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IN THE 21 CENTURY
– MULTIDIMENSIONAL
APPROACH

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PREFACE

We give the readers this Scientific Paper devoted to the issues of modern transport research and the challenges of transport development. It contains articles submitted to the TranSopot 2017 conference. This conference is a continuation of a long series of conferences focused on the topic of transport sector development. The purpose of the conference is to exchange views on the major challenges for transport growth and discuss the modern directions of transport development. Another important goal is to integrate scientists and transport practitioners in the field of transport, forwarding and logistics. An additional aim is to publish the research results and discuss new research areas.

The TranSopot 2017 conference: “Transport Development Challenges in the 21st century” was held from 29th May to 31st May 2017 at the Faculty of Economics of the University of Gdańsk.

This issue contains 10 articles submitted to the conference. The contents of the journal are divided into three dimensions: sectoral, local/city and enterprise dimensions. The first part contains articles discussing sectoral issues. The second part deals with local aspects and challenges of transport, concerning mainly transport in cities. And the third part includes articles addressing issues at the enterprise level.

The multidimensionality and complexity of transport issues requires a very broad research perspective to grasp the relationships and interdependencies affecting the further development of transport in the sector itself and in its surroundings.

Barbara Pawłowska

SECTORAL DIMENSION



Jan Burnewicz

Chair of Transport Economics, Faculty of Economics, University of Gdańsk

ECONOMIC PARADOXES IN TRANSPORT

Abstract:

Transport is a sphere of economic activity and social life where paradoxes appear at every step, except that they are disregarded and they are not called by name. It is therefore worth making transport professionals sensitive to the paradoxality of many phenomena, especially if it is important for the formulation of relevant theories and scientific principles. Paradoxes related to the development of the transport infrastructure have been described in the literature, but there are far more paradoxes in the behavior of transport users. A number of subjective theories and hypotheses that paradoxically do not find practical implementation are formulated in the theory of economics and transport policy. Paradoxical dilemmas should be resolved rather in favor of real facts than seemingly logical theories.

Keywords: economic paradox, infrastructural paradoxes, congestion paradoxes, mobility paradoxes

Introduction

Knowledge of the reality that is surrounding us has various forms including scientifically and practically formulated laws, regularities, tendencies, cause and effect relationships, rules, principles, characteristics of phenomena, models, patterns and standards. Economics is a part of the scientific system, as despite disputes and theoretical controversies it has been possible to formulate several dozen economic scientific laws, nonetheless the majority of books and articles are predominated by lower order forms of cognition of economic reality. Economic scientific laws are not as unequivocal as the laws of nature, but the considerable probability of their existence is sufficient to be guided by them to make a rational choice.

There are some chronic cracks in the picture of economic reality. These are the “white spots” of consciousness, taboos, decision dilemmas, logical contradictions and paradoxes. In this paper the magnifying glass has been used to examine paradoxes, a concept unwillingly developed in economic research. A review of electronic texts and messages available on the Internet shows that term “economic paradox” has currently little more than 15 000 entries in the English language and these are references of very low cognitive value, and in French the word “paradoxe économique” appears in just over 2700 references, most often of an anecdotal nature. In the Polish language the Internet contains about 350 completely worthless entries about economic paradoxes¹.

The concept of paradox has been known since ancient times. Paradoxical (strange, unexpected) means contrary to what is or seems to be obvious (Karwowski, 1972, p. 858). There are two main types of paradoxes: logical and real (physical).

A logical paradox occurs in case of a view or a statement that is surprisingly contradictory to the well-established beliefs. Paradoxical is the reasoning based on the seemingly obvious truth of its elements, but leading to conclusions that are clearly contradictory to each other or to the reality as a result of an error contained therein. The most famous logical paradoxes are those of the ancient thinkers, especially Zenon of Elea² and Eubulides of Miletus³. The most well-known modern logical paradox is the raven paradox proposed by Carl Gustav Hempel⁴.

Insofar logical paradoxes are only negligible manifestations of the mental weakness of the interpretation of phenomena, real paradoxes have a physical character and can have negative effects on human life. Real paradoxes take place when certain phenomena or processes seem to be going against the laws of nature. There is a large collection of real paradoxes. An example of a paradox of this type is a surprising phenomenon, which is contrary to the law of universal gravity, consisting in the fact that not everything that is above the surface of the Earth should immediately fall down. These are both the phenomena of water evaporation and flights of birds, airplanes, and balloons. There are also social paradoxes when single individuals or whole groups of people act against the obvious principles and interests. The most depressing social paradox is the case of the lack of gratitude of individuals and groups of people for the good they have received⁵. In scientific

¹ The English word “paradox” is currently quoted on the Internet more than 66 million times, and the Polish word “paradoks” has more than 3.6 million internet references.

² The paradoxes of Zenon of Elea are: paradoxes of motion (the runner’s distance dichotomy, the race of Achilles and the tortoise, the state of the rest of an arrow, the impossibility of a chariot race at a stadium), paradoxes of measure and quantity, the paradox of place, the paradox of sowing.

³ Creating theories of truth, philosophers often evoke the famous paradox of a liar saying “I am lying now”. This simple sentence contains a contradiction. If I am really lying now, by saying “I’m lying now” I say the truth, so I am not a liar which is the opposite of the uttered sentence. However, if I truly admit to lying, the truth of this fact is in contradiction with the meaning of the sentence. This paradox is attributed to Eubulides of Miletus living in the 4th century BC.

⁴ The raven paradox formulated by Carl Gustav Hempel lies in the logical inconsistency in the cognitive process. The statement that “all ravens are black” is logically equivalent to the statement that “everything that is not black is not a raven”. By induction and observation of birds, the case of a green parrot confirms the claim that “all ravens are black”.

⁵ In Poland, a socio-political paradox was to treat the achievements of the State in the period 2008–2015 as ruining the country, despite the greatest investment in history.

activity the most painful paradox accompanying the development of science since the Middle Ages is the case of condemnation (and sometimes execution) of discoverers of new laws and truths⁶. Nowadays in science there are rare cases of paradoxical criticism and negation of a well-written research thesis or textbook. The most popular are graphical paradoxes proving the imperfection of the visual perception of facts (see figure 1) and literary paradoxes involving surprising play of words (aphorisms and metaphors)⁷.

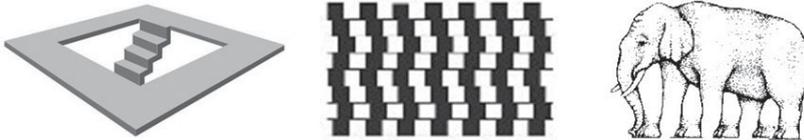


Figure 1. Examples of paradoxical presentation and perception of spatial shapes
Source: own study based on (Daahi.com, 2017; Miś, 2017; *The Eye's Mind*, 2017)

There are also mathematical paradoxes. The simple summing operation in which supposedly always $2 + 2 = 4$ is often referred to as indisputable. This is a true operation when it is performed on integers. In the case of summing numbers with decimal places, for example $2.3 + 2.3$ we get 4.6, and rounding it up to integers renders a paradoxical operation $2 + 2 = 5$ (well known to Excel users).

The list of other paradoxes is very long and includes, for example, paradoxes in the theory of decision (the prisoner's dilemma, Down's paradox of voting), astrophysical, classical mechanics, thermodynamic, biological, chemical, nutrition, health, psychological, travel time and other paradoxes. These paradoxes include food paradoxes which are most dangerous for the human civilization consisting in that that unlike animals consuming intuitively only what is healthy for them, intelligent human beings are fascinated with alcohol, drugs, intoxicants, fast food and other health-damaging products.

1. Best known economic paradoxes

In the economic life there are many paradoxes that reflect the divergence of reality from the laws and rules established scientifically or practically. The weakness of the economic knowledge is the nature of the several dozen laws that have been formulated so far which is only probable and not deterministic. This is the reason why in practice there are many exceptions to both deductively and inductively established laws. Therefore, it can be said that economic laws have been formulated

⁶ A drastic example of this cognitive paradox was the burning alive of Giordano Bruno at the stake at Campo de' Fiori in Rome for his "heretical discovery" which included, *inter alia*, a theory explaining the cause of the Earth's motion around the Sun.

⁷ Paradoxical aphorisms include, for example: *The wise always learn, fools know everything* (Apolinaire Despinoux); *Smart people talk about ideas, common people talk about things, mediocre people talk about people* (Jules Romains); *Who is rich does not need to be beautiful* (Oscar Wilde); *Only ignorance gives absolute certainty* (Leopold R. Nowak).

in an excessively simplistic way (even if they are written in complex mathematical formulas), but on the other hand, one must be aware that the economic reality is too variable and varied to be contained in a set of credible laws and rules. The laws of nature and the laws of formal and natural sciences have the characteristic that they work always and everywhere. Such laws could never be formulated by economic sciences.

The problem of economic paradoxes is considered in many contemporary book publications devoted to such issues as: the paradox of ineffectiveness of public regulation of markets and risk management (Haines, 2011), paradoxes of utility of goods and their prices, tax and budget paradoxes, the paradox of permanent poverty in economic growth, the paradox of the confidence of voter in economic promises of politicians, etc. (Skousen, Taylor, 1997; Hamouda and Rowley, 1997). In Poland, a specific kind of paradox is the declarative preference for mainstream economics, while at the same time there are no signs of identification of the most prominent economists with any school of modern economic thought in the world (liberal, Keynesian or heterodox) and the accompanying tendency to synthesize elements of different schools (e.g. new Keynesian economics with elements of the new institutional economy) instead of choosing the most convincing school (Konat, Smuga, 2016).

One can get the impression that the term “economic paradox” is a “white spot” of our contemporary consciousness, or even a taboo for some people. Therefore, some contribution should be made to the systematic exploration of this concept, and this study is of an exploratory nature in relation to this concept⁸. Transport is a sphere of economic activity and social life where paradoxes appear at every step, except that they are disregarded and they are not called by name. It is therefore worth making transport professionals sensitive to the paradoxality of many phenomena, especially if it is relevant for the formulation of relevant theories and scientific principles.

Paradoxes distort one of the most important economic laws which is considered to be the Law of Supply and Demand⁹. It is more likely that it is a large group of buyers and sellers rather than individual entities that behave in accordance with this law. There is nothing paradoxical in that, for example, that after a significant reduction in the price of a particular car model, a person who already owns a new car will not be tempted to make an additional purchase. A paradox with respect to this law is the mass atypical behavior of buyers with an increase

⁸ In the methodology of science, exploratory research is defined as identification, penetration, exploration, reconnaissance. In English literature it is called “exploratory research” or less often as “formulative research”. One of the aims of such research is to search for hidden features of objects and phenomena. Some include exploratory research into the descriptive research group, however, they are in fact of a different nature than an objective description of the subject matter of study. The purpose of exploratory research is to identify a problem, understand the essence of a phenomenon or process, as well as to determine the extent of the data needed for the research (“reconnaissance”) without creating hypotheses and developing a mature concept of how to conduct them. It is often a prelude to more detailed research, but it can also be an important form of research in itself. See: (Sosnowski, 2012).

⁹ This law, in the context of the invariance of other market phenomena (*ceteris paribus*), works in such a way that demand usually changes in the opposite and supply in the same direction as the price. The surplus of demand over supply causes the price to rise, the surplus of supply over demand causes the price to drop.

in prices of other goods. Without the *ceteris paribus* reservation, there are at least four demand paradoxes: a) Giffen's paradox of consumers with very low income and selection of lower-priced goods; b) Veblen's paradox of consumers with high-income and luxury goods; c) the speculative paradox related to predictions about the future price formation of a particular good; d) the paradox of imitation (the herding, fashion effect) occurring when consumers purchase a particular good or service or refrain from buying under the influence of other buyers. Veblen's pricing paradox is most important and it is evident in the growing demand with the rise in prices of luxury goods (demonstration effect, prestige effect, pursuit of thesaurisation) (Kochaniak, 2016).

Another known economic paradox is the diamond-water paradox posed in the question asked by Aristotle: why water which is necessary for life is cheap and diamonds which are biologically redundant are very expensive. This paradox was explained at the end of the 19th century (the Austrian school), using the marginal utility concept and formulating the law of the diminishing marginal utility of successively consumed units of a good (Zieliński, 2010).

A contemporary paradox known in the world economy is the paradox of plenty. This is a phenomenon of low economic growth in some countries with large deposits of natural raw materials (Sachs, Warner, 1995). As noted by Adrian Kozuchowski, at least in some of the existing research studies on the resource curse this phenomenon has rightly proved to be inexplicable by measurable factors and hence was called a paradox (Kozuchowski, 2010). The surplus infrastructure paradox and the phenomenon of "white elephants" in the form of unused airports, terminals and highways built on the basis of wrongly predicted traffic forecasts are related to this paradox (Burnewicz, 2013; Burnewicz, 2015).

Other significant economic paradoxes include:

- the cost paradox demonstrating that profits do not grow and employment decreases in companies that reduce employee wages;
- the paradox of saving where changing the amount of savings that households want to make at every level of income leads to a change in the amount of income needed to ensure a balance, but there is no change of savings at the point of balance as they still need to be equal to the planned investment;
- the paradox of relational competition consisting in that that in the cooperation strategy of enterprises the ultimately winning paradigm is to compete for the jointly earned value;
- the paradox of productivity (formulated by Robert Solow in 1987) due to the dynamic development of information and telecommunication technologies and their negative impact on productivity.

In addition to economic paradoxes of a universal nature (timeless, not geographically determined), there are many paradoxes specific for a given period, country, region, sector or technology of production. Economical paradoxes can be lasting and transient.

2. Infrastructural transport paradoxes

It is understandable to expect empirical confirmation of the hypothesis that the development of the transport infrastructure should have positive effects in terms of reducing congestion, stimulating entrepreneurship, increasing transport accessibility and intensifying economic and social development. Over the past half century, mesoeconomic, regional and microeconomic studies have been carried out in the highly-developed countries to demonstrate a functional (not only correlative) relationship between the transport infrastructure development and the socio-economic development. The results of these studies are not conclusive, as they are both positive, negative and neutral cases. Negative cases prove the existence of objective paradoxes. The nature and progress of these paradoxes has been described theoretically, and the names of the discoverers of these paradoxes served to derive their identification in the literature of transport economics and transport systems.

The best known infrastructural paradoxes in transport are:

- Braess's road paradox stating that in a certain road traffic model, vehicle travel times can be extended by adding a new connection to the road network (it is related to Lewis-Mogridge's law on the effects of widening roads);
- the Downs-Thomson urban congestion paradox stating that improvement in the urban street capacity leads to increased road traffic, lower use of public transport, and reduced public transport upgrading, which leads to increased costs of such transport;
- Sam Schwartz's paradox of greater safety on narrower lanes;
- the Cesare Marchetti paradox stating that regardless of the available means of transport, the day-to-day travel time is close to one hour.

Braess's road paradox is named after the German mathematician who published its principle in 1968 (Braess, 1968). It says that there are situations where adding capacity, i.e. building a new section in a road network, can increase the travel time on the route using this section. The essence of this paradox is explained in figure 2.

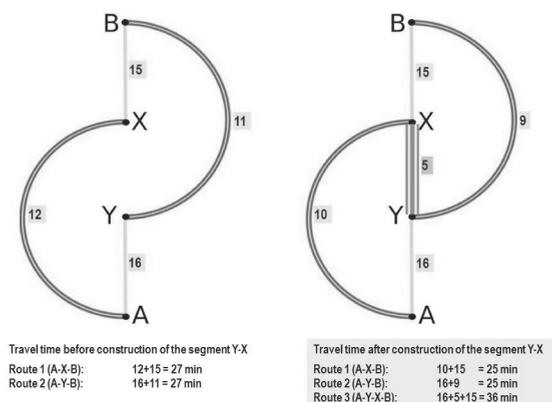


Figure 2. Braess's road paradox (theoretical example)
Source: (own study)

Braess's road paradox is rather a theoretical than real situation. It is possible with a specific spatial layout of the road network and a specific scope of its upgrading. If not only the Y-X section but a whole new A-Y-X-B road were built in figure 2, the travel time would be reduced from 27 to about 15–17 minutes. However, specialists fascinated by Braess's paradox are looking for cases in the world where failing to build a missing section or even closing certain sections due to repair or failure did not result in increased bottlenecks in the network. Braess's road paradox proves only the right choice to take a longer but faster route instead of a shorter but slower one. However, the author of this paradox did not take into account another important aspect: expenditure on the construction of the road network and the cost of its current maintenance. In figure 2, the total cost of building sections A-X-B and A-Y-B is doubtlessly higher than the expenditure on sections of the A-Y-X-B road. This is illustrated by the amount of outlays for the construction of bypasses of Polish cities, generally exceeding PLN 200 million.

The Lewis-Mogridge law (paradox) is a more likely case. It may appear on road arteries near large agglomerations. The construction of additional lanes (if allowed by the urban conditions) may not only reduce the congestion of cars on these arteries, but may contribute to attracting additional traffic to this artery. An example is the 20-lane Los Angeles Interstate Highway I-405 where the traffic intensity is more than 250 000 vehicles per day (fig. 3).

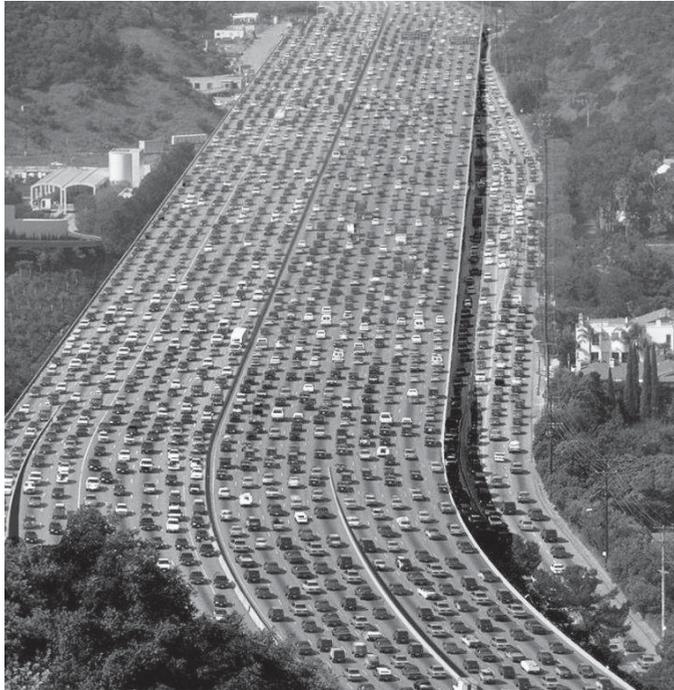


Figure 3. Congestion on the Los Angeles Interstate Highway I-405 in 2016
Source: (TheDetroitBureau.com, 2017)

The Downs-Thomson urban congestion paradox (also called the Pigou-Knight-Downs paradox) consists in the observation that the average speed of a person moving by car in a city depends on the average speed (door-to-door) of a person traveling on public transport. The more accessible and faster the public transport, the faster the individual transport is, as a more balanced distribution of passengers between these two forms of transport reduces street traffic jams (Downs, 2004). Respecting this paradox is of great practical importance. In many cases the separation of one of the car lanes and designating it as a tram track or a bus-lane leads to reducing traffic jams, which could not be achieved by the creating an additional lane for passenger cars. Nonetheless, a condition for achieving this effect is the existence of efficient public transport that is attractive for passengers.

It is more rarely that attention is drawn to the Sam Schwartz paradox stating that safety increases, if road lanes are narrowed (Schwartz, 2016). Indeed, it is safer on the narrow streets of historic old town streets than in the large exit roads of cities. However, the risk to narrow lanes on major urban arteries should not be taken on the basis of this supposed paradox. Even square safety islands separating lanes at crossroads and pedestrian crossings are very controversial as they seemingly improve the traffic safety, but in reality threaten to damage the wheels of the car.

