants and complies with the goals and principles of sustainable development. The author attempts to programme logistic policy in the context of sustainable development of an industrialized region, although the indicated objectives and principles of logistic policy can refer to both national and EU levels.

Keywords: logistic policy, sustainable development, industrialized region

INTRODUCTION

In an era of progressive liberalization, globalization, ever-growing production scale, technological interrelations and environmental degradation, it is extremely important to prevent developmental processes from being spontaneous or accidental, as that could lead to regression. The issue is even more significant in highly industrialized and urbanized regions that are polycentric and structurally diverse. One should strive for creating an integrated economic, social, environmental, spatial, institutional and political order that would be closely connected with the idea of sustainable development. It must be remembered that development by nature takes place in an unsustained manner, therefore it must be sustained and the results of developmental actions must be established by mechanisms and instruments within the frameworks of macroeconomic and other economic policies, which constitute an element in the shaping of the institutional and political order. The order is the foundation and core of an integrated order, in which other orders are immersed. The order determines and creates all the remaining reality, as it formulates all strategic conditions and strategic objectives in the economic, social, environmental and spatial aspects.

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The objectives of the Lisbon Strategy and the European Union Sustainable Development Strategy (*The Lisbon European Council* 2006) like economic growth, increase in employment or innovation, together with the priorities set forth in 2001 in Gothenburg (*A Sustainable* 2001), namely improvement of the quality of the environment and sustainable development, require the implementation of different methods and tools that facilitate sustainability. As practice shows, logistics is an excellent tool that may both facilitate competitiveness and speed up, or at least smooth the process of sustainable development, especially in industrialized areas. Beside this, numerous logistic technologies facilitate the accomplishment of economic, social, environmental and spatial objectives (Krupanek, Skowrońska (ed.) 2006, p. 5-79) which supports their development and implementation, which if properly programmed on the macroeconomic scale, should be one of the most important directions of practical accomplishment of objectives and principles of sustainable development.

This paper includes:

1. Theoretical deliberations concerning the relation between sustainable development of an industrialized area and logistic policy.
2. The author's own concept of logistic policy, which through a programme of deliberate direct and indirect actions that would facilitate physical and information flows among supply chain participants and comply with the objectives and principles of sustainable development.

The article represents both the theoretical/conceptual trend and the empirical trend. In the conceptual part, which deals with logistic policy programming in the context of sustainable development, the author proposes a makeup of the stakeholder forum that should conduct logistic policy; performs a SWOT analysis, which is an important element of logistic policy programming; and builds a tree of objectives for logistic policy. In the light of the author's research, it turns out as necessary to assume superior objectives and sustainable development principles as determinants that create logistic policy. Regarding indirect objectives, the author points to those which not only facilitate physical and information flows among supply chain participants, but also contribute to the accomplishment of sustainable development objectives and principles. As for operational objectives that facilitate the execution of indirect objectives, the author lists goals in seven fields: infrastructure and transport, public private partnership, research and development, innovation and sustainable logistic technologies, innovative and intelligent

regulations, efficient logistics, and cooperation. The author also suggests definite actions and a set of instruments which would encourage the accomplishment of sustainable development principles and better competitiveness.

In the part devoted to conceptualization of public logistic policy and pointing to its role in effective and efficient implementation of sustainable development principles, the author presents methods, conditions, possibilities and contributions connected with the creation of logistic policy, which could be used regionally, nationally and in the EU.

While building her own concept of logistic policy, the author has used achievements of the theory of state-building, development theory, system analysis and synthesis. She has also reviewed international, including European, documents that set forth the assumptions, objectives and principles of sustainable development and logistic policy. The author's ideas in this article are part of her more extensive research done in 2005-2008 (Skowrońska 2009).