3. Paradoxical behavior of transport users

Manifestations of the bounded rationality of man can be observed in transport. Thoughtful, logical, effective, efficient, honest actions respecting the natural values are considered rational. The manifestations of irrationality in transport are the excessive demand for mobility and transport, the inadequate choice of the means of transport to meet the needs, the accumulation of excess transport capacity in the means of transport, chaotic traffic in space and time. Freight transport users behave in a more rational way than passenger transport users (Burnewicz, 2017). Apart from the bounded rationality, the behavior of transport users shows paradoxical approaches, deviating from the logic of transport processes.

One of such astonishing phenomena in the urban transport is the Cesare Marchetti's paradox (Marchetti's constant) (Turner, 2012; Dybalski, 2014) which is a regularity described in 1994 on the basis of the research that shows that people in different cities around the world spend about one hour commuting to work. The paradox is that the demand for urban journeys is naturally limited by the length of the day and the organization of the life of an average person. The practical conclusion of this is that this demand cannot be significantly boosted by reducing ticket prices or introducing free urban transport. This paradoxical time constraint also determines the walking distance traveled in the city on foot (the target travel is made at a distance in the range of 500–1300 meters) or by bicycle (the average distance traveled is between 1.5 and 3.5 km). The aging of society slightly increases the leisure time budget throughout the day, the number of people with high mobility impairment increases with age, accounting for about 2.5% of the population in the working age, and over 4% in the post-working age.

In long-distance transport we have, in turn, the paradox of the ever-increasing number of kilometers covered by a statistical resident of the country per year. Despite a fixed time budget of 8760 hours per year and a limited opportunity to increase the slice of this time for transport, mobility rates are generally rising, but not in all countries. In Poland in the period 1990–2016 the mobility of inhabitants was steadily growing (tab. 1), and the paradox of this growth could be explained by analyzing changes in the branch structure of passenger transport.

Table 1. Increase in mobility of Poles in 2000–2016 (million passengers per km)

Mode	2000	2005	2010	2016
Cars	130 136	152 343	188 847	227 127
Aviation (Polish and foreign carriers)	11 339	22 660	41 842	74 534
Buses (including carriers <9 employees)	59 200	49 200	41 700	38 217
Rail	24 830	18 155	17 921	19 077
Public municipal transport	20 073	16 686	16 922	16 451
Target pedestrian traffic	8 496	7 293	6 173	5 325
Motorcycles and scooters	2 267	2 238	2 915	4 769
Private and public bicycles	3 840	3 791	3 938	4 019
Inland and marine water transport	1 433	484	451	526
TOTAL	261 613	272 851	320 707	390 046
km per capita	6 839	7 135	8 391	10 213

Source: own study based on: Transport – operating results (Central Statistical Office 2001–2016), Railway Transport Office and Civil Aviation Office data, own estimates of bicycle and pedestrian traffic

The increase in the mobility of a statistically average Pole from 6800 to 10 200 km per year was possible owing to the increased use of aviation and passenger cars, which are relatively faster than other means of transport.

Another paradoxical behavior of transport users is an increase in the risk of road accidents along with an increase in the increasing driver's sense of security, called the Peltzman effect (risk compensation). This is a special case of the tendency of people to increase the risk of their actions, related to the increase in the number of safety-related legal regulations. This discovery, which is as a matter of fact consistent with common sense, was made in the 1970s by Sam Peltzman, an American professor at the University of Chicago. According to his research, in response to increased safety (such as belt fastening in a car) man is inclined to more risky behavior than without these protections. As vulnerability to hazardous effects is lower, therefore it is compensated by allowing more dangerous behavior. This of course happens mostly unconsciously because the risk calculation is made by brain in fractions of a second and one simply does not think about it when taking a road bend 5 km/h faster (Kondratczyk, 2008).

Although freight transport users are more rational than passengers deciding about the way of traveling, the number of paradoxical adaptations of manufacturers of industrial products to the requirements of logistics is growing. Certain products are made of a greater number of components to be packed in as small boxes as possible, which makes it more difficult for the buyer to assemble them, lowers

the quality of the product, and increases the number of complaints (this is the case with the purchase of bicycles, lawn mowers and other devices of a spatial shape).

Conclusion

Paradoxical phenomena are not uncommon in economy and transport. The question is how to live with a paradoxical hazard. First and foremost, objective and subjective paradoxes should be distinguished. Objective paradoxes are a manifestation of the consequence of under-recognized phenomena (a general type is the phenomenon described as “much cry and little wool”). A number of subjective theories and hypotheses that paradoxically do not find practical implementation are formulated in the theory of economics and transport policy. The theoretical preference of transport modes that paradoxically are not accepted in the behavior of transport users creates a dilemma: whether to influence the behavior of transport users more effectively or modify the theory. Respecting the validity of the method of falsification of hypotheses and theories, one should show respect to the transport users and modify the formulated theories.

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SELECTED PROBLEMS OF INTERMODAL TERMINAL DEVELOPMENT PROJECTS IN POLAND

Abstract

Intermodal transport, or briefly speaking transport using at least two different modes of transport, is becoming an increasingly important element of the EU transport policy not only in terms of cost and time, but also in terms of safety and environmental protection. In Poland, mainly due to the observed development of intermodal terminals it recognizes the growing importance of this type of transport. In the last 5 years investments in the development of intermodal terminals with the use of the European Union funds have exceeded 300 million Euro. It is difficult, however, to identify the compliance of these projects with the available methodological standards and good practices. The article is just such an attempt – it examines the projects of development of intermodal terminals in Poland for the achievement of the objectives, compliance with the schedule and the efficiency of the planned budgets. A consequence of the analysis is to identify common problems for this type of projects and to offer solutions through greater use of the available project management methodological tools successfully used in other industries and sectors.

Keywords: intermodal transport, intermodal projects, project methodology, logical framework approach, project cycle management, Operational Programme Infrastructure and Environment

Introduction

The aim of the article is to evaluate the projects of development of intermodal terminals in Poland with EU financial support using the logical framework approach (LFA) – the European project management methodology. Based on desk research of project documentation available on websites of Managing Authority (MA),

Intermediate Bodies (IB) and Implementing Authorities of Operational Programme Infrastructure and Environment most common problems in preparing and implementing intermodal transport development projects are to identify and proposal of recommendation may be formulated.

1. PCM/LFA projects and methodology

Projects are unique and complex undertakings, with a significant degree of innovation, that aim to achieve a set objective, have a clear beginning and end, and to the implementation of which resources and budgets have been allocated. In today's world, projects are implemented in all areas of the economy. They are discussed in the context of different actions and activities. According to the IPMA (International Project Management Association) a "Project (undertaking) is a unique set of coordinated activities limited by time and cost, aimed at obtaining a set of predefined products (with a scope fulfilling the project objectives) maintaining the quality standards and requirements at the same time" (IPMA, 2009). The Project Management Institute, on the other hand, believes that this is "a temporary activity undertaken to produce a unique product, provide a unique service, or achieve a unique result" (Project Management Institute, 2013). Therefore it can be said that a project is an organized, single, unique, complex, time-based, undertaking using a finite amount of resources which is implemented by a team. In order to effectively implement complex projects, a structured approach and a specific way of action in the form of a set of rules, methods and tools are needed. The project life cycle, i.e. a simplified project model covers the phases from initiation and definition, through planning, implementation, until the project closure, which is in practice often simplified to the two stages – project preparation and implementation. The existing project management standards recommend the use of the available knowledge, experience, tools, and methods to effectively implement the project and deliver the expected business results at each stage of the project life cycle, taking into account their specificity.

The tool that focuses to the largest extent on the project life cycle management is the Project Cycle Management (PCM) methodology which is a kind of a project management system created for the needs of implementation of complex projects and adopted by the European Commission in 1992 as a methodological basis for the implementation of aid and operational programmes (European Commission, 2004). Project Cycle Management obliges project planners to focus on the real needs of beneficiaries by requiring a fair assessment of the existing situation and by applying a logic-based analysis and planning approach. From the very beginning of the project work, aspects that affect project durability are included in the project plan. The advantage of the PCM method is that the project documents are structured according to a specific pattern, identifying the elements important for the success of the project, including the assumptions on which the project is based. At each stage of the project life cycle, these issues are reviewed and verified, and then transferred to the next stage. Such a system makes the concept of the project

and the context in which it operates, transparent and legible, and allows better monitoring and evaluation of the project (European Commission, 1993). According to the assumptions of the Logical Framework Approach (LFA), which is an integral part of the PCM methodology, two phases – the analysis phase and the planning phase – lead to the full project preparation, including the following steps:

- 1) analysis phase:
 - stakeholder analysis – including identification and characteristics of key stakeholders, target groups and beneficiaries, taking into account the problems that need to be addressed by the project;
 - problem analysis – including identification of key issues, threats and difficulties to be addressed through project intervention;
 - goal analysis – including defining the goals arising from the existing problems, identifying the means leading to the desired effects;
 - strategy analysis – defining different strategies to achieve the goals; choosing the most appropriate strategy; defining the overriding objectives and the project objectives.
- 2) planning phase:
 - preparing the logical framework matrix – focusing on defining the project structure, checking the internal logic, formulating goals and measurable results, identifying resources and costs;
 - creating the project schedule – specifying the sequence and relationships between tasks, estimating the duration of tasks, identifying the milestones and assigning responsibilities for tasks;
 - creating a resource use plan – which is a summary of the needs of resources and means, their valuation, which consequently leads to preparing the project budget.

2. Co-financing of intermodal transport development projects

In the financial perspective for 2007–2013, intermodal projects co-financed by the European Union were implemented under Measure 7.4. of the Operational Program Infrastructure and Environment. The purpose of Measure 7.4. was to increase the share of intermodal transport in the general freight volume. This Measure covered the following projects depending on the area: construction, extension or repair of the infrastructure of rail or sea container terminals; construction, extension or repair of the infrastructure of a logistics center located in a seaport or on a railway line; purchase or repair of devices, installations, systems and equipment of a management terminal/center; purchase or repair of intermodal rolling stock including specialist cars and intermodal loading units.

The beneficiaries of projects could be operators of container terminals and logistics centers, seaport authorities, entrepreneurs conducting business in the field of intermodal transport. The EU aid amounted to a maximum of 50% in respect of the port infrastructure and the intermodal transport infrastructure, 30% in respect of intermodal transport facilities and ICT systems. As part of Measure 7.4 of the OPI&E,

projects were implemented under 21 co-financing agreements with a total value of PLN 1.28bn of eligible expenditure, including PLN 504.01m from EU co-financing.

In the current financial perspective for 2014–2020, intermodal projects are implemented within the framework of priority axis III “Development of the TEN-T road network and multimodal transport”. Intermodal transport development interventions will include projects for the upgrading and extension of existing terminals, including the access infrastructure, in particular located in the TEN-T network, as well as increasing their number, including intermodal terminals located in logistics centers and seaports. Telematic and satellite systems will be deployed to provide users with real-time information about the current location of the carried freight and thereby optimize and control the transport processes that contribute to shorter delivery times and reduced risk to the transported cargo. The projects also concern the purchase and upgrading of locomotives and specialized rolling stock (cars – platforms) adapted for carriage in intermodal freight units, semi-trailers or carriage of trucks in full. Beneficiaries may be operators of intermodal terminals and entrepreneurs providing or intending to provide intermodal transport business activities and rolling stock renting/leasing companies, as well as seaport authorities.

3. The most common problems in preparing intermodal transport development projects

Based on the analysis of documents provided by the EU Transport Projects Center and the project documentation of individual projects, an attempt can be made to identify the following common problems related to the preparation of intermodal projects:

- 1) an incomplete application for financial support in respect of the financial structure of the project, including but not limited to:
 - lack of information on collaterals for all non-eligible costs and on own contribution;
 - lack of information about the promise of a loan;
 - no mandatory investment plans covering the entire duration of the project.

These problems often arise not only from the financial constraints of the projector providers, but from the lack of awareness of the funding rules – could be reduced by subjecting the stakeholder analysis to a fair verification of the sponsor’s requirements and planning in advance the actions necessary to meet these requirements.

- 2) ignoring environmental requirements:
 - in the case of rolling stock projects including provision of maintenance facilities, e.g.: steel buildings, workshops, depots, refueling stations;
 - lack of the required environmental decisions.

Similarly to the first group of problems, the identified errors are due to an incomplete stakeholder analysis and stockholder requirements and they can be limited by the use of this tool in accordance with the PCM/LFA methodology guidelines.

3) problems with project indicators, including but not limited to:

- erroneously defined indicators;
- defining too many indicators with high levels of detail;
- revalued result indicators;
- ill-judged estimation or overestimation of the cargo weight per TEU.

These problems are often due to the lack of a complete vision of the project and its specific intentions, and could be eliminated by the use of a logic-based approach that orders up the project structure of goals and results, and precisely structures the indicators based on their qualitative, quantitative, time-related, venue-related and target group dimensions.

4) no clear division of project tasks:

- agreements with entities authorized to incur eligible expenses are not attached;
- the role of individual entities in ensuring the project sustainability has not been defined.

A problem is underestimating the importance of appropriate institutional solutions and their impact on the project objectives and the limited planning perspective reaching the project completion date only. A methodological solution can be reliable preparation of an analysis of the objectives and a logic-based approach.

5) inability to manage the change:

- treating the application documentation as a one-off tool for obtaining a EU subsidy and not taking into account possible future modifications.

When analyzing this problem from the management perspective, the probable source here is the object-based approach to the received funding and failure to see the risk associated with the volatility of the environment. The lack of openness to change can be partially eliminated through the use of more frequent cycles of project management methodologies aiming at agile project management, which involves continuous adaptation of the project to the changing conditions of the project environment.

6) excessive trust in external consultants:

- when the study is developed by external consultants, the information in the study is not always consistent with the reality and internally coherent. Some beneficiaries do not read or correct the documentation before sending it to the CEUTP;
- choosing consultants who do not have experience in obtaining UE funds on the terms applicable in the Operational Programme Infrastructure and Environment in projects of a similar scale.

A problem may be the perception of the system of applying for co-financing of projects from EU funds as too complicated and unmanageable by the beneficiary, which of course is often a true perception. Nonetheless, a solution could be preparing project using one's own resourced by developing competencies among one's own employees and applying proven methodologies supporting the process of project preparation and implementation, e.g. a full cycle of the methodological LFA approach.

7) incomplete diagnosis of the situation:

- no description of the terminal and equipment, supported by information concerning the throughput/handling capacity. No drawings showing the terminal logistics;
- no description of the financial standing of the beneficiary. In case of taking out a loan, no description of the loan parameters (installment amount, interest payments, etc.) or taking false assumptions.

A problem may also not attaching too much attention to the correct diagnosis of the situation or reluctance to present it in detail, often by reason of its obvious nature to the beneficiary – which does not have to be obvious to those evaluating the application for funding. A recommendation may be a full analysis of the problem in accordance with PCM/LFA requirements for an in-depth stakeholder analysis.

8) excessive optimism and imprecise planning:

- the forecast leap increase in the throughput volume and the market share without good and/or credible justification, including: no description of the strategy of the company's development, no description of the competitive situation, the company's market share, actions taken to attract new customers; letters of intent or lack of confirmation of the freight volumes presented in the assumptions in the letters of intent;
- making the handling forecasts depend on financial projections;
- no description of the assumed assumptions concerning the revenues, operating costs and replacement expenditures. It is not always clear to what extent the purchased rolling stock/equipment are replacement investments;
- the financial projections are unrelated to the cargo volume projections. Inconsistencies in projections for historical years compared to those verified by auditors;
- lack of reflection of the project and its financial sustainability in the multiannual projection of financial statements. Other EU-funded projects are not included in the financial installation (or the amounts are inconsistent);
- improper identification of the differences between the location of transport flows and the project, and without investments in transport corridors and their assignment to particular transport sectors (rail, road and sea transport);
- unclear definition of the catalogue of socio-economic benefits appropriate to the project or a definition which is not compliant with the guidelines in the competition.

In addition to situations of evident abuse aimed at obtaining the funding on the basis of untrue data, which fortunately is rare, a problem seems to be the concern related to the risk of taking the responsibility for implementation deviating from the original plan. The answer to this planning challenge can be to use a full analysis of targets in accordance with the PCM/LFA standard and to use assumption analysis in the logical framework approach, i.e., the adoption of conditions in which the achievement of objectives according to the plan will be possible. This is a special way of presenting the project sensitivity to the changing external factors.

4. The most common problems in implementing intermodal transport development projects

Having analyzed intermodal transport development projects with respect to the implementation phase of these projects, the following problems can be identified:

- 1) excessive optimism and imprecise planning:
 - delays in the performance of tasks related to the preparation of preparatory documentation, including the project documentation, due to the prolonged arrangements with other institutions;
 - problems with the timely settlement of a project co-financed from the EU due to settlement proceedings or other court proceedings conducted in connection with the project implementation;
 - problem with underestimating the value of the contract for the delivery/works resulting in the cancellation of the tender;
 - changes in the indicative scope during the project implementation (often during the tendering procedure) and the related need to execute annexes to the funding agreement and extend the time for submission of tenders by potential tenderers;
 - the necessity to carry out additional works, the execution of which is the reason why the project scope will not be completed by the deadline specified in the application documentation.

In most situations, the above problems were due to the weakness of the planning process and the launch of the project without full preparation. Reaching to the methodological project management models, reference could be made to the logical framework approach again, which by using the so-called project vertical and horizontal logic supports correct planning and eliminates potential implementation errors.

- 2) no solutions for project risk management:
 - poor financial condition of the potential supplier of rolling stock/contractor of construction works threatening with bankruptcy of the supplier/contractor, and consequently lack of project implementation and return of the EU funds plus interest;
 - force majeure and its impact on the project implementation;
 - untimely delivery of rolling stock/completion of construction works and lack of liquidated damages for delays (in the event that such damages were stipulated in the contract with the supplier/contractor).

Complex projects are the most risky example of the activity of any organization and the uncertainty accompanying the project implementation cannot be totally eliminated. However, an effective solution increasing the chance of the project success is to employ verified project risk management methods, starting from the analysis of assumptions in the logical framework approach, ending with the full implementation, e.g., the MoR® methodology.

- 3) ignorance of the current procedures for the implementation of projects co-financed by EU funds:
- not recognizing fixed assets purchased under the project in the register of fixed assets of the beneficiary;
 - including spare parts for the purchased rolling stock in basic delivery contracts, also recognizing these expenses as eligible costs. Such items are operating expenses to be used in the operational phase of the project cannot be recognized as eligible costs.

The bureaucratic requirements for the preparation and implementation of EE projects are a challenge for most beneficiaries. However, it should be emphasized that in the case of larger scale projects, and a large part of intermodal transport development projects in Poland belong to this group, the necessary competences in this area should be ensured. A tool facilitating this process is the use of solutions recommended by the sponsor itself, in this case the European Commission recommending the use of the PCM/LFA methodology for the needs of preparing and implementing projects.

- 4) problems with the application of the public procurement law:
- not announcing proceedings in the Official Journal of the European Union, the so called TED;
 - entering into additional contracts with the existing contractor, which are necessary for its proper performance, in a scope not covered by the basic agreement, omitting the mode referred to in Articles 701–705 of the Civil Code when the necessity to perform services or construction works covered by an additional agreement did not result from unforeseeable circumstances;
 - specifying specific trademarks, patents or places of origin without allowing equivalent tenders to be submitted.

The main reason for the above problems is the obligation of the private sector enterprises, and most of the beneficiaries come from this group, to apply in the project the laws created for the needs of public institutions. Lack of experience in this respect and the abstract nature of some of the requirements adds new difficulties for a market-oriented business. The problem could be partly solved by an in-depth stakeholder analysis identifying the specific requirements of certain institutions and the appropriate selection of engagement strategies for organizations and individuals having the public procurement know-how.

Conclusions

The analysis of documents of the EU Transport Projects Center related to the preparation and implementation of intermodal transport development projects in Poland and the documentation of the beneficiaries of individual projects has allowed identifying the key problems associated with such projects. The main areas of imperfection were focused on the issue of insufficient quality of project preparation manifested in a limited analysis of the project environment and weaknesses in its design, weaknesses in planning, and the excessive optimism of beneficiaries in the project. Further, the inability to manage the project risk and change,

and ignoring the requirements of stakeholders and the binding regulatory regime. Using the project management approach recommended by the project management standards, taking into account fair performance of the stakeholder analysis, problem analysis, goal analysis, and strategy analysis would make it possible to avoid many planning errors. Most of the implementation challenges would also be avoided if verified solutions in project preparation and good project management practices were used. Special attention should be paid to the use of the logical framework approach that forces a high level of project coherence in relation to the planning objectives, indicators, sources of verification and risk management. It could be widely implemented in the project application forms by Intermediate Bodies as well as in project description documents used by beneficiaries.

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THE IMPACT OF DESIGNATING LIMITED USE AREAS ON THE SITUATION OF AIRPORTS IN POLAND – WHETHER THEY CREATE AN OPPORTUNITY FOR CONDUCTING CORPORATE SOCIAL RESPONSIBILITY

Abstract

A limited use area (LUA) is a legally designated area which is affected by the adjoining facility or other similar structure, e.g. water treatment plant, municipal landfill, communication route, power line/substation, airport. Different kinds of sources causing the limited use of the property have impact either on air quality, noise or generation of electromagnetic fields. According to the law, the permitted emission standards can be exceeded in a LUA. The owner of real property situated in such area may request the purchase of property, compensation for the reduction of the real property value caused by restrictions on use and limitations on expansion of such property, or a claim for the improvement of acoustic comfort. The paper presents the essence of designating limited use areas around airports, analysis of the existing legal framework on the LUA, and an overview of experiences and solutions adopted in selected Polish airports in this regard. The article presents information on how LUAs are designated and on the related prohibitions and restrictions. It also discusses the possible claims and approaches of particular airports towards various types of compensation. The aim of the article is to present opportunities for conducting the corporate social responsibility policy at airports as a result of introduction of limited use areas. It also attempts to assess the good as well as troublesome legal solutions from the point of view of management of Polish airports. When developing this paper, analyzes of the existing legal provisions on LUA designation, internal materials and documents provided by airports, as well as information available on the websites of examined entities were used. A valuable source was also information gathered in the course of in-depth interviews conducted with employees responsible for the management of processes related to the LUA.

Keywords: limited use areas, airport, transport, financial claims

Introduction

An airport is a great prestige for a region and its inhabitants. New jobs are created, economic development is progressing and the interest of foreign investors is growing. However, the operation of an airport may also be associated with problems and nuisance. A particularly annoying issue for people living and working in the vicinity of air routes may be noise. This is why areas of limited use are designated under the routes of aircraft approaching to land or taking off.

A limited use area is a geographically separated protection zone for the land exposed to excessive noise, adopted pursuant to the provisions of the The Environmental Law of 27 April 2001 (Journal of Laws of 2008 No. 25, item 150 as amended). Pursuant to Article 135 Par. 1 and Par. 2 – if the results of an environmental review, an environmental impact assessment or a post-implementation analysis show that, despite having applied the available technical, technological and organizational solutions, the environmental quality standards outside a plant or another facility cannot be met, a limited use area is designated for waste water treatment plants, municipal landfills, composting plants, communication routes, airports, power lines and power stations, and radio communication, radio navigation and radio location installations. A limited use area for a project likely to have significant environmental impacts, as referred to in Article 51 Sec. 1.1 within the meaning of the Act on Providing Information on the Environment and Environmental Protection, Public Participation in Environmental Protection and on Environmental Impact of 3 October 2008 (consolidated text) (Journal of Laws of 2016, item 353) on the provision of information on the environment and its protection, public participation in environmental protection and on environmental impact assessments, or on businesses or other facilities where an installation qualified as such project is operated is designated by the Provincial Assembly (Sejmik Województwa) by way of a resolution.

Nonetheless, it should be noted that the types of nuisance that may justify the designation of a limited use area around airports can consist not only in exceeding the permissible noise levels in the environment, but also in exceeding the permissible levels of certain substances in the air and failing to meet the soil quality standards.

1. Designation of a limited use area for the Gdansk Lech Walesa Airport

Constant development of the airport infrastructure necessitates the designation of limited use areas which in turn opens the way to file claims related to its designation.

The Gdańsk airport is one of the fastest growing regional airports in Poland, as demonstrated by the state-of-the-art T2 passenger terminal commissioned in 2012. As a result of the expansion, the total airport terminal area is almost 40 000 square meters, and the passenger capacity has increased from 2.5 to 5 million

passengers per year. This investment has contributed to improving the air traffic safety and providing better service to carriers and passengers. The dynamic development of the airport and the intensification of its infrastructure doubtlessly involve benefits for the Pomeranian Province. On the other hand, this development increases the intensity of noise associated with the airport operations (Gdansk Lech Walesa Airport, 2017a).

The limited use area around the Gdańsk airport was designated on the basis of a post-implementation analysis which was carried out in connection with the completion of the first phase of the airport expansion which ended in 2012. This analysis was based on the data collected from both permanent and periodic noise monitoring and the forecasting assumptions, the flight route layout, and the assumptions regarding the aircraft fleet operating at the airport (Gdansk Lech Walesa Airport, 2017b).

A LUA is designated on the basis of the sound envelopes determining the iso-lines of noise with the maximum allowed limit values specified in the relevant regulations. These envelopes are determined taking into account:

- the noise resulting from the conducted air operations;
- the inbound and outbound routes of aircraft – in the daytime and nighttime;
- the air traffic forecasts.

Noise around the Gdańsk airport is monitored by SVANTEK Sp. z o.o. The noise monitoring system is maintenance-free and takes continuous measurements. This system consists of four stations designed to automatically take long-term measurements of the acoustic parameters of the environment (*Podręcznik dobrych praktyk*, 2015).

The post-implementation analysis showed that the noise levels in areas surrounding the airport requiring acoustic protection were exceeded in the daytime and nighttime. For this reason, the noise reduction measures were proposed, including:

- control of the noise certificates of the aircraft used in the airport and preference for the latest generation aircraft meeting the requirements of ICAO Annex II;
- selection of air routes in the way minimizing the negative feelings of the local population;
- limiting flights in the nighttime to the necessary minimum and selecting aircraft of a proper type;
- providing environmental authorities with monthly reports with measurements of the acoustic environment around the airport;
- providing the required data, verified by measurements, to be compiled in accordance with the requirements for the acoustic maps of Gdańsk.

These measures practically exhausted the technical, technological and organizational capacity to reduce the airborne noise. Due to the fact that, despite these actions, noise related to the airport operation went beyond the area to which the Gdańsk airport had a legal title, it was necessary to design of a limited use area around the airport (Grounds for Resolution, 2016).

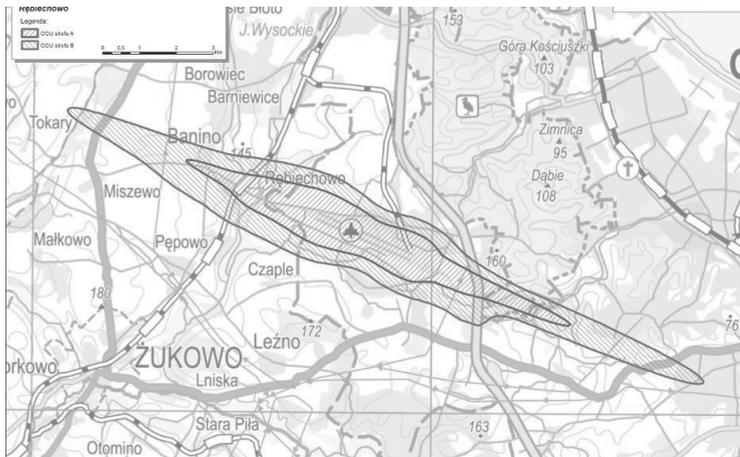


Figure 1. Limited use area around the Gdańsk airport
Source: (Annex No. 1 to Resolution, 2016)

The designated LUA which spreads from Gdańsk-Chełm to Banino has been divided into two zones. Zone A (interior, i.e. located closer to the runway) covers the area around the airport where the noise exceeds 50 dB in the nighttime and 60 dB in the daytime. The resolution prohibits, for example, to use this area for building hospitals, social care homes and buildings connected with permanent or temporary residence of children and young people such as schools, kindergartens, dormitories, children's homes, etc., including also the prohibition to designate health resort protection "A" zones. It is also prohibited to change the function of buildings into the above mentioned facilities. It is allowed to locate residential housing in zone A on condition that an adequate acoustic environment is provided in rooms requiring noise protection. A larger zone B (the outer zone surrounding zone A) includes areas where the sound level exceeds 45 dB in the nighttime. Restrictions have been imposed also for this zone, however they are less severe than in zone A. The figure 1 below shows the scope of the limited use area around the Gdańsk airport.

2. Examples of LUA designations around selected airports in Poland

Analysis of the acts on the designation of limited use areas around airports proves that LUAs have been designated at the airports in Wrocław, Katowice, Kraków, Warsaw, Poznań and Modlin.

With regard to the airports in Kraków and Warsaw the basis for designating LUAs were environmental reviews prepared for the existing installations on the basis of Article 237 and the Environmental Law. In the case of airports in Katowice, Modlin and Poznań, the basis for the designation of LUAs were environmental impact assessment reports prepared in connection with the projects carried out

by individual airports. There is no experience on creating a LUA on the basis of a post-implementation analysis as was the case in Gdańsk. All the documentation specifying the need to establish a LUA included proposals of the related restrictions and maps illustrating the proposed boundaries on the basis of the master map. For most of the analyzed airports the procedure of designating a LUA was supported by a request by the airport concerned.

The orders and prohibitions concerning restrictions formulated in the resolutions include the following issues (Pawłowska, Behnke, 2013):

- a ban on allocating land for residential development, services, farm buildings, collective residence, related to permanent or temporary stay of children and young people, hospitals and social welfare homes;
- a ban on location of out-of-town recreation and leisure sites;
- a ban on allocating land for health resort protection zones “A”;
- a ban on location of buildings with residential, services, farming, hospital functions and with features associated with permanent or temporary stay of children and young people;
- prohibition to change the functions of existing buildings for residential purposes;
- the order to ensure adequate insulation of newly designed buildings;
- the order to ensure the proper acoustic environment of the existing buildings.

These above restrictions are justified by the insufficiency of technical, technological and organizational solutions used to meet the permissible noise levels in the environment, including but not limited to:

- prohibition of engine tests without applying safety measures;
- prohibition of training, test and technical flights in the nighttime;
- permitting air operations by aircraft certified for noise according to Chapters 3, 5 and 10 of Annex 16 to the Convention on International Civil Aviation, after authorization by the Airport Authority;
- introduction of standard procedures for departures and arrivals and their continuous optimization;
- introduction of special take-off and landing procedures, determining the priority use of the runway for approaches and departures in the nighttime;
- setting the rapid exit taxiways and the continuous descent approach;
- defining procedures for de-icing with the engine shut off;
- changing the fleet and parking sites of the Medical Emergency Service aircraft;
- replacing equipment with electrically powered devices;
- introduction of noise abatement procedures in the AIP.

A specific preventive solution introduced at the airport in Warsaw is a noise charge. This charge was modified 2009 and the modification concerned cancelling the daily noise charge for most aircraft and raising the noise charge at the latest night hours which was to encourage carriers to fly during the day and reduce noise in the nighttime. Similarly, the canceling of the parking charge at night hours is an incentive for airlines to leave more aircraft for the night in Warsaw. Airplanes offer more flights from base airports.

The basis for establishing the LUA in airports were the data from the continuous monitoring of airborne aircraft noise (Warszawa-Okęcie, Poznań-Ławica) or

the results of modeling in this respect (Katowice-Pyrzowice, Warszawa-Modlin), referred to the projected average traffic in 2020. Due to the applicable noise emission standard in relation to the period of the day, the area was designated by comparing the flight conditions in terms of the noise emission conditions and specific flight destinations (e.g. Warsaw-Okęcie) or representative days including such worst conditions were sought on the basis the monitoring data (Pawłowska, Behnke, 2013).

3. LUA information policy of airports

Airports provide information about the created limited use areas in many ways. For example, information about LUAs constituted an element of the websites of all the analyzed airports. It should be noted that airport websites are the main communication channel with the environment in matters concerning the LUA, and this information was usually presented under the “environmental protection” section (Modlin, Katowice) or in sections suggesting a responsible approach of the airport to the LUA (“Aware Airport” in Poznań, under the special service www.odpowiedzialnelotnisko.pl [responsible airport] in Warsaw). The websites of the airports in Katowice and Warsaw do not currently contain any extensive information about the LUA, providing instead information about repealing the resolution concerning the LUA by the administrative court or about the end of the period in which it was possible to file claims related to the LUA. This shows the intention to have the website active for a limited period of time, or a twofold formula of the content of this website: from the time of initiating the dissemination of information about the LUA until the expiry of the period for filing claims and after the expiry of that period. The information published in the first phase indicates the intention to use it to control the selection of the type, method of filing and processing of claims (websites and interviews).

There are three main groups of data in the LUA information provided on the websites:

- 1) general explanation of the LUA and the legal basis;
- 2) information on the manner of designating a given LUA and the prohibitions and restrictions related thereto;
- 3) indication of possible claims and the airport’s position with respect to specific claim types, description of the non-contentious procedure.

Information concerning the first group was related to the legal basis for LUA designation, the source of the obligation to designate a LUA for a specific aerodrome, the zoning and the area designation methodology, the legislative act and the authority responsible for designating the LUA. It was only the airport in Warsaw that had an information policy which could be called an information campaign. Information was provided on a specially created separate website with elements of the “news” service related to the LUA and a blog of the airport spokesman. Such a broad information policy resulted in an increase in the awareness of owners of real property located in the LUA and was a specific “instruction”, which resulted in an increase in the average number of claims against the airport compared

to other airports. Nonetheless, it should also be pointed out that the Okęcie airport is located in an urban area and it has significantly more residents in the area.

All the analyzed airports, on their websites or in separate brochures and leaflets, frequently included Frequently Asked Questions to provide help without the need to involve anyone to do it.

The websites of airports did not provide any direct access to the documentation forming the basis for assessment of the need to designate a LUA (Environmental Impact Assessment Reports or Environments Reviews). These documents were often available on the websites of Marshal's Offices (Urzędy Marszałkowskie) or made available in connection with the information about consultations. The texts of resolutions forming the LUA are available in all Press Information Bureaus of Marshal's Offices. The websites also did not make it possible to directly establish whether specific real property was located within the limits of a designated LUA. The websites of the airports in Krakow and Poznań or other materials (Warsaw) made it possible to learn the statistics concerning the LUA, including: the area of the LUA and specific zones, the number of residential units and public utility buildings in specific areas, the approximate number of residents. Airports which developed procedures of settling claims in a non-contentious manner included a description of these procedures, contact details, and application forms for filing claims. Nonetheless, it should be noted that the websites of airports also provided contact details of the individuals responsible for providing information in matters concerning the LUA. For contact purposes, special e-mail addresses were also created or e-mail addresses of responsible employees were provided.

While proceeding with an open communication formula on LUA issues, in addition to the above described websites, airports also prepared other, additional information materials taking the form of leaflets or brochures.

The airport authorities or staff of the airports in Katowice, Poznań and Warsaw organized or participated in meetings. With the exception of the Warsaw airport, general information meetings were generally organized on request or under the pressure of the Marshal Offices or the authorities of the municipalities concerned. First and foremost, it should be considered that it was purposeful to organize meetings aimed at presenting the steps and documents of non-contentious procedures.

The airports of Katowice, Poznań and Warsaw also organized telephone hotlines dedicated to LUA issues.

4. Settlement of claims arising from LUA designation

A specific legal basis for claims related to the creation of a LUA is stipulated in Article 129 and Article 136 of the Environmental Protection Act. As follows from the above regulations LUA-related claims may take the form of a request concerning:

- purchase of real property or a part thereof; this claim can be extended to include exchange of property;
- compensation for the loss consisting in a reduction of the value of real property;

- compensation for a loss related to the costs incurred to meet the technical requirements for buildings resulting from the designation of the LUA;
- compensation for another loss.

It follows from the information received in airports that the method of out-of-court negotiations is related exclusively to claims for providing technical protection of buildings the obligation to provide which occurred in connection with the adoption of the act establishing the LUA. Claims for purchase of real property and claims for compensation related to the reduction of value are considered in court. Claims for purchase or exchange of real property are considered only in respect of real property that has been subject to a development ban under the act establishing the LUA.

To prepare for disputes concerning claims, airports administrating aerodromes for which an LUA had already been designated would commission preparing such documentation and developing such tools as:

- a computer application to specify the location of the real property by address, plot number, Land and Mortgage Register number, name of owner or user, etc.;
- an expert opinion on the market value of the real property at the moment of creating the LUA;
- an expert opinion on the estimated amount of the claims expected in connection with the creation of the LUA – for the purpose of creating provisions or sources of financing;
- a database on the characteristics of construction materials and products used over the years in construction (POZ) for the purpose of determining the level of acoustic comfort in buildings and changes required in this area;
- in individual cases: acoustic, technical and construction expert opinions and expert opinions in respect of real property valuation or building cost estimation.

Airports created financial provisions to pay future financial claims. It follows from the available data for the Warsaw airport that: “in the years 2008–2009, Port Authority Porty Lotnicze (Airports State-Owned Enterprise) created a provision for the LUA in an amount totaling PLN 23.9 million” (Pawłowska, Behnke, 2013).

Claims were filed generally by owners of the real property located in the LUA, acting alone or through professional attorneys. In addition to local law firms (mainly solicitor firms) claims are also filed through legal offices specializing in LUA claims or claims settlement companies acting on a similar basis as insurance companies (“indemnity companies”). Claims are not filed by public administration authorities.

In terms of type, the filed claims concern mainly compensation related to the loss of value of the property and they are referred for settlement in litigation, as well as claims for improvement of the acoustic environment of a building or real property for which the airports have formulated amicable or conciliation procedures.

Non-contentious procedures proposed by airports are initiated by applications for acoustic upgrading of buildings or providing acoustic insulation. The position of the airport towards an application is expressed three months of the dated of receipt of the application at the latest. Ad hoc teams of experts in construction and sound engineering are hired for the processing of applications, and the costs of processing of an application of a claimant are in the range of PLN

10 000–15 000. The opinions of experts in the area of construction and acoustics are the basis for stating the airport's position as to the claim and a proposal or a counter-proposal of the expenditure required to satisfy the claim or pay the compensation. Owners or users of real property are not charged with the cost of analyses, regardless of the outcome. The POZ Airport prefers payment of financial compensation. The WAW Airport enters into tripartite agreements with real property owners and contractors of acoustic insulation works. The research relates exclusively to residential units and housing. Claims of a different nature and claims that have not been settled in a non-contentious manner are referred to the legal departments of airports.

During the process of submitting and processing LUA applications, usually small social organizations are established, mainly associations grouping interested owners of real property located in the LUA. However, the role of these organizations is not significant, an environmental organizations do not show any interest in the LUA issues.

Conclusions

The actions of the legislators were aimed at providing a possibility for residents and users of areas located around airports to claim compensation from airport authorities for the restriction in the manner of using the real property. The purpose of this legal instrument was to provide a possibility to obtain compensation resulting from the nuisance of living in the vicinity of an airport. However, as the experience gained so far shows, the literal approach to this provision of the Polish courts and the activity of compensation agencies aiming at obtaining the highest possible compensation for the loss of the real property value due to the noise emission has reduced it only to the possibility of obtaining additional income. This provision is not considered as an opportunity to improve the acoustic comfort of the population. As a result, the Polish airports which wished to implement the principle of corporate social responsibility and facilitated the possibility of filing claims (Warsaw and Poznań) soon became aware that the scale of the claimed and awarded compensation started to threaten their core business. As a result of the introduction of this provision into the legal system, airports that were often only "working their way up" after a period of intensive investment were exposed to an attack by compensation agencies rather than directly by residents. The objective of the activity of such agencies is to lead to litigation and not to reach a settlement. In consequence, the policy of an open approach to the inhabitants of the airport authorities caused a huge financial burden due to the need to participate in court proceedings. The LUA instrument is treated as a way to earn an extraordinary gain and not as an opportunity to develop good practices to improve the acoustic comfort of the population. In this situation, the introduction of corporate social responsibility is becoming too costly for the operators of aerodromes and they cannot afford it. It seems that a reasonable solution in this situation would be to set up social committees which, with the involvement of the local authorities

and the airport authorities, would be able to work out appropriate solutions that would be a compromise acceptable to all parties taking into account the interests of the entire community and not just selected residents.