1. SUSTAINABLE DEVELOPMENT OF AN INDUSTRIALIZED REGION AND LOGISTIC POLICY

There are a lot of definitions of sustainable development in reference works. In this analysis, the author is going to use the concept of sustainable development as a *holistic paradigm that generates a new vision of an integrated order. The vision strives for economic effectiveness, social harmony, balanced natural environment and spatial structures that would be in opposition to chaotic, expansive and disorderly development. Creating an integrated order should favour satisfaction of needs of the present generations, without limiting the needs of those to come.*

In view of the growing significance of logistic policy on the macroeconomic scale (at the regional level as well) and the more and more distinct and more significant logistic sector, which is becoming one of the sectors that participate in the generation of the national income. The share of the logistic sector in the world GNP is 13.8% and 13% in Europe. Logistic costs (mainly transport and storage) within the costs of a finished product are 15-20%. Annual expenditure on logistics in Europe and North America reach EUR 1.000.000.000 in each of these regions. It is estimated that by 2020 the importance of the logistic sector will have increased by 50% in comparison to today. As a factor influencing economy, society, environment

and space, it proves necessary to make traditional transport policy evolve towards logistic policy (more on the evolution of logistic policy in: Skowrońska 2007a, p. 19-31). The importance of logistic policy is particularly manifest in an industrialized region, where there is a distinctive feedback between the logistic sector and its surroundings. Relations that take place between the logistic sector and its environs in an industrialized region may be divided into exchange relations, power relations and secondary effect relations. The relations can be either positive or negative. Thanks to programming of logistics within a policy and thanks to its integration and coordination characteristics, there are a lot of opportunities to establish positive relations, while eliminating pathological ones.

Logistic policy, through a programme of deliberate, direct and indirect actions of the state aiming at improving performance and effectiveness of product flow processes and accompanying information among supply chain participants could strengthen the logistic sector. At the same time, it could co-create the institutional and political order that is the essence of sustainable development (the issue of logistic policy in theory is broadly discussed in: Witkowski 2004, p. 54-64; Skowrońska 2006, p. 35-42; Skowrońska 2007b, p. 15-18).

In the system of interventionist actions of the government, logistic policy should be placed centrally. Such a location does not change any interrelations and intermingling of logistic policy with other policies. The author would like to emphasize that while developing a logistic policy, objectives and instruments in macroeconomic policies should be significantly coordinated. The same applies to policies that aim at production, trade and transport, as well as social, economic and environmental activities. Such an approach agrees with the guidelines issued by the European Commission (more details in: *Sustainable Europe* 2005), which underline the necessity of a new approach in creating new sector policies, which so far have been developed with unsatisfactory coordination. That often led to situations where activities directed at the accomplishment of objectives of one policy undermined progress in another. Such an approach gave rise to numerous, long-term and unsustainable trends.

2. THE AUTHOR'S CONCEPT OF LOGISTIC POLICY IN AN INDUSTRIALIZED REGION

Creating any policy within present-day regions or countries requires participation of all the stakeholders. In relation to logistic policy, a stakeholders' forum should at least consist of representatives of local councils, logistic organizations, road carriers, rail carriers, carriers by sea, carriers by land, air carriers, public road administration, port authority, airport authority, railroad authority, inland road administration, commercial associations and chambers, environmental organizations, non-governmental public health organizations, the police and provincial road transport inspectorates, customs service and border guard service. Another step should involve a SWOT analysis for the logistic sector (see Table 1).

Table 1

SWOT analysis as an element of logistic policy programming

SWOT Analysis	
Strengths	1. Dissemination of telematic solutions in logistics 2. Growing importance of cooperation among logistic systems of companies 3. Improved competitiveness of logistic systems of companies 4. High adaptation skills of logistic systems in companies 5. Participation of scientific units in international projects and experience in their accomplishment 6. Development strategy for information society and broadband Internet access formulated in governmental and local council documents 7. Energy and transport potential of rivers as alternative sources of energy and transport 8. Promptly introduced technological changes (cleaner production, delivery, transport) 9. Well-developed railway network (e.g. in Poland)