As a result, the experience of the Polish airports indicates the unfavorable effects of introducing the principle of social responsibility. This is currently distorting the idea of an instrument that was intended to contribute to the dialogue between the residents and the activity of a nuisance neighbor which is the airport for the nearby residents.

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LOCAL/CITY DIMENSION



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SPACE AND ITS USE FOR PEDESTRIAN TRAFFIC IN CENTER AREAS OF SELECTED POLISH CITIES

Abstract

The quality of urban space in terms of walkability can be assessed taking many parameters into account, such as the presence of sidewalks, their density and continuity, appropriate technical parameters as well as the presence of greenery, squares, parks, which create the environment for pedestrian traffic. The lack of travel barriers, the possibility to shorten the route, travel safety and security, the presence of street furniture, shops and services are also significant. This article concerns some of the above described factors and presents selected research results on the use of space in city centers of several Polish cities – Kraków, Gdańsk, Szczecin, Warsaw, Gdynia, Wrocław and Poznań as well as the results of an analysis on the friendliness of this space for pedestrian traffic. The first phase of this study was to determine the share of public space within the analyzed city center areas, and then define areas used as roads, infrastructure for pedestrians and cyclists, squares, green areas, parks and public courtyards. The balance of the used space was created for each researched area, and the space dedicated to pedestrian traffic was additionally analyzed in terms of the presence of obstacles as well as sidewalk location. The analysis results prove that that greatest amount of the public space is located in the city center of Poznań, and the smallest in Kraków. Warsaw is characterized by the greatest and Szczecin by the smallest percentage of the pedestrian infrastructure. Szczecin dominates in terms of the share of roads in the downtown area, Wrocław in terms of squares and Gdańsk – public courtyards.

Keywords: pedestrian traffic, walkability, public space quality

Introduction

Foot travel is the most natural and basic form of mobility, and at the same time – the most eco-friendly, cheapest, and one of the healthiest ways to move. Not only is it an independent form of transport, but it can also be one of the segments of a journey made by the public transport or by car (walking to a stop, a parking area, etc.). Traveling on foot stimulates other activities and is an opportunity to interact with people (Gehl, 2014). Improving the conditions of pedestrian travel promotes sustainability not only in the environmental but also social sense, allowing children, elderly or less affluent people or those who do not have a car to reach their destination and have everyday activity on foot (Soni, Soni, 2016; Gilderbloom *et al.*, 2015). The research also shows that by creating appropriate conditions for travelling with the force of one's own legs only, more people not only walk but also remain in urban areas (Gehl, 2014). Moreover, it leads to new ways of using space, increases the pace of their lives, they become more vital. The fact that pedestrians are filling the space which is made available to them is evident on the examples of Copenhagen or New York, where a steady increase in pedestrian activity has been noted with emerging new areas and facilities dedicated to pedestrians (Montgomery, 2013). How to create pedestrian friendly urban spaces then?

To paraphrase Jan Gehl's statement "First we shape our cities, then they shape us" (Gehl, 2014) it can be said that one should start with the issue of spatial planning because the way in which we shape spatial structures will determine the way we move in them. Thus, planning techniques that are conducive to pedestrian travel are e.g. balancing the job offer with the number of occupationally active people or increasing the degree of multifunctionality of the area, which leads to reduced travel needs over longer distances – sources and targets are located in close proximity and therefore are available on foot (Cervero, Duncan, 2003; Ewing, Cervero, 2010). In the context of the infrastructure, the important issue is the presence of sidewalks, their density and continuity and appropriate technical parameters (appropriate width, comfortable pavement) (Southworth, 2005; Olszewski, 2007; Lee, Talen, 2014), as well as adaptation to the needs of the disabled, elderly and children (Moayedi *et al.*, 2013). The traveler must be able to safely cross the street (however, rather in the form of an on-ground than underground crossing or a footbridge), and the traffic safety can be further improved by introducing, for example, structures for limiting the speed of vehicles (Jacobs, 1992; Galanis, Eliou, 2011). The presence of signs, markings and traffic signals for pedestrians and motorists is also not without importance, which, in addition to the safety aspects, facilitates the pedestrian orientation (Moayedi *et al.*, 2013). The quality of the pedestrian space is influenced by the provision of street lighting adapted to their needs, the absence of obstacles such as parked cars and the possibility of shortening the route (e.g. lack of barriers in the form of fenced housing estates) (Gehl, 2013). In addition, the space is made more attractive by the presence of greenery and trees (which also provide shade), street furniture (increasing the comfort of travel), shopping and service outlets, and street art (Gehl, 2014).

This article deals with some of the above described factors that shape pedestrian-friendly spaces. The research results presented in the article concern areas located in the city centers of seven Polish cities – members of the CiViNET POLSKA network¹ – Kraków, Gdańsk, Szczecin, Warsaw, Gdynia, Wrocław and Poznań.

1. Short description of analyzed areas

The research on the space in selected cities of the CiViNET POLSKA network was carried out from 15th September to 13th October 2015.

The researched area in Kraków is located inside the second ring road of the city and its boundary runs along Trzech Wieszców Avenue and Powiśle, Podzamcze, Świętego Idziego Streets. On the eastern side, the space is limited by the railway track. The space is about 2.9 km² in area. In Warsaw an area of approx. 2.8 km² was studied including, inter alia, Downtown, Old Town and the Saxon Garden. The border runs along, Generała Andersa Street, Marszałkowska Street, Jerozolimskie Avenues, then parallel to Nowy Świat Street and Krakowskie Przedmieście Street (also along the western boundary of the Beyer Park, Dynasy Street, the western boundary of the Kazimierzowski Park), up to Solidarności Avenue, eastward along the alley and then on Wybrzeże Gdańskie, R. Sanguszki and Konwiktorska Streets. The analyzed section in Poznań is slightly smaller in area, approx. 2.3 km². Its borders are: Niepodległości Avenue, Królowej Jadwigi Street, the Warta River, Ewarysta Estkowskiego Street, Małe Garbary Street, Wolnica Street and Solna Street.

In Gdynia the studied space, approx. 2.0 km² in area, covering the Downtown and the place called Kamienna Góra (the Stone Mountain) is limited by railway tracks on the west. The other borders run along Piłsudskiego Avenue, the Baltic Sea, and Jana z Kolna Street, T. Wendy Street and św. Piotra Street on the north side. The researched space in Wrocław, approx. 1.4 km² in area, is limited by the Odra River and the City Moat. It is located entirely in the Old Town.

The smallest analyzed space was in the city center of Gdańsk and Szczecin – approx. 1.2 km². In Gdańsk, the area includes the Old Town, the Main City, Zamczysko (the Castle), and its border runs along Podwale Przedmiejskie Street, Okopowa Street, Wały Jagiellońskie Street, Podwale Grodzkie Street, parallel to Wałowa Street and north of Stępkarska Street and then along the Motława River. In Szczecin the analyzed area includes the Old Town, with borders formed by the Odra River, 3-go Maja Street, Niepodległości Avenue, Żołnierza Polskiego Square and Trasa Zamkowa im. Piotra Zaremby Road.

¹ CiViNET POLSKA, which is a network of cities that have been carrying out CiViTAS projects in the past and are ready to share experiences as well as cities and other entities that would like to benefit from this experience. It is a platform for information exchange and a tool for promoting innovative sustainable mobility.



Figure 1. Analyzed area in Gdańsk
Source: Own study based on (OpenStreetMap, 2017)

2. Share of public space in analyzed areas

The urban space may have different functions, such as residential, service, etc. In the presented research, the emphasis was put on analyzing the space serving travel functions or forming the environment for pedestrian traffic, e.g. parks, squares, etc. The first stage of the study was to determine the share of public space in each of the analyzed areas. For this purpose, using an orthophotomap, maps available at www.google.pl/maps and the QGIS software were used; the surfaces occupied by roadways, the pedestrian and cyclist infrastructure, squares, urban green areas, parking lots and public courtyards were counted and added. The results of this operation are shown in figure 2.

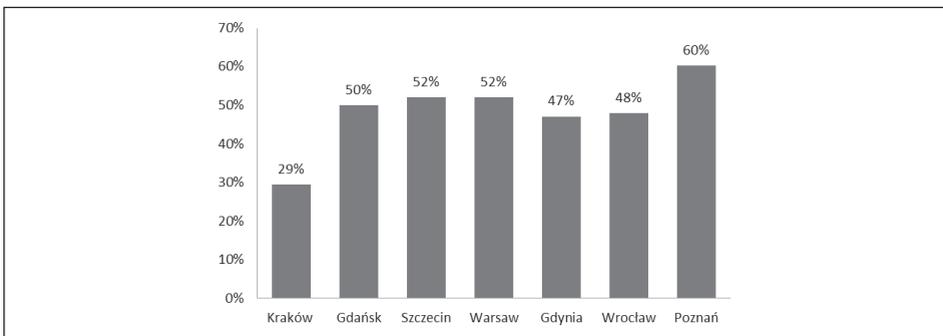


Figure 2. Share of public space in analyzed areas
Source: (own study)

Analyzing figure 2 it can be seen that the largest percentage of public space is located in the city center of Poznań – as much as 60% of the total area of this space serves travelling functions or is developed as squares, green areas. On the other hand, the smallest percentage, accounting for only one third of the analyzed area, is located in the center of Kraków. This is probably due to the Kraków Old Town buildings, which are densely packed and with a great number of enclosed church areas. The share of public space in the analyzed urban centers of the other cities is similar, at the level of 47% to 52%.

3. Use of public space in analyzed areas

Due to the local conditions, the size of public space may vary, nevertheless, the most important thing is the way in which it is used. Balances of the used space were prepared for each of the analyzed urban areas and the result of this analysis is presented in figure 3.

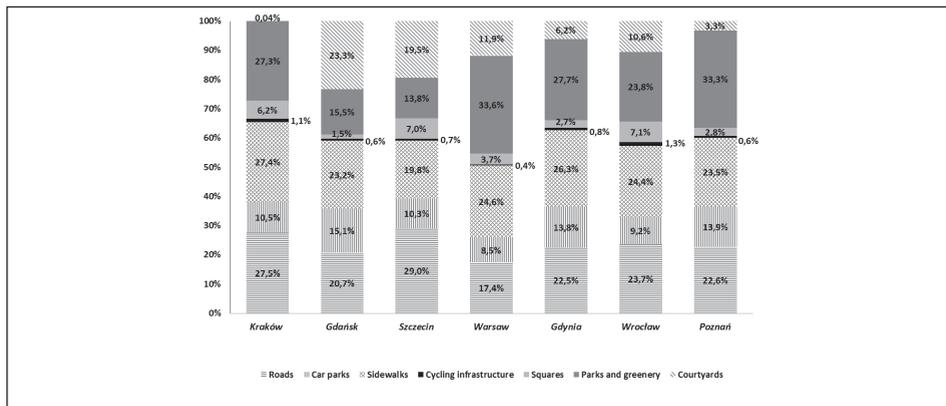


Figure 3. Functional division of public space in analyzed areas
Source: (own study)

When analyzing the functional division of space an unfavorable regularity can be noticed – roadways and car parks collectively occupy an average of over one third of the public areas in the urban centers of the analyzed cities (35% on average). The largest amount of space provided mainly to cars is to be found in Szczecin – one third of the public space is occupied by roads and another 10% – by car parks. Not much less, 38% of the public space in total is dominated by motorized traffic in Kraków. The smallest percentage of this type of space (26%) is characteristic for Warsaw.

About 11 percentage points on average less than in the case of the space for motorized traffic in the analyzed areas is occupied by pedestrian traffic areas (24.2%). The largest share of sidewalks is in Kraków and Gdynia, while the smallest in Szczecin. Almost in every case the smallest share of the public space

is the infrastructure for cyclists (0.4–1.1%), and such a small percentage, in addition to the years of neglect in the developing the cycling infrastructure, also results from the fact that cyclists can ride in the general traffic in central areas.

As regards the presence of spaces that can play role of the environment for pedestrian traffic, i.e. squares, parks and greenery, the leading city is Warsaw where nearly 34% of the space in the downtown are green areas, and approx. 4% are squares.

In addition, a large percentage of green areas are to be found in the centre of Poznań, Gdynia and Kraków, surely thanks to the Kraków Planty Park. The smallest share of squares, parks and green areas in the analyzed areas was noted in Gdańsk and Szczecin. On the other hand, the highest percentage of squares is in Wrocław, Szczecin and Kraków.

When analyzing the quality of urban space in the context of pedestrian traffic, it should be remembered that a very important factor is the possibility of shortening the route of passage, which is influenced e.g. by the lack of fenced housing estates and the presence of public courtyards. In light of the conducted research the leader in this respect is Gdańsk, in which the share of courtyards of this type reaches over 23%. A relatively high percentage – 19.5% is to be found also in Szczecin. In Warsaw and Wrocław these shares are 12% and 11%, respectively, in Gdynia – just over 6% and in Poznań – just over 3%. Interestingly enough, there are no public courtyards in Kraków, which means that it is impossible to shorten the route and it is possible to travel along the streets only.

4. Quality of sidewalks

The next step of the research was to assess the quality of sidewalks in the context of inconveniences for the user (lack of sufficient width of sidewalks) and location of sidewalks (located in or outside a park). The results of the analysis on the location of sidewalks are shown in figure 4.

Analyzing figure 4 it can be observed that sidewalks in the analyzed areas are located mainly outside parks (in Szczecin almost exclusively outside them). The share of pedestrian infrastructure located in parks is the largest in Warsaw and Poznań amounting to 23% and 20%, respectively. And in the context of inconveniences for the user in the absence of sufficient width of sidewalks, surface-based analyzes have shown that in general, the percentage of pedestrian areas with such inconveniences in the surveyed urban areas is small in the range from 1% to 5%. The largest share of sidewalks with inconveniences for pedestrians was found in Kraków and in Gdańsk.

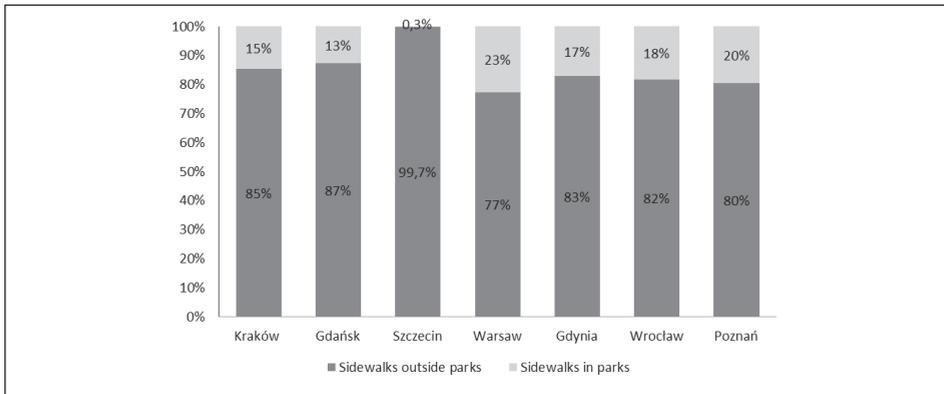


Figure 4. Quality of sidewalks

Source: (own study)

Conclusions

As the above described research results have shown, the share of public space in the city centers of the studied cities is about 50%, and its value depends on the local conditions, including the type of development. The functional division of space has revealed an unfavorable regularity – roadways and car parks collectively occupy on average over 35%, while pedestrian traffic areas account for 24% on average. The amount of space dedicated to motorized traffic is to be found in Szczecin and the largest share of sidewalks is in Kraków and Gdynia. Sidewalks are located mainly outside parks, although the leader in terms of space surrounding the pedestrian area (squares, city green areas) is Warsaw. The greatest possibility to shorten the route is in Gdańsk, while in Kraków such a possibility is almost unavailable to the pedestrian.

It should be noted that an inventory of street furniture (benches, trash baskets, fountains, monuments), public toilets and trees was made during the research. However, the data of the inventory is still analyzed, although in the light of the first results, the following conclusions can be drawn:

- the largest number of benches and trash baskets is to be found in the city centre in Wrocław;
- the largest number of trees, monuments and public toilets are in the city centre in Kraków;
- the area analyzed in Warsaw is characterized by the largest number of fountains.

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ORGANISATION OF PUBLIC TRANSPORT IN METROPOLITAN AREAS

Abstract

The article discusses the problem of organisation of public transport in metropolitan areas as a task of self-government units. The comparative analysis of the manners of organising and integrating public transport in selected metropolitan areas in Poland shows weaknesses and strengths of these applied manners, especially organizational solutions used in the analyzed examples concerning unified tariffs and coordination of various means of transport. The Polish law provides for three types of models for public transport organisation – metropolitan unions, communal unions and communal agreements. At this moment no metropolitan unions have been established so there are no practical experiences in this matter. Two existing conurbations (Silesia Metropolitan Area and Gdańsk Metropolitan Area) organise public transport on the basis of a communal union, whereas in other Polish metropolitan cities (i.e. Warsaw) the instrument of communal agreements is being used. On the other hand the example of London shows that also other legal entities (regional authorities) may be responsible for organising public transport. The size of a metropolitan area and the applied legal model should not influence the functioning of public transport. Nevertheless, the organizational solutions used in the presented transport systems show that the legal framework can make a difference. This article can contribute to an in-depth study on the organization of public transport in metropolitan areas which could lead to the use of good practices in various cities and changes in the Polish law.

Keywords: public transport, metropolitan areas, communal unions, communal agreements, local self-government

Introduction

The organisation of public transport in metropolitan areas is an important task of self-government units because the efficacy of transport systems in highly urbanised areas translates directly into the rate of their economic development or level of investment attractiveness. The quality of public transport depends on the degree to which basic transport demands expressed by passengers are met. These demands regard the journey time (e.g. speed, punctuality, regularity, frequency), the transported object (e.g. safety, comprehensiveness of service, adequate transport costs) and spatial distance (e.g. access to transport network, directness, capacity) (Kozłak, 2008). The degree to which the abovementioned postulates are met is based on the manner in which public transport is organised. In order that it meets passenger demands as much as possible, public transport should be arranged in line with the specific characteristics of a given metropolitan area, taking into consideration the local legal conditions.

As noted in the “National Spatial Development Concept 2030”, an appendix to Resolution No. 239 of the Council of Ministers of 13 December 2011 on the adoption of the National Spatial Development Concept 2030 (Monitor Polski of 2012, item 252), the metropolitan functions include: transport, higher education, control and decision-making, administrative, tourist and industrial functions. The organisation and administration of public transport should therefore be treated not only as an important task, but also as one of the pillars supporting the functioning of metropolitan areas.

In the era of intensive development of individual car transport and the resulting aggravation of traffic congestion in functional areas of large urban centres, transport issues are considered material barriers to development. The lack of an appropriate transport policy and public transport organised accordingly leads to uncontrolled suburbanisation or limitations to the spatial development of labour markets. It is therefore worthwhile from the viewpoint of local authorities to conduct comparative analyses which may help identify the imperfections of individual public transport systems and gain knowledge of possible solutions based on the examples of good practices in other metropolitan areas presented in those analyses.

1. Statutory conditions underlying the organisation of public transport in metropolitan areas in Poland

Public transport duties are carried out in metropolitan areas on the basis of different legal models. The basic entity that should be established for the performance of such duties is a metropolitan union which is the most obvious form of collaboration for self-government units in functional areas of large urban centres. However, there are currently no metropolitan unions in the Republic of Poland due to the fact that the Council of Ministers, which is competent to issue the respective implementing regulations, has not taken any organisational steps to this aim. Thus,

it is hard to refer to any experience in the organisation of public transport by this category of entities.

The area which currently seems closest to establishing a metropolitan union is the Upper Silesia Agglomeration. For this purpose, the Sejm¹ has passed the Act on the Metropolitan Union in the Śląskie Voivodeship on 9 March 2017 (Journal of Laws, item 730). However, the said Act at the same time repealed the Act on Metropolitan Unions of 9 October 2015 (Journal of Laws, item 1890), in force since January 2016, which for the time being prevents other large Polish cities from establishing this form of collaboration in their metropolitan areas. The third legal act dealing with metropolitan matters which has recently been developed in the Parliament is the currently considered draft Act on the Organisation of the Capital City of Warsaw, which was submitted to the Parliament on the initiative of a group of deputies from the Law and Justice (Prawo i Sprawiedliwość) Parliamentary Club on 30 January 2017.

All of the three described statutes (drafts) stipulate that public transport activities fall into the category of public duties entrusted to the metropolitan union (a metropolitan self-government unit – see Art. 1(1) the draft Act on the Organisation of the Capital City of Warsaw). However, there are certain material differences between the solutions applied in each of the legal acts.

In the Act on Metropolitan Unions, the first to be adopted, Art. 12(1)(3) entrusted unions with the performance of public duties in the scope of public transport on their territory. At the same time, the legislator amended Art. 7 of the Act on Commune Self-Government of 8 March 1990 (Journal of Laws of 2016, item 446) by adding sec. 1a, excluding the performance of duties in the scope of local public transport by communes participating in a metropolitan union. This means that – if a union was established on the basis of the 2015 Act – the associated communes which would be organisers of public transport within the meaning of Art. 7 of the Public Transport Act of 16 December 2010 (Journal of Laws of 2016, item 1867) would cease to perform this function and would be replaced in this field by the metropolitan union.

The Act on the Metropolitan Union in the Śląskie Voivodeship departs from this solution by limiting the union's duties in the field of public transport to planning, coordination, integration and development of public transport, including road, rail and other track-based transport, as well as sustainable urban mobility. On the one hand, this clarifies the set of matters to be dealt with by the metropolitan union in the sphere of public transport. On the other hand, the union may not take actions of an organiser of public transport on its territory. The grounds of the draft Act on the Metropolitan Union in the Śląskie Voivodeship noted that the repealed 2015 Act contained a dysfunctional construction allowing the metropolitan union to abruptly take over the transport duties, without giving transport administrators time to prepare for a potential reform in that scope (Sejm document No. 1211). The document even indicated that a lack of adequate regulation “prevents the provision of undisturbed continuity of public transport in metropolitan areas”. Therefore, the Act of March 2017 not only repealed the 2015 Act, but also eliminated Art. 7(1a) of the Act on Commune Self-Government which prohibited the simultaneous

¹ Sejm – the lower house of the Polish parliament.

performance of transport duties by the metropolitan union and by an associated commune (Szlachetko, 2016). Further in the grounds, the authors of the draft Act indicate that such model of union provides an opportunity for the union's evolutionary transformation into the transport organiser in a voluntary manner, on the basis of agreements concluded between the metropolitan union and individual organisers of public transport. It may also be worth noting that the original draft Act stipulated that the metropolitan union in the Śląskie Voivodeship would perform the function of an organiser of public transport in the metropolitan area. However, as a result of lobbying of the President of Jaworzno, the draft was modified during works in the Ministry (Dziennik Zachodni, 2016).

A legal arrangement close to the construction presented in the Act on Metropolitan Unions was adopted in the draft Act on the Organisation of the Capital City of Warsaw (Sejm document No. 1259). In accordance with Art. 12(1)(5) of the draft Act, the capital city of Warsaw as a metropolitan self-government unit (not a metropolitan union) shall perform the duties of communes in the scope of public transport. However, the authors of the draft Act have not provided for a construct similar to Art. 7(1a) of the Act on Commune Self-Government. Therefore, it is not clear whether the performance of communal duties in the scope of public transport by the capital city of Warsaw should exclude individual communes from performing the function of an organiser of transport. While Art. 12(2) of the draft Act provides for an identical mechanism excluding the simultaneous performance of duties by the capital city of Warsaw and communes on its territory, it refers to Art. 12(1)(4), i.e. duties in the scope of social and economic development of the capital city of Warsaw on the basis of the development strategy for the capital city of Warsaw, and not duties in the field of local public transport. A separable model of public transport is also provided for in the Public Transport Act which differentiates between communal and metropolitan passenger transport.

The examples above indicate that the performance of duties in the field of public transport in functional areas of large cities based on collaboration within metropolitan unions is still a hypothetical model which may become a standard in the Polish legal conditions only in the (near of more distant) future.

Taking into account the existing status of the construct of a metropolitan union, it should be noted that transport duties in metropolitan areas are performed directly by communes located within the metropolis territory. However, due to the fact that transport services have to be integrated in the whole metropolitan area, they are not organised independently by individual communes, but by means of legal forms of cooperation. The Act on Commune Self-Government of 8 March 1990 and the Public Transport Act distinguish communal agreements and communal unions.

Agreements between communes are concluded on the basis of Art. 74 of the Act on Commune Self-Government. They may concern the performance of public duties falling within the scope of responsibilities of commune self-government units. The catalogue of a commune's own duties contained in Art. 7 of the Act includes e.g. meeting the collective demands of the self-government community in the scope of local public transport. In accordance with Art. 74(2) of the Act, a commune

performing public duties subject to an agreement assumes the rights and responsibilities of the other communes related to the duties it is entrusted with, and the other communes are obliged to participate in the costs of implementing the entrusted duty. Agreements may also be concluded with poviats and voivodeships; under such documents communes assume the performance of duties within the remit of the larger units. On the one hand, it should be noted that Art. 7 of the Public Transport Act does not allow a commune to perform the function of an organiser of public transport on the territory of a poviat on the basis of an agreement with a poviat self-government unit. On the other, the legislator has imposed an obligation on some of the Polish communes to perform the duties of a poviat (cities with poviat rights, the so-called municipal poviats²). There are currently 66 such poviats on the territory of Poland. Poviats' own duties in light of Art. 4(1)(6) of the Act on Poviat Self-Government include the performance of supracommunal public duties in the scope of public transport. Therefore, the scarce cases where a commune performs the tasks of the organiser of transport on the territory of the poviat (with which it has concluded an agreement) refer precisely to cities with poviat rights. This means that formal cooperation takes place between two self-government units performing the duties of a poviat, i.e. on the basis of Art. 7(1)(3) of the Public Transport Act which stipulates that one of the poviats subject to an agreement may be the organiser of transport on the territory of those poviats.

The second currently applied legal model for performing public transport duties in metropolitan areas, albeit less popular in practice than administrative agreements between communes or poviats, consists in entrusting the function of the organiser of public transport to a communal union. Such entities are established on a voluntary basis by communes interested in performing public duties together (e.g. the local public transport duty). A union is established on the basis of concordant resolutions adopted by the councils of individual communes. Moreover, the newly-founded union has to be registered by the minister of public administration. A union has its own bodies: the assembly composed of the representatives of the associated communes and a collegial executive body – the management board. The detailed solution determining the union's organisational structure is provided for in its Articles of Association which also require approval by member communes. The union is a body corporate and therefore may – contrary to the model based on an agreement – enter into civil-law relationships on its own behalf and account, including executing civil-law contracts for the provision of services in the scope of public transport with public transport operators (carriers).

The Public Transport Act also provides for the option that the duties of the organiser of transport are fulfilled by poviat unions, poviat and commune unions and voivodeships; however, the legislator clearly distinguishes communal and metropolitan passenger transport from poviat, poviat and commune, and voivodeship transport. Hence, it is currently not possible in legal terms to completely replace

² In accordance with Art. 91 of the Act on Poviat Self-Government of 5 June 1998 (Journal of Laws of 2016, item 814), poviat rights are granted to cities which on 31 December 1998 had more than 100 000 residents, and cities which on that date ceased to be seats of voivodes, unless at the motion of the relevant City Council a city was not granted poviat rights, and those which were granted the status of cities with poviat rights during the first administrative division of the country into poviats.

communes, poviats or metropolitan unions in the provision of public transport within a metropolitan area (unless on the basis of agreements concluded between relevant organisers). It would in any case require regulations excluding the performance of transport duties by individual self-government units in statutes determining their organisation³.

2. Organisation of public transport in selected metropolitan areas – a comparative study

After determining the statutory conditions for the organisation of public transport in Polish metropolitan areas, it is worth focusing on the examples of metropolitan areas which have decided to implement various forms of communal cooperation in the scope of organising public transport. A comparison of the Gdańsk Metropolitan Area, the Upper Silesia Agglomeration and Warsaw may help highlight the advantages and disadvantages of individual solutions, especially since each of the abovementioned areas has been integrating public transport for at least a decade, which is enough to make a fair review. Moreover, the three Polish metropolitan areas will be compared to London which in the view of public transport users is an example of very good practices in terms of integration of urban transport services in a large metropolis. This comparison is aimed to incline the authorities to learn some ideas for solving the existing problems related to the organisation of public transport in Polish cities which, in turn, should lead to full coherence and integration within transport systems. Table 1 presents a comparison of key information regarding the manner of organising and integrating public transport services in several selected metropolitan areas (Gdańsk, Upper Silesia, Warsaw, London).

The process of integrating the public transport system is not at a very advanced stage in the Gdańsk metropolitan area, despite the introduction of one metropolitan ticket. The authority responsible for implementing the common transport policy in that area is the Metropolitan Transport Association of the Gdańsk Bay (MZKZG), which comprises 14 communes and has been functioning for a decade. Slow integration may be hinted at by the fact that there are three organisers of urban public transport in the metropolitan area (in Gdańsk, Gdynia and Wejherowo), and PKP Szybka Kolej Miejska w Trójmieście Sp. z o.o. (PKP SKM), a company providing passenger transport services using urban and suburban rail. MZKZG, lacking the status of an organiser of public transport, cannot effectively influence the integration of the transport system in the metropolitan area. The said organisers of public transport in the Gdańsk and its vicinity issue their own tickets, and the fares of MZKZG serve solely as an alternative. This situation seems chaotic and incoherent to passengers advocating for comprehensive services. It should also be noted that although Gdańsk and Gdynia have introduced uniform fares as part of preparations for the integration of communes participating in MZKZG, the Association has not managed to level the differences between the time-based

³ In a similar manner as in Art. 7(1a) of the Act on Commune Self-Government.

Table 1. Comparative analysis of the manners of organising and integrating public transport in selected metropolitan areas

Metropolitan area	Organiser of public transport	Collaboration form	Beginning of collaboration (year)	Number of collaborating communes	Number of residents covered by collaboration	Integrated transport branches and other actions within public transport management, if any
Gdańsk Metropolitan Area	Metropolitan Transport Association of the Gdańsk Bay (the union is not the organiser of transport in the area of its operation)	Communal union	2007	14	ca. 1 million	<ul style="list-style-type: none"> - buses - trams - trolleybuses - urban and suburban rail - water trams
Upper Silesia Agglomeration	Municipal Transport Association of the Upper Silesian Industrial Region	Communal union	1991	29	ca. 2 million	<ul style="list-style-type: none"> - buses - trams - urban and suburban rail
Warsaw	Public Transport Authority (ZTM)	Communal agreements	1991 (ZTM) 2004 (agreements with communes and the woloński powiat)	34	ca. 2.7 million	<ul style="list-style-type: none"> - buses - trams - metro - urban and suburban rail - city bike - park & ride - kiss & ride
London	Transport for London	TfL is an organisational unit of Greater London (a regional-level self-government unit in England)	2000	33	above 8.17 million	<ul style="list-style-type: none"> - buses - trams - metro - urban and suburban rail - water trams - city bike - on-demand transport services for the disabled - taxi licences - management of road infrastructure (including collection of the congestion charge) - other tasks related to passenger and pedestrian safety, and coordination of e.g. freight transport in the city

Source: (own elaboration)

tickets in those cities and the kilometre-based tickets in PKP SKM during the ten years of its existence. Although the competence of the Metropolitan Transport Association of the Gdańsk Bay primarily includes issuing and distributing tickets, settling revenue from the sale thereof or cooperating with operators, organisers and carriers, the Association does not have a direct impact on the coordination of timetables, prices and manner of distribution of tickets issued by urban organisers and does not develop a coherent (and single) system for funding the public transport in the Gdańsk and the adjacent communes. As it does not have the function of the organiser of transport, it does not conclude agreements for the provision of transport services with carriers. MZKZG is thus only an external entity for the organisers, one that makes futile attempts (due to the lack of adequate duties and competence) to introduce full integration of the fragmented transport systems (Metropolitalny Związek Komunikacyjny Zatoki Gdańskiej, 2017).

In the metropolitan area of the Upper Silesia Agglomeration, the Municipal Transport Association of the Upper Silesian Industrial Region (KZK GOP) forms the same type of communal cooperation as MZKZG. It has been functioning longer than the Gdańsk association – it was established in 1991. However, the progress of integration within the metropolitan public transport system is completely different here, mostly due to the fact that the Association acts as the organiser of public transport in that metropolitan area. As a consequence, the agglomeration has a unified fare system, a particularly important fact from the passengers' viewpoint. What is more, KZK GOP has concluded a number of agreements with organisers of transport (e.g. with Koleje Śląskie, PKM Jaworzno, MZK Tychy, "Communal Transport" Municipal Union) which result in the acceptance of KZK GOP tickets (on a reciprocal basis) also in other means of public transport operating within the metropolis. The Association also coordinates timetables, administers transport duties and develops a coherent system for funding public transport in the communes subject to integration (Komunikacyjny Związek Komunalny Górnośląskiego Okręgu Przemysłowego, 2017).

The function of the organiser of transport in the so-called Warsaw agglomeration, integrating the capital with 33 adjacent communes (and the wołomiński powiat) is performed by the Public Transport Authority which is an organisational unit of the capital city of Warsaw. In contrast to the two areas described above, the largest Polish metropolis decided for a form of collaboration based on communal agreements. A solution of this kind allowed the integration of public transport, e.g. in the scope of unified fares. Tickets issued by ZTM are accepted in all means of urban transport and on territories of communes integrated with Warsaw under the agreements. Moreover, ZTM concluded separate agreements with railway companies (WKD, Koleje Mazowieckie and PKP Intercity), what led to the integration of fares with individual organisers. The agreements also allow the passengers of long-distance rail to use transport services within Warsaw. ZTM also boasts membership in the European Metropolitan Transport Authorities (EMTA) and the International Association of Public Transport (UITP). Cooperation with organisations managing public transport in the largest European metropolises helps ZTM to constantly develop and improve its public transport offer

in the metropolitan area of the capital of Poland (Zarząd Transportu Miejskiego w Warszawie).

The electronic ticket is one of the instruments for fare integration, especially important in terms of the passengers' convenience of use of public transport. This function may be performed by different data carriers (e.g. city cards, student cards, credit and debit cards), but they only guarantee ease of use in conjunction with unified fares. Organisers have introduced an e-ticket functionality in all the discussed metropolises. However, its scope differs in each case. Metropolitan Transport Association of the Gdańsk Bay has not yet worked out a uniform electronic instrument. Each organiser of transport (ZTM Gdańsk, ZKM Gdynia, MZK Wejherowo) issues electronic city cards with an option to encode season metropolitan tickets. A similar solution has been implemented in the Warsaw metropolis. Due to the uniform fares functioning in the capital, the city card can record a wider array of season tickets, and it allows the user to rent city bikes. The most multifunctional system has been implemented in the Upper Silesia Agglomeration. The Silesian Public Services Card (ŚKUP) is a platform allowing holders to use public transport and city car parks, as well as services in the spheres of culture, sports and recreation. It also serves as a library card and an identity card when dealing with certain official matters, including a carrier of the electronic signature. It is worth noting that the passengers of public transport may use ŚKUP to carry seasonal tickets and charge a prepaid virtual purse which may serve to pay for single rides.

It functions in a similar manner as Oyster, the electronic payment system for public transport services introduced in the London metropolitan area. The organiser of transport in the capital of the United Kingdom, Transport for London, which is an organisational unit of Greater London⁴, integrates a whole range of transport branches in one administration system. Table 1 indicates that it covers not only every available means of transport in the metropolitan area, but also accompanying services, such as granting licences to taxi drivers, managing the road infrastructure or coordinating on-demand transport services for people with disabilities. Moreover, Transport for London deals in charging ecological fees for entry into the city centre (the congestion charge), carrying out ticket inspections in means of urban public transport, ensuring passenger safety, or verifying the observance of traffic and parking regulations on roads it administers. The abovementioned duties are not within the competence of authorities organising public transport in Polish metropolitan areas, although it seems that such a solution leads to a more coherent metropolitan transport system (Transport for London, 2017).

Conclusions – recommendations on how to improve the organisation of public transport in metropolitan areas

In summary, it should be noted that the two discussed forms of communal cooperation in the scope of organising public transport applied in Poland do

⁴ Greater London – an administrative region covering the City of London; the highest level of self-government units on the territory of England.

not guarantee that there are only two models which transport systems in metropolitan areas can follow. The comparison of MZKZG and KZK GOP brings us to the conclusion that a communal union is not a form of collaboration which ensures a strictly defined model of integration of public transport. In the case of the Gdańsk metropolitan area, barriers to integration include in particular the lack of political decisions to entrust the union with the function of an organiser of public transport, which results primarily from the lack of a system, common for all associated communes, for funding urban transport and the lack of a fair system whereby communes may account for public transport subsidies. Furthermore, the metropolis has not currently got an integrated and modern electronic ticket system which would encourage people to use transport services. The key element ensuring the improvement of transport organisation in a model assuming voluntary cooperation of self-government units is the profitability criterion, both from the viewpoint of the associated communes and that of the passenger.

The fact that public transport in London, which is several times bigger than Polish cities, functions at a high level of integration of transport services leads to the conclusion that the size of a metropolitan area does not have a big impact on the quality of the public transport system. This results primarily from the selection of an appropriate organisational model which assumes that decision-making is transferred to an authority at a level which guarantees comprehensive management of the transport system in the whole functional area of a large urban centre. The examples of London (United Kingdom) and certain other European metropolises (e.g. Madrid) indicate that it proves efficient to place the body organising public transport at the level of regional self-government. In Polish legal conditions, it would be most beneficial to establish metropolitan unions and clearly empower them as organisers of public transport.

The comparative analysis regarding the forms of cooperation of communes and other self-government units in Poland and in other countries in the scope of organising public transport in metropolitan areas may be deemed a valuable source of knowledge on good practice and solutions which may often be transferred and applied when solving transport issues of individual metropolises. Despite the differences in administrative and legal conditions, it is possible to draw on the experience of metropolises in Europe and around the world which boast better integration of transport systems.

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TRANSPORT BEHAVIOUR AND PREFERENCES OF CYCLISTS IN GDYNIA

Abstract:

The aim of the article is to present preferences and transport behaviour of cyclists in Gdynia. Conducting research in this regard allows the local authorities to develop bicycle transport in a way that is adjusted to the expectations of users, while raising the chances of increasing the participation of bicycles in the daily travels of Gdynia inhabitants in general. The results presented in the article clearly indicate that the development of bicycle transport is beneficial not only for cyclists, but also for the society. The research shows how important it is for the life comfort of residents of cities to convince them to give up cars in favour of bicycles to the greatest extent possible. The discussion on this topic is upgraded also by the present situation presented in the article, where in general, a low participation of this means of transport which is consistent with the policy of sustainable mobility development of Gdynia inhabitants is observable.