Weaknesses	1. Too little emphasis on public private partnerships 2. Difficulties with controlling physical and information flows in globalizing supply chains 3. Low quality and efficiency of infrastructure (especially airports, ports, roads) 4. Insufficient participation of railway transport, river and sea transport in overall transport 5. Weak links in environmental improvement of general safety of supply chains, which is caused by small and medium-sized companies being unable to comply with ever-stricter regulations 6. Inadequate awareness among entities forming chain links, concerning possibilities of technological connection of production plants and eco-friendly collection of used products 7. Too few cheap and safe IT solutions 8. Weak compatibility of present transport policy with other policies (financial, tax, regional policies, etc.) 9. High degree of fixed assets usage in logistic systems of companies 10. Little participation of advanced technology industries in sold produce 11. Low level of investment outlays 12. Unsatisfactory saturation of logistic systems of companies with information and communication technologies (ICT) 13. Insufficient access to external financing sources for innovative companies at early development stages 14. Low level of means dedicated by entrepreneurs to research and development (R&D) 15. Insufficient willingness to cooperate between companies and research stations 16. Underdeveloped system of legal and tax incentives for companies and concerns to invest in R&D 17. Insufficient scope of polluter pays principle (PPP)

Opportunities	1. Displacement of hierarchical structures by network structures 2. Increased demand for transport 3. Increased importance of home delivery 4. Improved road traffic safety 5. Development of logistic centres 6. Elimination of barriers in linehaul transport of passengers 7. Opportunity to develop sustainable transport with significant participation of railway and inland navigation 8. Development of institutions that support companies 9. Significant supply of qualified workforce 10. Access to world achievements in business and innovation 11. Shift of sector help directions to pro-developmental help 12. Development of innovativeness, including one leading to decreased material consumption 13. Influence of market mechanisms that make waste recycling more profitable 14. Increased safety and comfort of carriers' work 15. Improvement of conditions in maritime environment and sailing safety 16. Development of transport system in accordance with sustainable development principles
Threats	1. World markets conquered by specialized niche operators 2. Crowded city roads 3. Environmental and social pressure 4. Increased transport costs due to elevated costs of workforce, oil prices, fees connected with traffic hold-ups and ever-stricter safety requirements 5. Increased production in the developing economies of China, India, Brazil and Russia 6. Longer transport distances 7. Shift of the world economy and decision centres related to management and control over logistic chains 8. Terrorism and natural disasters 9. Strong influence of transnational corporations 10. Increased costs of business activity in road transport 11. Distrurbances in developmental enterprises as a result of insufficient legal regulations, lack of effective management of investments 12. Increased costs of business activity 13. Unstable and unpredictable legal environs 14. Rather high costs of using renewable energy

Source: author's study based on: Krupanek, Skowrońska 2006, p. 45-48; Kauppinen et al. 2006, p. 1-34

Before pointing out and hierarchizing objectives of logistic policy, it should be understood that there must be reflexive relations between the impact of the authorities on the efficiency and effectiveness of the processes of commodity and information flows among logistic chain participants and sustainable development. That fact results from the sheer definition of sustainable development (*Environment Protection Law* 2000, p. 1ff). This assumes interference and coherence of equivalent economic, social and environmental aspects, as well as – in the author's opinion – spatial aspects, which are all an expression of development sustainability as the basis of its directing and shaping.

In view of the fact that in the system of interventionist actions of the government and local authorities, logistic policy should be placed centrally and be a kind of 'clip' that binds together and coordinates many different means and issues situated outside logistics itself, but placed within industry, transport, trade, environment protection, spatial planning, etc. This means that logistic policy is not only interested in logistics in the strict sense, as the domain of this type of policy, but in all the areas that directly or indirectly contribute to better efficiency and effectiveness of product and information flows among supply chain participants. It is manifest that the following factors will have more and more influence on sustainable development planning: improvement of efficiency of logistic processes, improvement of effectiveness of logistic services, location of logistic centres, organization of public transport and storage infrastructure in a region.

The concept of sustainable development assumes that it is possible and necessary to eliminate the contradiction between social, economic and environmental goals. Logistic policy is also an area of mutual interrelations and permeation between logistic policy and other policies. Therefore, objectives of sustainable development should be imperative. Logistic technologies undoubtedly facilitate the accomplishment of the goals, but it is logistic policy, based on goal coordination and integrated actions of macroeconomic policy instruments, as well as a holistic viewpoint, that will help to use all the available technologies and logistic solutions in the process of sustainable development. In any case, coordination of objectives and instruments of various policies connected with the accomplishment of economic, social, spatial and environmental goals, is itself the base of the essence of sustainable development.