Keywords: transport behaviour, transport preferences, cyclists

Introduction

A bicycle as a means of transport has a great share in the urban traffic across many cities worldwide. Denmark and Netherlands are amongst those countries in Europe which can pride themselves on a particularly large share of urban travel completed by bike. The share of this means of transport in the capital cities in this countries reached 30% and 22%, respectively (EPOMM: Home, 2017). The Danish research has shown that each kilometre of urban journeys completed by bike gives 23 eurocents of profit back to society. On the contrary, the same distance completed by car generates an external cost of 16 eurocents (Cathcart-Keays, 2016). The research carried out in Copenhagen suggests that people who travel by bike are found to live

longer, have more stamina and have less absence from work due to illness. All those factors contribute to a drop in the cost of healthcare by 1.1 USD per each kilometre of travel completed by bike (Available from: www.copenhagenize.com). Further research conducted on the basis of an analysis of costs and benefits has shown that 1 kilometre of travel by bike generates a cost of 0.6 Danish Crown, whilst the same distance travelled by car generates a cost of 3.74 Danish Crown (Cycling Embassy of Denmark, 2012, p. 16). The above mentioned research was inclusive of internal costs incurred by the person travelling as well as of external costs incurred by the society. All of the research mentioned, despite the varied methodology, points to the fact that an increase in the share of bicycles in urban travel may bring a significant benefit. The introduction of a sustainable development strategy in the cities forces both the central and local governments to take actions that would encourage inhabitants to use this particular mode of transport. Local governments are entrusted with the responsibility to shape the transport policy within their cities and to develop the cycling infrastructure. This development should strive to meet the requirements of bicycle usage as much as possible. Therefore it is vital to conduct market research that will allow such requirements and needs to be determined.

1. Public transport and bicycle transport according to the level of utilization by the inhabitants of Gdynia

A representative study of the preferences and transport behaviour of the inhabitants of Gdynia is conducted at regular intervals (2–3 years) on the basis of an interview conducted with the respondents between 16 and 75 years of age who constitute a representative sample of 1% of the total number of inhabitants. The findings of this study show that the share of public transport and bicycle transport in urban trips of the city's inhabitants is decreasing. Figure 1 illustrates the downward trend of the popularity of this type of travel that has been seen for years. The current level of 42% of urban trips completed via bus, trolleybus, rail or bicycle allows a conclusion that the attempts to convince the inhabitants of Gdynia to travel according to the sustainable development strategy have been unsuccessful.

Bicycle transport in Gdynia remarkably shows a growing trend in the share of urban travel of the city inhabitants contrary to other means of transport preferred in the sustainable development strategy. Nonetheless, this share is still small and amounts to only 1.8% of the total number of trips (fig. 2). Nevertheless, it must be mentioned that this level signifies a twofold increase in comparison to 2013, and an over fourfold increase in comparison to the years 2008–2010. In those years the share of buses, trolleybuses, and rapid urban rail in the trips completed by the inhabitants of Gdynia decreased by 20%, 30%, and 35%, respectively. In Gdynia, 36% of households do not have a bike, 22% of households have one bike, 26% of households have two bikes and 16% of households have 3 or more bikes (Hebel, Wyszomirski, 2015, p. 19).

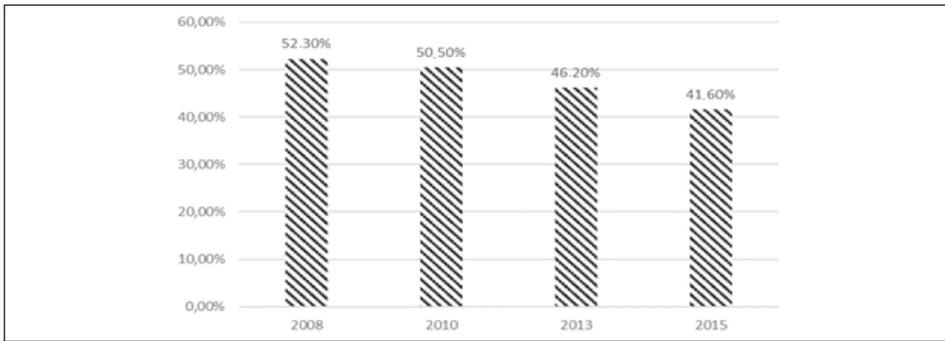


Figure 1. Share of urban public transport and cycling in urban travels of Gdynia residents 2008–2015 (pedestrians excluded)

Source: own study based on (ZKM, 2015)

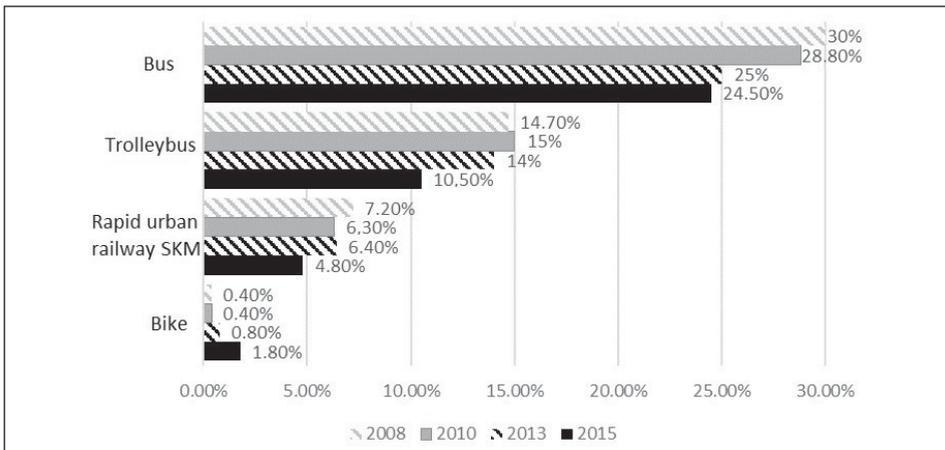


Figure 2. Modes of urban travel by public transport and cycling by Gdynia residents in 2008–2015

Source: own study based on (ZKM, 2015)

A representation of the scale of bicycle transport in Gdynia in comparison to other Polish cities is hindered due to the lack of a uniform methodology of study in various cities. There is also no nationwide comprehensive study of bicycle transport with the exception of research concerning state and voivodeship roads conducted by the General Directorate for National Roads and Motorways (Generalna Dyrekcja Dróg Krajowych i Autostrad).

2. Transport behaviour and preferences of cyclists in Gdynia

416 respondents took part in the research into bicycle transport in Gdynia conducted in 2016. 37% of the respondents were female and the rest were male. The study was conducted on the basis of an individual interview in 38 research points located along the city and sylvan bike routes. 44 cyclist travelling on sylvan routes and 372 cyclists travelling on city routes were interviewed. The histogram in figure 3 illustrates the age of respondents. Respondents who at the time of the interview were below 10 years of age were considered as outside of the histogram. This happened due to a legal requirement that children of 10 years and younger cannot travel on bikes without adult supervision, and hence, they cannot be considered as able to decide independently to choose a bike as means of transport. The said histogram in figure 3 is characterised by a distinctive slope on its right side. This means that younger people are more eager to use bicycles. Nearly half of the respondents were between 21 and 35 years of age.

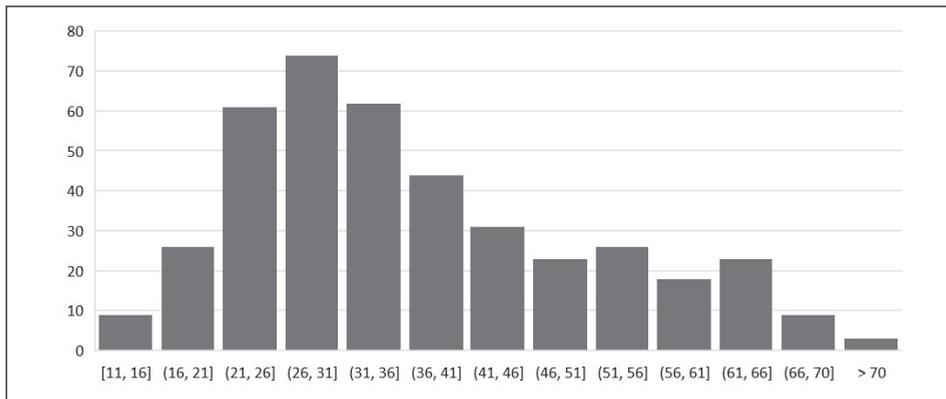


Figure 3. Age of studied cyclists

Source: (own study based on ZDiZ Gdynia data, October–November 2016)

Another feature used for segmentation of cyclists in Gdynia was the frequency with which they chose a bike to travel a given route about which they were interviewed. The largest group of respondents (39%) were people who use bicycle transport on a regular basis. These respondents used a bike at least 4 times a week (fig. 4). Respondents choosing to travel by bike only once a week were among the group with the fewest number of respondents.

Figure 5 illustrates that the highest number of people chose a bike for leisure purposes. They constituted nearly a third of the total number of respondents. 26% said that they used a bike to get to the workplace and 22% on their way home. It was only 3% of the respondents that chose a bike to get to the place of education. The suggestion that such a small number of students use bikes to get to school is confirmed by a study of the preferences and transport behaviour of high school students in Gdynia and Sopot. According to its findings as little as 0.27% of all school commuting was completed by bike (Konarski, Wyszomirski, 2015, p. 25).

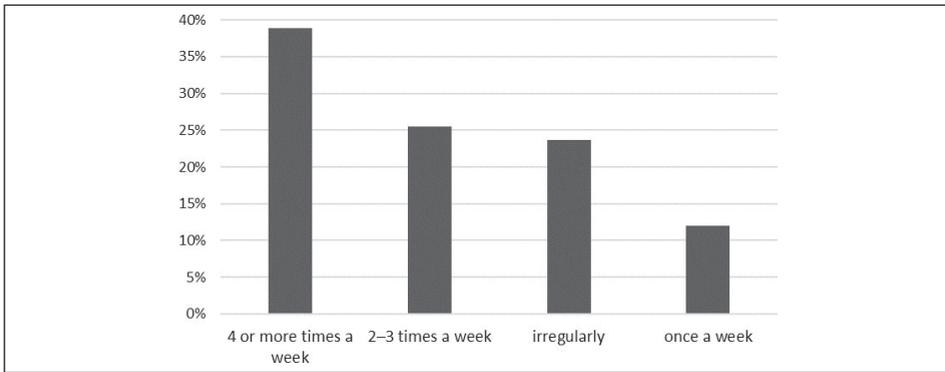


Figure 4. Frequency of travelling by bike

Source: (own study based on ZDiZ Gdynia data, October–November 2016)

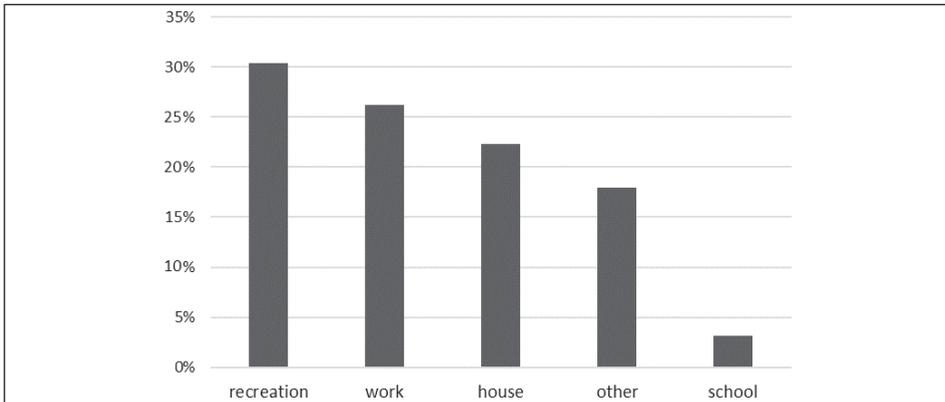


Figure 5. Destination of studied persons

Source: (own study based on ZDiZ Gdynia data, October–November 2016)

A change in the purpose of travel finds its reflection in the change of the transport behaviour of cyclists in Gdynia. Those who choose a bike to travel to the workplace or school cycle much more often than those who use bikes for leisure purposes. Nearly 60% of people choosing to cycle to work/school declared that they travelled by bike at least 4 times a week. It was only 24% of the respondents using bike for recreational purposes that matched that frequency. The largest number of respondents using bike for leisure do so intermittently (fig. 6).

Cyclists choose their routes depending on the aim of travel. 30% of the respondents travelling to work said they chose the shortest possible route. On the contrary, 82% of those choosing a bike for leisure declared that the route length was not the major factor in deciding about the choice of the route.

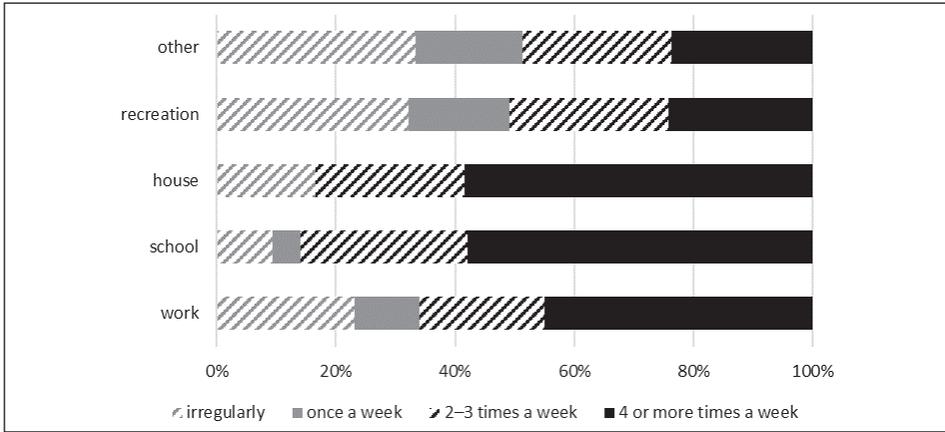


Figure 6. Influence of destination on bike travel frequency
 Source: (own study based on ZDiZ Gdynia data, October–November 2016)

The respondents evaluated four factors having influence on choosing the shortest route on a scale of 1–4 (where 1 means the most discouraging and 4 the least discouraging). Figure 7 illustrates their choices. The following factors were among those having the most negative influence on the route choice by the cyclist:

- necessity to travel through crossroads with traffic lights;
- necessity to travel uphill;
- unsuitable surface on the route;
- type of route.

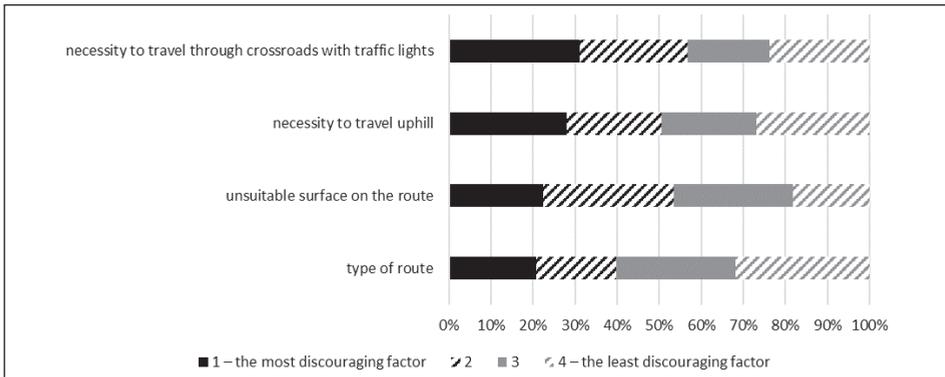


Figure 7. Factors discouraging from travelling by bike by the shortest route
 Source: (own study based on ZDiZ Gdynia data, October–November 2016)

Each route type chosen by the cyclist was further evaluated on a scale from 1 to 4 (where 1 means the most discouraging and 4 the least discouraging) during the study. Cycling paths were chosen as the most attractive route form (fig. 8) – they were chosen by 87% of respondents, 97% of which gave them a mark of 1 or 2. Pavements are the least attractive route form according to cyclists. 42% of the total

number of lowest marks were given to pavements. Marks 3 or 4 chosen by the respondents accounted for 78% of the total number of given marks. The Road Traffic Act of 20 June 1997 (Journal of Laws, No. 98, item 602) defines a cycling path as “a path or a part of a road designated for bicycle traffic, sign posted by appropriate signs and separated from roads for car traffic or distinctly isolated from the roadway either structurally or by the means of safety features”. The cycling infrastructure in Gdynia consists of 39 sections totalling 56 kilometres of mostly cycle paths. Nonetheless, the authors of the sustainable development plan emphasise that this network is characterised by a lack of flow which hinders travel between the city centre and the outskirts (The plan of sustainable city mobility for Gdynia). The following issues are also named as hurdles in the development of the bicycle transport in Gdynia: freedom of car travel; spatial obstructions; large differences in altitude between various areas of the city; development of residential areas located west of the city – a considerable distance from the centre; ownership issues hindering the process of allocation of space for cycle paths (Bue, Makowski, Reiter, 2013, p. 21).

The advantage that cycle paths have over other types of bicycle routes in the eyes of the respondents taking part in the study proves that using regular roadways does not present an attractive alternative for space specifically designated for bicycle travel. Therefore, it is vital that the cycle paths in Gdynia should be connected as soon as possible whereby bicycle travel through the main passageways would be possible without the need to turn to less attractive routes.

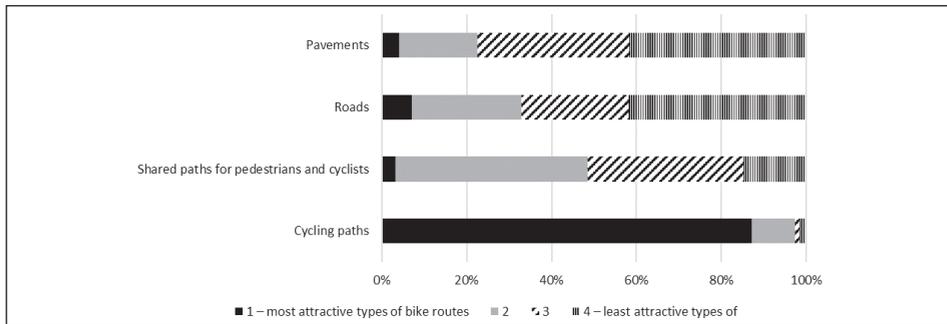


Figure 8. Assessment of specific types of bike routes
 Source: (own study based on ZDiZ Gdynia data, October–November 2016)

Cyclists who took part in the study also evaluated the road surface friendliness on a scale of 1 to 5 (1 being the lowest mark and 5 the highest). The undeniable leader was Tarmac with 68% of all top marks given by the respondents. Nearly 90% of 5 and 4 grade marks were given to this type of surface. Cobblestones were the surface with the lowest marks from users. 68% of the total number of lowest marks were given to this type of surface. 86% of marks given to cobblestones were either 1 or 2.

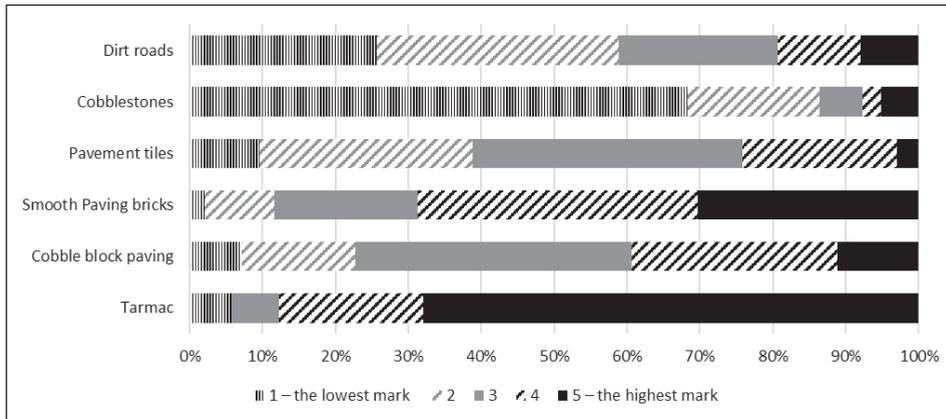


Figure 9. Assessment of specific bike route surfaces [N = 290]
 Source: (own study based on ZDiZ Gdynia data, October–November 2016)

Tarmac is seen as the best surface for cycle paths not only in the eyes of cyclists but also engineers who deal with the issue of such infrastructure. Among many advantages of using this type of material they name easiness and swiftness of construction as well as relatively low costs in comparison to other available solutions. Moreover, tarmac cycle paths are very durable, smooth and provide little resistance (Bańkowski, 2016, p. 2).