Bearing in mind the aforesaid considerations, the SWOT analysis and the renewed sustainable development strategy for a region or a country, the following imperative objectives of sustainable development as determiners

of logistic policy creation should be assumed (more in: *Review of the EU Sustainable Development Strategy* 2006, p. 3-5): environment protection, social fairness and coherence, economic prosperity and meeting international obligations.

While creating a logistic policy, one must remember to include sustainable development principles that are indicated in the renewed strategy (*ibidem*): promotion and protection of fundamental rights, solidarity within and between generations, open and democratic society, involvement of citizens, involvement of businesses and social partners, policy coherence and governance, policy integration, using best available knowledge, precaution, and making polluters pay.

In order to answer the question as to what logistic policy should be to improve the effectiveness of physical and information flows among logistic chain participants in an industrialized region (where this objective comes directly from its definition) and to be a tool that can satisfy the goals and principles of sustainable development of the region, it is worth remembering that direct and operating objectives of logistic policy should include the need for effective usage of resources and energy. This ability to use resources successfully is a key factor determining competitiveness. In view of the challenges that the world is facing, it seems necessary to limit the excess of commodities and energy consumption, which means to improve the efficiency of resource management.

The following indirect objectives may improve physical and information flows among logistic chain participants, while complying with the goals and principles of sustainable development:

1. Optimal access to high quality goods at low general, economic, social and environmental costs, and minimal disturbances.
2. Construction and improvement of network connections efficiency.
3. Providing logistic services at such costs that customers do not lose their competitiveness.
4. Creating an operational environment that could activate the competitiveness of entities forming logistic chain links, as well as the whole chains in a region.

Operating objectives should facilitate the execution of the indirect objectives. In the context of regional logistic policy, they can fall into seven areas (categories): infrastructure and transport, public private partnership, research and development, innovation and sustainable logistic technologies, innovative and intelligent regulations, cost efficiency (effective logistics), and cooperation (see Table 2).

Table 2

Operating objectives of regional logistic policy

Operating objective categories in regional logistic policy	Detailed objectives within operating objectives
Infrastructure and transport	1. Improvement and development of infrastructure with an analysis of economic, social, environmental and spatial costs and profits 2. Investments in the transport sector and transport equipment 3. Development and continuation of programmes for intelligent transport systems and intelligent mobility in transport 4. Taking advantage of the possibilities of rail transport and emphasizing increased speed, frequency and load bearing of trains, as well as low energy consumption and minimal noise levels 5. Sustainable development of all transport branches 6. Development of good quality transport and telecommunication infrastructure and associated services 7. Increasing flow capacity of infrastructure through its development and even arrangement of traffic in time and space thanks to investments in management technologies and network control 8. Optimal usage and joining of different means of transport (activities aimed at: elimination of regulation barriers that make intermodality practice difficult; encouraging to gather experiences and exchange proven solutions; supporting standardization and interoperativeness among different means of transport and also investing in reloading junctions) 9. Supporting the development of external and internal municipal logistics 10. Minimizing road traffic overload 11. Construction of ring roads and bypasses to relieve main roads of cities and towns of transit traffic 12. Improvement of road safety and minimizing the number of fatal accidents 13. Adaptation of road surfaces and bridges to trucks with increased axle loads 14. Improvement of efficiency of the road sector and ports in order to decrease the costs of logistics and transport, thus improving competitiveness of exported goods 15. Encouraging the usage of water transport as practical and economical

Innovative and intelligent regulations	1. Development and continuation of programmes for intelligent mobility in transport 2. Promotion of innovative solutions and knowledge-based economy and creating a business-friendly environment 3. Avoiding redundant regulations 4. Providing competitiveness by the authorities in the logistic services market so as to assure efficient and abundant services 5. Introduction of effective mechanisms to protect the market from excessive concentration and monopolization 6. Providing a clear and long-term perspective of regulation changes that should help companies to prepare for their future implementation
Public private partnership	1. Fostering the synergy effect in relation to cooperation among public administration, supervising organs, business and academic world 2. Promotion of public private partnerships as the best way to the creation of logistic centres 3. Analyses and recommendations related to financial agreement models and their optimal role 4. Accomplishment of public-private investments that lead to economic, social, environmental and spatial objectives
Research, development and training	1. Strengthening technological and scientific bases 2. Providing financing of R&D in transport, distribution and storage 3. Increasing availability of R&D services and results 4. Supporting academic staff in professional training and cooperation with business (including courses for logistics specialists) 5. Development of automatic processes and technology for optimal usage of resources

Innovation and sustainable logistic technologies	1. Initiation of stimuli that urge companies to introduce innovativeness and mechanisms to improve competitiveness of small and middle-sized companies in order to develop new logistic solutions 2. Improvement of innovation management 3. Efficient usage of modern technical and organizational solutions in logistic chains, in the road and railway subsystems 4. Promotion of better information flow security 5. Promotion of information technology connected with authorities integration into logistic chains 6. Creation of competition conditions for sustainable technologies
Cooperation	1. Participation in international work on standardization of information exchange in logistics 2. Sharing databases through electronic platforms 3. Integrated and coherent logistic activities among supply chain companies and the authorities 4. Facilitating fluent and prompt integration or conformity among different modalities 5. Constructing mutual regulations with regard to noise levels, pollution, working hours, etc. 6. Supporting regional cooperation in creating a shared area of mutual influence among logistic chains 7. Supporting cooperation and coordination among regions in planning and developing transport infrastructure (especially transport corridors)
Cost efficiency	1. Providing transparent costs for the use of infrastructure and other public services 2. Enriching knowledge of logistic costs and the costs of the use of infrastructure and other public services

Source: author's research

All the foregoing, relatively stable (continuous) intermediate and indirect objectives of logistic policy should undoubtedly support the attainment of the goals within the four (economic, social, environmental, spatial) fields determined by the concept of sustainable development.

In spite of the fact that all the objectives of logistic policy suggested by the author, based on goal coordination and integrated influence of instruments of macroeconomic policies and a holistic perspective, should themselves facilitate the achievement of the superior objectives within the concept of sustainable development, it is also advisable to build a specific set of actions. Such actions could: improve air quality and reduce carbon dioxide emission; improve environmental efficiency; reduce levels of noise and disturbances caused by means of goods transport; reduce the number of accidents, injuries and diseases connected with production and relocation of commodities.

As can be deduced from the author's abovementioned proposals, logistic policy objectives should be dominated by future-oriented goals, especially the so-called objectives for logistic innovation and relatively stable objectives. One cannot, however, exclude future-responding objectives (the so-called repair objectives), which are especially significant in highly industrialized regions and incidental objectives, connected with the need of problem solving or counteracting transient phenomena, connected with the need of problem solving, or counteracting transient phenomena, connected with supply chain participants transgressing the levels of gas or carbon dioxide emission or other kinds of pollution. While constructing logistic policy objectives, general non-addressed objectives should prevail, which are characteristic of horizontal policies and involve the shaping of responsibility of supply chains for economic consequences (implied by creating market value), social consequences (correlated with the impact on various interest groups) and environmental consequences. Yet, in order to achieve logistic policy objectives, one ought to build a set of useful instruments, such as those suggested in Table 3 below.

Table 3

Set of selected logistic policy instruments supporting sustainable development

Types of national instruments
rise of tax rates: carbon and sulphur emissions, diesel oil, electricity and water supply, waste incineration and storage, new car purchase, petrol sale, industrial carbon emission, sale of pesticides, chlorinated solvents, solid waste accumulators, water pollution, air pollution
tax deductions for companies investing in alternative energy solutions (e.g. wind power engineering)
tax deductions for companies investing in energy saving solutions
marking products manufactured in compliance with environmental standards with eco-friendly labels