Conclusions

The following conclusions can be drawn from the study into the bicycle transport in Gdynia:

- age constitutes one of the determinants in choosing the bicycle as a means of transport;
- the share of bicycle travel is small (1.8% in 2015), however, it shows a high growing trend;
- a bicycle is used by the inhabitants of Gdynia mostly for leisure, and to a lesser extent, as a means of transport to the workplace or school;
- the aim of travel bears an influence on the traffic behaviour of cyclists in Gdynia. Those travelling to work or school by bike use this means of transport more often than those who travel by bike for leisure. They are also more likely to choose the shortest available route;
- the following factors were named by the cyclists in Gdynia as the most detrimental to the route selection: necessity to travel through crossroads with traffic lights, necessity to travel uphill, unsuitable surface on the route, route type;
- cycle paths were named as the most appealing type of a route. Pavements were the least appealing cycling routes for riding;
- the respondents named tarmac as the best surface for cycling paths. Cobblestones were the least appealing to them.

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ENTERPRISE DIMENSION



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SELF-REGULATORY EFFICIENCY OF TRANSPORT ENTERPRISES

Abstract

The self-regulatory efficiency indicator is a metric which collects basic economic characteristics and allows identifying enterprises which can compensate for the changes in a stable way and those whose self-regulatory ability is variable, regardless of their size. During the research on the self-regulatory efficiency of transport enterprises with the use of the indicator in question it was proved that during the years 2013–2015 the self-regulatory abilities of different entities were variable. However, as a general tendency, smaller enterprises tend to show a better ability to compensate for the changes in their surroundings.

Keywords: transport enterprises, self-regulation, self-regulatory efficiency index

Introduction

The TSL industry is highly competitive and provides a dynamic environment for entities operating in it. Processes in this industry require enterprises not only to act appropriately, but to build and develop mechanisms for survival and development. One of such mechanisms is the self-regulatory efficiency, based on partial capacities of self-regulation, i.e. the financial (measured by profitability of revenues), operating (measured by employment-related revenues) and economic (measured by employment-related profitability) self-regulation.

Based on information from the TSL industry, it is possible to identify the characteristics of analyzed, but it is also possible to identify changes in their self-regulatory capacities. Analysis of the variability of the self-regulation efficiency of selected TSL enterprises became the objective of this study, the thesis being the statement that the traditional position of an enterprise in a given industry measured by

the level of revenue does not reflect its self-regulatory efficiency. On the basis of the self-regulatory efficiency indicator, enterprises can be summarized in terms of their potential and future ability to survive and develop. The research covered the years 2013–2015.

1. Self-regulatory efficiency of enterprises

The equilibrium and ability to maintain a stable business is a condition for the existence and development of enterprises. Active management and responsiveness to the variability of the environment is reduced to maintaining the legal entity. An enterprise, thinking about a positive future, has to constantly strive to build an equilibrium and functional stability manifested in the internal and external dimensions (Szalucki, 2017). Synthesis of fractional material, social, information and behavioral equilibrium becomes a global equilibrium of an enterprise, which can be defined as a stable and variable system of relations within the defined limits between the enterprise and its surroundings (Kozmiński, Obłoj, 1989).

An enterprise is adapted to the environment on different scales and in different scopes. It depends on the quality and amount of the resources that are at the disposal of the enterprise at a given time and to what extent it is able to meet the challenges of competition. The position of the enterprise on the market resulting from the processes of stratification is also important (Majecka, 2015). Enterprises and the environment exert mutual influence on each other by triggering the feedback needed to eliminate interference with operation. The environment in the form of state and market influence is a basic condition of a enterprise's operation (Żurek, 2016).

The regulatory role of the market causes operators to interrelate, the nature of these interactions varies – from willingness to cooperate, to fight. As part of cooperative activities, relationships between entities lead to mutually consistent goals, but in the context of competitive behavior, enterprises are pursuing goals that may be contradictory. However, sometimes the situation is not so clear, as entities behave cooperatively where competing behavior is dominant in the market, and compete where cooperative behavior is the primary behavior. This may manifest itself by the following phenomena (Letkiewicz, 2013): enterprises competing when pursuing various goals nor infrequently show willingness to self-limitation in the methods and tools of the struggle; enterprises competing in one area can cooperate in other areas; competing enterprises can take joint action to reduce costly cost-cutting competition; competing enterprises may seek to eliminate the competitive situation completely by dividing the market.

In such conditions, companies seek to adapt their goals and mechanisms of operation to the requirements of the environment. This is the reason why they set out directions and ways of doing things by identifying and forecasting changes occurring in the environment. Such actions are the reason why enterprises are able to survive even under conditions that will be less favorable than now. Potential constraints on the efficiency and effectiveness of management should be

included in the development scenarios, taking into account the distribution of forces that alter and counteract this, in order to ensure the sustainability of economic activity. Ensuring sustainability requires changes, so that the entity should be able to respond to the demands of the environment or internal needs (implicated by early adaptation to the environment). These changes may have the nature of a gradual adaptation or a radical nature. They are caused by a “discontinuity” in the institutional, legal, technological processes or management conditions and consist in (Letkiewicz, 2013): repair in order to survive in a short time perspective (self-regulation); revitalization of practices carried out in the absence of time constraints although of a short-term nature (adaptation); reorientation of the operation (optimization); transformation of the way of perceiving the environment (strategy).

In the context of changes in the environment, self-regulation is based on understanding their dynamics. Self-regulatory changes consist in restoring the equilibrium of the enterprise. Self-regulation refers to the efficiency of achieving a target identified in the dimension of the data available as reporting data such as assets, revenues, costs and profit, sometimes employment. The important issue are not only the resources used, but also the way in which they are configured. Compensation for changes in the market self-regulation is reduced to looking for such a structure of the mechanism of the enterprise’s operation to best determine the rules of using the resources responsible for generating revenue with respect to the market opportunities. The use of resources is measured in the form of operating costs in the core business area. Taking into account the characteristics of management of transport enterprises, the methodology of measuring the self-regulatory efficiency can be based on the revenue and profits earned by the entity, nonetheless these amounts have to be relativized by the efficiency of performance expressed in terms of the level of employment, as evidenced by the nature of the transport activity identified as the provision of services. In this way it is possible to build a self-regulatory efficiency indicator to take into account the profitability of revenues (financial self-regulatory efficiency), the employment-related revenues (operating self-regulatory efficiency) and the employment-related profitability (economic self-regulatory efficiency). The individual types of partial efficiency strengthen or weaken each other, hence the relations between factors should be described as a mathematical product. In order to eliminate the management scale effect, the result of the multiplication should be divided by the revenue achieved by the last enterprise from the sample used for analysis. Thus, the formula for the self-regulatory efficiency indicator is as follows (Letkiewicz, Majecka, 2016):

$$WSS = \frac{\frac{Zn}{Ps} \times \frac{Ps}{Zatr} \times \frac{Zn}{Zatr}}{Sop}$$

where:

Zn – net profit;

Ps – revenue from sales;

$Zatr$ – employment;

Sop – the revenue earned by the last enterprise from the studied sample.

2. Situation of the TSL industry in 2014 and 2015

The economic situation in the TSL industry can be presented on the basis of the annual research carried out by Halina Brdulak (Warsaw School of Economics). And thus: "The economic situation of Poland throughout 2014 was good. The stable growth of macroeconomic indicators from 3.3% to 3.6% in particular quarters of the year and the declining unemployment rate pointed to a favorable direction of development. The 61 entities participating in the survey achieved revenues totaling PLN 16 billion, which represents an increase by 112% in the revenues of the analyzed enterprises compared to 2013. Thus, the TSL market growth in 2014, measured year on year on the basis of the analyzed companies is high. Employment growth is slightly lower than in the case of revenues – 108%. The difference between the growth of revenues and the growth of employment would indicate the possibility of optimization. However, the analysis of profits and the decline in profits confirm the tendencies related to the price pressure in this industry. [...] Analyzing the results achieved by enterprises in 2014, the past year can be assessed as positive for the entire TSL industry" (Brdulak, 2015).

The above comment, but referring to 2015, was as follows: "an analysis of the trends in the TSL industry based on the companies listed in this year's ranking shows positive changes taking place in the market. In 2015 the pace of growth of the ranked companies as measured by revenues from the TSL activity was more than twice faster than the GDP growth rate and amounted to almost 9% (8.9%) Employment was growing even faster, at a rate of 9.8%. Other indicators were also positive. The growth rate of net fixed assets was almost 16%, the expenditure for IT systems (measured as a percentage of the company's revenue) – 9.5%, and the net profit per employee (employment-related profitability) – almost 20%. The average profitability in the industry was at a level of 3.2% compared to 2.8% in 2014. 37 of the ranked companies showed the Polish origin of capital, and their share of their revenues in the total revenue was 45%. Assessment of the impact of the sustainability concept on the financial performance indicates a positive correlation between the revenue and the publication of CSR reports" (Brdulak, 2016). Certain problems affecting the transport industry were evident in the shrinking markets as well as in the weak liquidity of individual entities (Otto, 2016).

In such conditions, the TSL industry managers had to make choices and decisions about proper self-regulatory responses to the variability in the environment. The consequences of their decisions are reflected in the achieved position on the market and are reflected in the ranking of companies in the TSL industry for the years 2013–2015 which is presented in table 1.

Analyzing the data in table 1 it should be said that by presenting the industry with the described revenue volume, the market is characterized by stability. The positioning of companies is relatively stable, although there are slight differences between the positions of individual entities compared year to year, but it is to be assumed that they are rather random, due to the short-term variability of the conditions and the results of management. Therefore, this ranking allows making a conclusion on the stability of its entity structure. However, it does not give a picture

Table 1. Results of TSL industry in 2013–2015

Pos. by revenue	2014		Name	Revenues			Net profit			Employment		
	2015	2014		2013	2014	2015	2013	2014	2015	2013	2014	2015
1	1	JAS-BFG S.A.	447 214 000	445 351 000	462 822 000	6 086 000	7 808 000	7 933 000	950	1 018	1 030	
2	2	Hellmann Worldwide Logistics Polska Sp. z o.o. sp.k.	254 294 000	280 525 000	305 439 000	1 126 000	1 033 000	4 680 000	410	391	1 055	
3	4	LINK Sp. z o.o.	220 176 170	242 707 000	285 321 000	5 030 073	5 092 203	8 655 000	504	531	640	
4	5	Yusen Logistics (Polska) Sp. z o.o.	164 616 000	208 101 000	262 606 000	-275 000	1 077 000	3 394 000	178	205	211	
5	3	Grupa Delta Trans	253 107 600	252 081 000	245 106 000	9 534 700	5 309 500	2 867 000	1 148	1 036	916	
6	7	OMIDA Group	88 112 973	193 486 000	240 363 000	769 046	2 242 478	4 464 000	120	188	325	
7	8	PPT PKS Gdansk-Oliwa SA	162 868 849	180 487 000	217 801 000	2 776 186	2 372 011	4 167 000	148	164	181	
8	6	MEXEM Sp. z o.o.	182 812 000	196 081 000	192 302 000	6 037 000	8 192 000	6 934 000	253	259	272	
9	9	SM LOGISTIC Sp. z o.o.	156 739 984	170 039 000	164 647 000	1 202 778	1 896 702	1 909 000	98	101	332	
10	12	Optima Sp. z o.o.	58 709 694	99 000 000	146 386 000	6 361 412	1 898 494	9 334 332**	125	173	263	
11	10	Eurogate Logistics Sp. z o.o.	99 502 000	117 176 000	134 465 000	878 000	1 701 000	2 421 000	57	68	65	
12	11	No Limit	94 605 000	103 279 000	127 675 000	147 000	1 655 000	4 226 000	354	371	390	
13	13	JURA POLSKA Sp. z o.o.	69 969 400	77 953 000	91 727 000	45 500	-261 600	-657 000	29	33	34	
14	14	Trans Logistyka-Olga Iuchniewicz sp.k.	56 856 000	70 154 000	68 606 000	3 191 000	3 485 000	4 113 000	172	229	245	
15	15	Botrans Sp. z o.o.	68 478 659	64 306 000	65 782 000	989 149	809 719	500 000	113	94	48	
16	16	Asstra Associated Traffic AG	84 354 000	58 677 000	64 454 000	1 133 000	187 000	1 994 000	77	80	79	
17	17	SM AGROLAND Sp. z o.o.	48 281 824	48 173 000	48 264 000	842 979	622 275	559 000	33	35	35	
18	18	Intertransports Centre-Polska Sp. z o.o.	34 227 322	36 932 000	31 756 000	1 426 238	1 501 991	1 228 000	18	19	17	
19	19	Delphia Piszarska-Klinkosz, Klinkosz i Żagarów s.j.	11 529 333	12 971 000	13 939 000	117 339	844 238	1 480 000	12	13	12	
20	20	Transrem Sp z o.o.	8 320 061	8 772 000	8 822 000	803 934	1 040 611	1 040 000	84	86	93	
21	21	*Albatros Cargo Sp. z o.o./Formica 3PL Solutions Sp. z o.o.	5 400 000	5 200 000	4 600 000	312 000	862 000	327 000	6	8	9	

* entity changed name

** estimates based on average profitability of revenues in 2013 and 2014 due to an obvious error in the source specification

Source: own study based on *Dziennik Gazeta Prawna*, 24 June 2015, No. 120 (4013) and *Dziennik Gazeta Prawna*, 27 June 2016 No. 122 (4269)

of the adaptability changes of individual entities, as even the scale of profit depends on the scale of the entity's business and it is difficult to compare in this way directly entities employing more than thousand people with entities employing a dozen or so. Therefore, such a comparison can be made with the use of a relative measure, which is the self-regulatory efficiency indicator. Hence, the next tabular breakdown (tab. 2) presents the results of individual entities in terms of the self-regulatory efficiency indicator (entities are ordered in alphabetical order).

Table 2. Self-regulatory efficiency indicators of the TSL industry enterprises in years 2013–2015

Name	2013	2014	2015
Albatros Cargo Sp.z o.o./Formica 3PL Solutions Sp. z o.o.	2 704.00	11 610.06	1 320.11
AsstrA Associated Traffic AG	216.51	5.46	637.08
Botrans Sp. z o.o.	76.62	74.20	108.51
Delphia Pisarska-Klinkosz, Klinkosz i Zagarów sp.j.	95.61	4 217.38	15 211.11
Eurogate Logistics Sp. z o.o.	237.27	625.74	1 387.28
Grupa Delta Trans	68.98	26.27	9.80
Hellmann Worldwide Logistics Polska Sp. z o.o. sp.k.	7.54	6.98	19.68
Intertransports Centre-Polska Sp. z o.o.	6 278.26	6 249.24	5 217.94
JAS-BFG S.A.	41.04	58.83	59.32
JURA POLSKA Sp. z o.o.	2.46	62.84	373.40
LINK Sp. z o.o.	99.61	91.96	182.88
MEXEM Sp. z o.o.	569.38	1 000.42	649.88
No Limit	0.17	19.90	117.42
OMIDA Group	41.07	142.28	188.66
Optima Sp. z o.o.	2 589.92	120.43	1 115.30
PPT PKS Gdańsk-Oliwa SA	351.86	209.19	530.02
SM AGROLAND Sp. z o.o.	652.54	316.10	255.09
SM LOGISTIC Sp. z o.o.	150.63	352.66	33.06
Trans Logistyka-Olga Juchniewicz sp.k.	344.19	231.60	281.83
Transrem Sp. z o.o.	91.60	146.41	125.05
Yusen Logistics (Polska) Sp. z o.o.	2.39	27.60	258.74

Source: (own study)

Analyzing the position of individual enterprises based on the self-regulatory efficiency indicator it can be noticed that the variance of the close surroundings, as well as the resource configuration efficiency and decisions on the characteristic configuration of resources showed some stability, while in other cases the differences between the years were fairly drastic. The enterprises the position of which changed maximum by two positions according to the self-regulatory efficiency indicator in the years 2013–2015 include the following 6 entities (tab. 3).

Table 3. List of entities with the highest position stability in the ranking by the self-regulatory efficiency indicator in 2013–2015

Name	Position according to indicator		
	2013	2014	2015
Intertransports Centre-Polska Sp. z o.o.	1	2	3
MEXEM Sp. z o.o.	5	4	6
Trans Logistyka-Olga Juchniewicz sp.k.	7	8	10
LINK Sp. z o.o.	11	13	14
JAS-BFG S.A.	17	16	18
Hellmann Worldwide Logistics Polska Sp. z o.o. sp.k.	18	20	20

Source: (own study)

The size of the enterprise is not important in this specification as it includes both very large entities such JAS-BFG SA. (employment – 1030 people in 2015), medium-sized entities like MEXEM (employment – 272 people in 2015) or Trans Logistyka-Olga Juchniewicz sp.k. (employment – 245 people in 2015) and small enterprises such as Intertransports Centre-Polska Sp. z o.o. (employment – 17 people in 2015). A group of enterprises with the highest stability of position in ranking by the self-regulatory efficiency indicator can be confronted with a group of entities with the greatest difference between the highest and the lowest position. The largest difference in the group of analyzed entities is characteristic for the entity called AsstrA Associated Traffic AG, which was ranked 9th in 2013, 21st in 2014, and 7th in 2015. The reason for that was that 2014 was a year in which the self-regulatory efficiency of this entity drastically deteriorated, however this efficiency was successfully restored in 2015. The list of entities for which the change between the highest and the lowest position in the years 2013–2015 was the greatest is presented in table 4.

Table 4. List of entities with the highest variance of position in the ranking by the self-regulatory efficiency indicator in 2013–2015

Name	Position according to indicator			Maximum position change
	2013	2014	2015	
AsstrA Associated Traffic AG	9	21	7	14
Delphia Pisarska-Klinkosz, Klinkosz i Zagarów sp.j.	12	3	2	10
JURA POLSKA Sp. z o.o.	19	15	9	10
SM LOGISTIC Sp. z o.o.	10	6	19	9
Yusen Logistics (Polska) Sp. z o.o.	20	17	11	9
Optima Sp. z o.o.	3	12	5	9

Source: (own study)

The analyzed three-year period of change of position of entities based on the self-regulatory efficiency indicator requires using a tool to illustrate the stability in respect of the position of particular enterprises in the stratification system. This may be the average position of enterprises – entities with the highest average

position with respect to the self-regulatory efficiency indicator were the best to cope with the variability of the environment. A breakdown of positions and average position of individual companies in 2013–2015 is presented in table 5.

Table 5. A breakdown of positions and average position of studied companies in 2013–2015

Name	Position according to indicator			Average position in 2013–2015	Position acc. to average position in 2013–2015
	2013	2014	2015		
Intertransports Centre-Polska Sp. z o.o.	1	2	2	1.7	1
Albatros Cargo Sp. z o.o./Formica 3PL Solutions Sp. z o.o.	2	1	4	2.3	2
MEXEM Sp. z o.o.	5	4	6	5.0	3
Delphia Pisarska-Klinkosz, Klinkosz i Zagarów s.j.	12	3	1	5.3	4
Eurogate Logistics Sp. z o.o.	8	5	3	5.3	5
Optima Sp. z o.o.	3	12	5	6.7	6
PPT PKS Gdansk-Oliwa SA	6	9	8	7.7	7
SM AGROLAND Sp. z o.o.	4	7	12	7.7	8
Trans Logistyka-Olga Juchniewicz sp.k.	7	8	10	8.3	9
SM LOGISTIC Sp. z o.o.	10	6	19	11.7	10
AsstrA Associated Traffic AG	9	21	7	12.3	11
LINK Sp. z o.o.	11	13	14	12.7	12
Transrem Sp. z o.o.	13	10	15	12.7	13
OMIDA Group	16	11	13	13.3	14
JURA POLSKA Sp. z o.o.	19	15	9	14.3	15
Botrans Sp. z o.o.	14	14	17	15.0	16
Yusen Logistics (Polska) Sp. z o.o.	20	17	11	16.0	17
JAS-BFG S.A.	17	16	18	17.0	18
Grupa Delta Trans	15	18	21	18.0	19
No Limit	21	19	16	18.7	20
Hellmann Worldwide Logistics Polska Sp. z o.o. sp.k.	18	20	20	19.3	21

Source: (own study)

The results of analysis of the stability of the self-regulatory efficiency of enterprises operating in the TSL industry clearly show that the best entity, Intertransports Centre-Polska Sp. z o.o., (employment – 17 people) as well as the second best company in the ranking Albatros Cargo Sp. z o.o./Formica 3PL Solutions Sp. z o.o. (employment – 9 people) are small enterprises. The first entity is characterized by high stability of the position with a downward trend – positions from 1 in 2013 to 3 in 2015, while the second enterprise was 2nd in 2013, and 1st in 2014 and finally it took the 5th place in 2015, which could be due to the change of the name and formula of operation. Then (positions from 3 to 17) were taken most of all by medium-sized enterprises. The ascending group includes Delphia Pisarska-Klinkosz, Klinkosz i Zagarów sp.j., which moved forward from the 12th place in 2013 up to the 2nd place

in 2015 and JURA POLSKA Sp. z o.o., which moved from the 19th place in 2013 up to the 9th position in 2015. Both these entities have good prospects for the future in respect of self-regulatory capacities. The reverse trend of self-regulation efficiency was characteristic for SM AGROLAND Sp. z o.o., whose position according to the self-regulatory efficiency indicator was gradually deteriorating (from the 4th place in 2013, 7th in 2014, down to the 19th place in 2015). The entity called Botrans Sp. z o.o. was characterized by a stability of the positions taken. The final part of the table is taken by large entities characterized by functional inertia resulting from the scale of business.