production limits
elimination of regulatory and infrastructural barriers in using rail, water and air transport
economic and financial support of combined transport development, safety improvement and environmental protection
branch sustainability of transport
fee systems for infrastructure users in city centres
mechanisms of vehicle tax differentiation depending on environmental criteria
promotion of intermodal transport development
planning and private public partnership within logistic infrastructure development
promotion of EDI standards
construction and modernization of sea ports, airports and reloading terminals, etc.
counselling and promotion concerning logistic services
banning disposable products
subsidies encouraging effective use of water and wind power
motor vehicle and oil directives
standards against motor vehicle fumes
standards regulating fuel quantity
appropriate legal framework for substitution fuels of lower emission
railway system reforms (separation of service utilization from infrastructure administration, restructurization)
development of organization structures of industrial cooperation system
development of credit guarantees system for companies forming logistic chain links
research and analyses of logistic sector and logistic systems
governmental appointment and/or support of research units and governmental orders for scientific and developmental research results
fees and product taxes
deposit and refund fees
emissions trading
sharing, pooling
manufacturer's responsibility for products
commissioning of evaluation to access influence of goods transport on environment
system of incentives encouraging haulers to use railways and waterways

Source: author's research

As it is apparent from Table 3, in order to improve physical and information flows among supply chain participants, while complying with the principles of sustainable development (apart from the principles of sustainable development expressed in the Renewed Lisbon Strategy, there

are some more: the principle of using mainly recyclable space, material and energy; the principle of relying on renewable material and energy only when they cannot be substituted by recyclable resources; the principle of economical and effective usage of time, space, material and energy; the principle of discharging processed materials and energy into the environment, only when they cannot be reused; Janikowski 1999), the following factors might be valuable (Weizacker, Lovins, Lovins 1999, p. 14-15): elimination of subsidies and tax deductions in relation to energy consumption, transport and labour rationalization; changes in energy management; introduction of tax deductions for increased efficiency of resource utilization, as well as rewards and penalties for highly effective, durable means of transport.

Moreover, logistic policy should be an oriented concept of material productivity. F. Schmidt-Bleck, who is said to be author of this concept, derived 'material productivity' from 'material input per service.' The method makes it possible to calculate or evaluate for each well-defined service, how many tons or kilograms of material one needs to extract from the environment. It can be aided by the following instruments: rental instead of sale (users are guaranteed the longevity of products); extended responsibility for products (manufacturers pay attention to eco-friendly usage and the ease of reusing or removal); shared usage e.g. of means of transport (the same amount of service provided with fewer products); remanufacturing (only worn parts are exchanged); recycling-oriented designing.

There are other factors that can also prove significant: active influencing of energy and resource prices, as well as dissemination of such instruments as futures and other derivatives of resource effectiveness.

Subjects and instruments of logistic policy should constitute a suitable base for conditions that encourage logistic chain participants to: manufacture long-life products, which results in less waste (one of the methods of avoiding waste involves separation of structural elements of products from their visible elements) and increased material productivity; make sure that quick wear parts are the easiest to replace; make sure that it is easy to join and separate visible and structural elements (helpful when replacing worn parts), while maintaining the ease of renovation or usage of visible elements as recyclable materials.

In order to make logistic chains participants interested in the concept of product longevity, helpful methods might include shifting from sale to rental that is optimized in view of its use and shifting the focus from the interest in

products to the interest in services (it turns out that large numbers of small, short-lasting products go worse, in view of material effectiveness, than fewer, but larger and more durable products).

It can also turn out important for logistic policy that, while improving physical and information flows and complying with the principles of sustainable development, it should create a system of stimuli that will inspire companies to: use repeatedly (in both ways) durable containers, e.g. steel containers instead of disposable boxes, in goods traffic among subjects and within them; use new packaging made of plastic waste. (It is important for the recycled material to have the same properties as the initial material, yet its recycling should be less energy-consuming than the original production).

The author once again wants to point to the fact that although in this article she programmes logistic policy in the view of sustainable development of an industrialized area, the objectives, principles and instruments of logistic policy can be also applied to national and EU levels.

3. FINAL REMARKS

Sustainable development of an industrialized region, which assumes the possibility and necessity of clear-cut and harmonious attainment of economic, social, environmental and spatial objectives, becomes a crucial issue. Therefore, it is essential to seek, choose and use the most innovative methods and tools that foster sustainable development.

As logistics has become a significant factor improving competitiveness and development, not only in industrialized regions, but also in the world economy, it is also a vital tool of development sustainability. Besides, the role of logistics is expected to be more and more prominent. All things considered, only macroeconomic, well-planned development of logistics that closes and directs its potential and capacities in a defined framework connected with the accomplishment of the suggested goals and actions, may be a crucial direction of the practical fulfilment of the sustainable development paradigm. It is therefore necessary to guide the development of logistics within a logistic policy. Through a range of intentional activities, logistic policy in the hands of appropriate institutions could strengthen the logistic sector in the process of creating a political and institutional order, or the nucleus of an integrated order, which is the essence of sustainable development.

One must not forget that each type of policy that is supposed to facilitate the implementation of the concept of sustainable development, including logistic policy, has to face the challenge of rethinking the far-reaching development processes and has to be guided by the rule of prevention, which in public opinion (shaped under the pressure of mass media) is balancing between overestimation and disrespect of dangers. It must not rely on the simple realization of scientific knowledge in practice as knowledge is incomplete and rather makeshift, and has to be more like an experiment (acquiring and managing knowledge for sustainable development often takes place under the influence of political decisions, far from the traditional self-understanding of science as free of evaluation). In the face of the temporariness and uncertainty of knowledge from the point of view of sustainable development, science provides a policy involving sustainable development actions, with strategic, experimental knowledge. Such knowledge, if practically accomplished, influences practice, which then again becomes a subject of scientific study. Its results are then to be put into further actions. Policies favouring sustainable development do not only implement scientific knowledge, but attempt to create a kind of learning cycle, which would encompass elements of normative premises, policy guidelines, empirical analyses concerning monitoring and theoretical analyses. In order to achieve that, the science-policy relation should be shaped in a way that mutual resonance could be possible, and has to take up integrated evaluation of more and more complex systems, it should operate regardless of fields and departments.

The analysis of the tools suggested in this paper points to their relatively wide spectrum. It includes institutional environment instruments, general economic instruments that constitute a system of incentives, as well as contractual, administration, economic and financial, analytic, indirect and direct instruments. Regardless of which instruments are used, the author would like to strongly emphasize the fact that logistic policy tools ought to only include variables controlled by the public authorities. With the use of the variables, the authorities will not only be able to enhance efficiency and effectiveness of flows in supply chains and among them, but will also support the accomplishment of social, environmental and spatial objectives while maintaining integrity among several macroeconomic policies.

Satisfying all the postulates concerning creation and implementation of logistic policy, which result from a comprehensive and thorough analysis and economic research in the perspective and light of globalization and the concept of sustainable development, should facilitate and optimize the

development, both with reference to industrialized regions and entire economies. This thesis is confirmed by the author's 2005-2008 research concerning the economies of Japan, China, Thailand, Hong Kong, Australia, the Union of the Baltic Cities, and the United Kingdom (see e.g.: Takahashi, Tsukada, Kono 2006, p. 88-89; Zerui, 2006; Hong Kong 2007, p. 2; Logistics Hong Kong 2001; Amos 2007; *Freight Logistics in Australia: An Agenda for Action* 2002; *Evaluation of the Australian Logistics Industry Strategy* 2007; Kauppinen et al. 2006).

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Received: October 2008; revised: January 2009

Wrocław University of Economics
Argumenta Oeconomica Editorial Office: Komandorska 118/120, 53-345 Wrocław

Editorial Committee:

International Scientific Council:

ARGUMENTA OECONOMICA

1 (22) • 2009

Wrocław University of Economics
Wrocław 2009

Editor

Ewa Knichnicka

Verified by Elżbieta Macauley,
Tim Macauley and Ewa Kania

Graphic design: Maciej Szłapka
Printed by: Reprographers of
the Wrocław University of Economics
Order 164/09
300 copies

Published with the help of a grant
from the State Committee for Scientific Research

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