Conclusions

The basic conclusion from the presented studies can be contained in the statement that traditional rankings do not reflect the capacity of enterprises to compensate for the rapid changes in the environment, but merely indicate their place in the market in the context of the performance of these entities. Moreover, they refer to the global characteristics of entities. When attempting to visualize the situation on the TSL market by identifying the level of self-regulatory efficiency of individual entities, an entirely different ranking of companies is obtained – they are ranked according to the potential for long-term survival and development. As it turns out, it is not the largest enterprises with the highest levels of operating income, that have the highest self-regulatory capacity – it is rather small enterprises that are leaders in this respect. The conclusion that follows from this is that the potential of an enterprise basing on the size of its assets, the ability to generate high revenues and a high level of employment does not necessarily allow it to develop self-regulatory capacities. It is small entities that do not have huge assets to support them, when they want to survive in the dynamic environment of the TSL industry, they have to be characterized by the highest self-regulatory efficiency.

Based on the research conducted in the years 2013–2014, a number of changes occurred in the TSL market, perceived both in the context of the performance of individual enterprises and their self-regulatory efficiency. The researched market is a area of dynamic changes, which should all the more encourage enterprises to develop their self-regulatory, both fractions and global, abilities.

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FUNCTIONING OF OPERATIONAL SYSTEMS IN ROAD TRANSPORT COMPANIES: DIRECTIONS OF EVALUATION

Abstract

The operational system, the heart of every company, requires constant evaluation through appropriate indicators. Measuring them allows evaluation of the level of efficiency and productivity of transport services performed by road transport companies, supporting the management process in this way.

Keywords: transport, indicators, measure, operational systems

Introduction

Operational activity, the essence of production processes of transport companies, comprises organization and performance of material services, which consist in relocation of cargo or passengers. This activity requires involving an indispensable quantity of material, human, financial and information stock in such a way so as to perform transport services efficiently. Operational systems consist in transformation of input components into output products. It is the area where all concepts, processes and ideas gain a real form. This is why it is so important to define through various indicators the directions of evaluation of operational activity and stock invested in it.

1. Operational system specificity in road transport companies

Operational activity, also called productivity, is directly related to the production of goods or provision of services. It is the basic component of economic activity of a company and it cannot be conducted in an arbitrary way; it has

to be directed appropriately in time and space as well as conducted in specified technical-production and organizational conditions (Mytlewski, Nowosielski, Schomburg, 2010). The operational area is multi-faceted and strategic. This multi-faceted nature concerns various technical-organizational dimensions of the production process, as well as it relates to the correlation between production and other areas of a company's activity. The central position of the operational function stems from the fact that other functions e.g. marketing, financial, accountancy, research-development, etc., become pointless without efficient performance of this function (Kasiewicz, 2002).

In production processes, employees, through their labour, influence the object of labour and the result of these activities is production of goods/provision of services. Thus, all production factors: human, material and non-material should be involved to enable the performance of any operational activity (Żurek, 2007). Omission of any of these factors means that the conditions for the production are not met because production processes can only be performed with the presence of all the three production factors (Marszałek, 2001).

Transport is an "activity which consists in intentional relocation of cargo and people" "with the use of appropriate objects of labour, called means of transport, travelling the way from the sender to the recipient of a transport operation" (Piskozub, 1975, p. 18). If transport is defined as a process of production, then its final product is the transport service. Transport production creates services the intentional effect and core aim of which is translocation: change of the location of things and people. The performed service is consumed instantly at the moment of its provision, so there is no time gap between the provision of the transport service and its consumption (Burnewicz, 2009). The essence of this production process is relocation of cargo (people), performed through transport services accepted by the client. Thus, the intended aim of transport production is changing the location, so the production process consists in influencing the space, contrary to material production, where the technical influence of labour on objects is used. Road transport is undertaking and performing the economic activity of relocation of people or things with trucks and cars registered nationally. Trucks/cars also include chains made of vehicles and trailers and semitrailers in the Republic of Poland and outside) (Road Transport Act of 6 September 2001, Journal of Laws, No. 125, item 1371).

The service activity which consists in chargeable transport with the effect of relocation of passengers and cargo is performed by road transport companies. The economic activity which is the subject of production processes in road transport companies includes a chain of organization and performance activities resulting in relocation of cargo and people. The operational activity of road transport companies requires involving determined resources in order to perform the transport service in an efficient way (Rześny-Cieplińska, 2013).

Operational activity has to be characterized by a universal model solution. Specified, homogenous elements need to be distinguished for all the companies involved. Thus, it can be said that operational activity is based on a system. Five basic elements are distinguished in the structure of the operational system of a transport company (Jasiński, 2005):

- input elements (materials, fleet, infrastructure, energy, human resources, capital, information);
- output elements (transport services, waste);
- transformation processes (transport operations, inspections, storage);
- information and material relations;
- management.

The operational system of a road transport company is responsible for the production factors and their processing. This is where decisions about establishing the proportions of factors (i.e. financial structure, involvement of human and financial resources) are made in order to perform the transport service efficiently. The functioning of operational activities requires taking decisions about input elements (input of production factors), transformation operations/processes and output services.

2. Characteristics of resources of the operational system of a road transport company

The operational system of a road transport company requires involving specified resources to perform the transport service efficiently. The resources indispensable to perform the transport service are as follows:

- 1) material resources:
 - production means determining the transport potential of a transport company:
 - means of transport (fleet);
 - loading machinery and equipment;
 - loading units (e.g. pallets, containers);
 - infrastructure: land, buildings, engineering structures and facilities:
 - production buildings (depots, locomotive workshops, technical backup facilities);
 - non-production buildings (social buildings, offices);
 - structures (access roads, stations);
 - transport infrastructure (e.g. tracks, transport points and stations);
 - logistics infrastructure (warehouses and storage areas, tools);
 - natural means indispensable to start using the transport potential:
 - fuels;
 - electric energy;
 - supplementary materials (e.g. oils, lubricants);
- 2) financial resources – equity and borrowed capital;
- 3) human resources – people and their qualifications, skills, capabilities and motivation to act (Wojciechowski, 2006) or, in other words, the human potential of a company which reflects the quantity and quality of transport production and employees;
- 4) non-material resources (information) which are not physical or financial but they are an important element of the functioning of a transport company. They

can be used in various places at the same time and they do not lose their value throughout the process. Non-material resources can be classified as (Kozłak, 2008):

- assets: licences, concessions, patents, copyright, trademarks and their recognition in the market, reputation, information, databases, relationships, contacts with clients and suppliers.
- skills and competence: employee know-how, suppliers, sales and service policies, company procedures, information about the market and competition, company culture.

All these resources have an impact on the correct transport production process, thus, good knowledge of their features allows choosing them in an appropriate way. It highly influences the quality of services and the cost of transport (Marszałek, 2001). A right choice of production factors determines the possibility of effective management. Unsuitable employees and asset structure, especially in the scope of the fleet owned, which is the foundation of the assets, may impede the performance of transport tasks resulting from signed contracts, as well as it influences the functional efficiency (Letkiewicz, 2006).

“Collection of means and objects of labour and hiring people is a necessary condition to endeavour operational activity but it is insufficient” (Jasiński, 2005, p. 14–15). A road transport company has to have such a potential of human and material resources at its disposal so as to create transport production in accordance with the market expectations declared and learnt. If it is not the case, the company will be subject to lowered efficiency of activity caused by an excessive amount of resources and, resulting from this fact, the cost level will exceed the economic relevance or the company will lose revenue due to insufficient accessibility of resources (transport potential), impeding the delivery of services to all the declared demands from clients (Szafucki, 2017).

In order to conduct rational basic activities of a company, it is required that resources appropriate in terms of quantity and quality are collected and compared to the objective, they should also be interrelated in time and space, creating a whole in which each and every element helps the company succeed.

3. Evaluation of operational systems of road transport companies

Evaluation of a company’s activity is a set of interrelated and supplementary elements, with the help of which the level of realisation of aims determined for a given period of time for a company can be specified. Thanks to its cognitive values, evaluation is a valuable as well as indispensable tool of company management (Wersty, 2000).

Various measures and indicators will be helpful in such evaluation. Measures are economic categories which reflect occurrences and facts regarding management of the company’s resources and its relationships with the environment (Twaróg, 2005).

A measure is a numerical quantity indispensable to calculate indicators. Indicators are economic categories related to occurrences and facts of the material flow and information related to them. Economic indicators are considered to be a fundamental and most common form of economic information. They play an important role in the decision processes of companies. Indicators are a standard used to reflect the basic information resulting from calculation of all objects, processes and occurrences (Twaróg, 2005). The highly cognitive value of indicators depends on observing the rules laid out when they have been constructed. The important indicator construction rules include: the aim, correspondence, proportionality

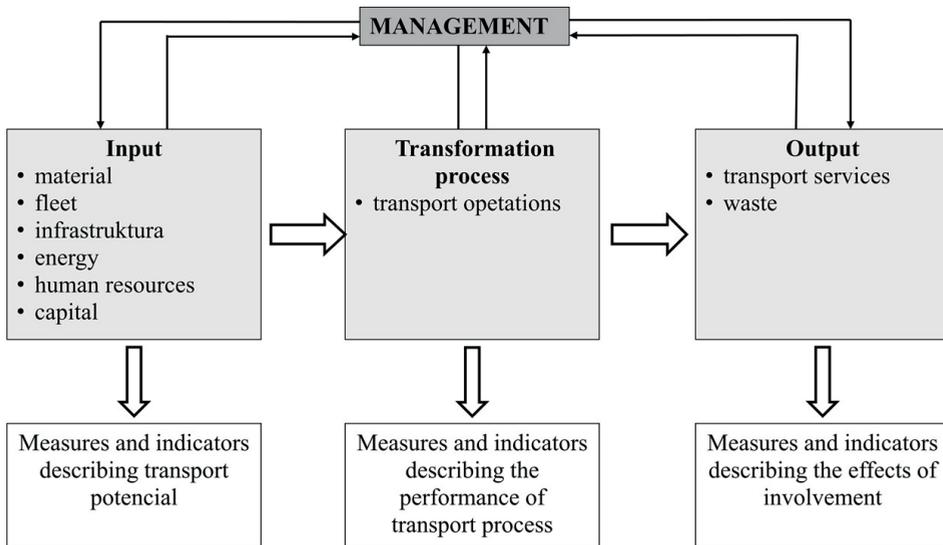


Figure 1. Diagram of the operational system of a transport company
Source: own work based on (Letkiewicz, 2006) and (Jasiński, 2005)

When constructing indicators evaluating the operational system of a transport company, one should follow the right choice of production factors that will provide a possibility of efficient management and performance of transport tasks. The result is that a fundamental indicator evaluating the operational activity of this kind of a company is the transport potential. There are two possible approaches to this indicator.

Firstly, it is formed by: the number of owned vehicles, inventory vehicle-days and total inventory capacity. The number of vehicles owned is a measure which is the total of all individual items of the company's fleet during one day. When calculating this measure, the fleet which did not operate during a given day should be excluded. An inventory vehicle-day is a measure which depends on the number of fleet vehicles owned and the period of ownership measured in days. The ability to deliver services is an indicator which consists of the number of fleet vehicles owned and their capacity (Letkiewicz, 2006).

Secondly, it is the ratio of the following measures and indicators: the inventory stock of the means of transport, the technical readiness of the means of transport, the use of the technically operating fleet, the average operation time of the means of transport, the average operating speed, the use of mileage, maximum capacity, the use of capacity. The inventory stock of the means of transport is a measure which informs about the size of the fleet owned by the company. The technical readiness of the means of transport is an indicator which demonstrates what proportion of the fleet has to operate in a given calculating period. The use of technically operating fleet is an indicator which demonstrates what proportion of the means of transport with the ability to operate will actually operate in a given period. The average time of operation during 24 hours is a measure expressed in natural units. The average operating speed obtained by the means of transport in a given period is also a natural measure. The use of mileage is an indicator demonstrating what proportion of operation was performed with cargo or passengers. Maximum capacity of the means of transport in operation is a quantity indicator. The use of the capacity of the means of transport in operation is also a quantity indicator (Szałucki, 2017).

The performance of a transport process requires covering space, thus it should be formed by the following indicators: the mileage and the quantity of the transported tonnes. When forming the transport measure, mileage with cargo or passengers (the quantity of kilometres with cargo or passengers) and empty mileage (without cargo or passengers) should be taken into account. From the point of view of the transport process performance, the time measure comprises: the time of the fleet in motion resulting from relocation of cargo or passengers, and the time related to fleet stoppage. The quantity of transported tonnes is called the capacity use indicator and it consists in comparing the weight of cargo and the capacity of the vehicle performing its transportation (Letkiewicz, 2006).

The effects of venture are measured by transport work, the distance of transport, the average dynamic capacity of the means of transport and the use of capacity. Transport work is an indicator expressed in tonne-kilometres (passenger-kilometre) and it means transportation of cargo/passenger per 1 km. The transport distance relates to the average transport distance of one tonne of cargo. The indicator of average dynamic capacity of the means of transport depends on the participation of individual fleet groups in the overall mileage. The dynamic indicator of the use of capacity determines the relation between the transport work and the possible potential work to perform, should the capacity be entirely used (Letkiewicz, 2006).

4. Directions of evaluation of operational systems of road transport companies

When determining the directions for evaluation of operational systems of road transport companies, it should be stated that the most essential resources which are indispensable to perform transport services are: the fleet along with the machinery

and equipment, materials and human resources. They play an important role on the three stages of this system: input, transformation and output. There is information flow between elements of the operational system; it enables predicting the results of the undertaken activities as well as evaluation of the company's operational activity from the point of view of the determined aims and then taking measures to improve whatever needs improving. This information is an indispensable factor in the management processes, which are related to decision-making on the basis of the obtained information. Access to information enables making the decision about the method of processing of a given transport order, the choice of the input elements and the performance of operations indispensable to transform them into planned output services. Efficient management of an operational system requires that appropriate measures and indicators are developed. The basic measures and indicators in the evaluation of an operation system are presented in table 1.

The input stage is related to the investigation of the transport potential and its planning. It is important to answer the questions: what to transport, how, and to whom; when, where to transport and to whom; transport with what. At this stage, it is intrinsic to collect the measures of a natural and technical-economic nature. When evaluating the fleet, machinery and equipment, it is important to know the quantity, structure and age of the fleet owned, its technical readiness and capacity. Thanks to these measures it will be easy to plan which and how many vehicles are indispensable to transport a determined quantity of cargo or people to the destination in a given time. An important problem is also to conduct an optimal policy for the purchase of new vehicles as well as upgrading and modernization of vehicles owned. And road transport cannot be efficient without access to materials i.e. fuel, tyres, spare parts. The condition and the level of wear of these factors need to be evaluated on an on-going basis, as their shortages may cause stoppages and the lack of a possibility to perform transport services. It is also crucial to evaluate the human resources. The most important natural measures are the status and structure of employment (the number of drivers and service employees) and their qualifications. When evaluating the input stage, the market demand and the possibilities created by the technical development need to be taken into account. Thus, the transport potential ought to be planned in a flexible way, taking into consideration changes in the environment, keeping up with them, and ideally, being ahead of them.

The evaluation of the input stage will influence the second stage: transformation and performance of the actual transport service. Measures used to evaluate this stage will be: natural (quantity), quality, space and value measures. The basic question at this stage is: how long does it take? how is it performed? are there breaks and stoppages in the transport process? are repairs of the fleet frequent? Measures evaluating the fleet should be coupled with indicators presenting the use of consumable materials and spare parts, as well as measures evaluating the performance of employees e.g. the time of work or the number of travelled kilometres.

The last stage, output, will answer the following question: what are the effects of the performed transport work for the entire company? Mostly, complex,

Table 1. Indicators to evaluate operating system functioning

Specification	Fleet, machinery and equipment	Materials	People
Input	<p>FLEET STRUCTURE</p> <ul style="list-style-type: none"> - measure of the quantity of vehicles - measures of the company's asset structure with particular consideration of vehicles owned (type structure, age, depreciation level, territorial distribution of the fleet, vehicle brand and type, fleet group, cargo capacity, etc.) - measures describing operation and technical features of vehicles - indicator of cargo capacity of vehicles - indicator of technical readiness - indicator of vehicle-workdays inventory - indicator of entire inventory capacity - inventory capacity average - measures related to planning of revisions and repairs - measures related to investment activities (purchase/modernization of vehicles) - measures of tasks to be performed by the crew and vehicles - indicator of how time-consuming given works are - indicators showing the how intense, extensive and technicized the works are 	<p>MATERIAL STOCK</p> <ul style="list-style-type: none"> - measures of stock and turnover of consumable materials (fuels, tyres) and additional materials - measures of stock and turnover of spare parts - indicators of wear of material - statistic standards - indicators of standard stock - reserves - contracts in material management subsystem - measures of spare parts - stock and stock of materials - indispensable for fleet repairs - in planning and balancing repairs - contracts with suppliers - of materials 	<p>EMPLOYMENT STRUCTURE</p> <ul style="list-style-type: none"> - measure of employment status - measures of employment structure (rank categories) - measures investigating vocational qualifications and licenses of employees - measures investigating work practices - measures related to holiday planning and recording
Transformation Process	<p>TRANSPORT PERFORMANCE</p> <ul style="list-style-type: none"> - indicator of the quantity of transported passengers/cargo by a vehicle - measure of vehicle operation days - measure of vehicle downtime - measure of vehicle operation downtime days - measure vehicle technical downtime days - measure of total downtime vehicle-days - measure of time and quantity of repairs - measure of time of delays of vehicles - measure of vehicle speed - measure of transport regularity - measures of fleet performance in various sections 	<p>WEAR OF MATERIAL</p> <ul style="list-style-type: none"> - indicator of fuel consumption - and wear of tyres (by vehicles, drivers, routes) - indicator of wear of spare parts (by vehicles) - deviations from standard wear - indicator of materials which do not demonstrate motion 	<p>WORK PERFORMANCE</p> <ul style="list-style-type: none"> - measure of worktime of drivers and technical service employees - indicator of the quantity of drives/services performed by a given employee - indicator of the quantity of kilometres driven by an employee (with and without cargo)

	<ul style="list-style-type: none"> - indicator of technical readiness vehicle-days - indicator of use of technically ready fleet - indicator of use of fleet - indicator of total capacity of vehicles in operation - indicator of average capacity of vehicles in operation - measures of regularity of passenger transport - indicator of the use of work time - indicator of actual time of loading and unloading - measure of the number of services - indicator of average time of one service - measure of the number of repairs - indicator of average time of one repair 		<ul style="list-style-type: none"> - indicator of the quantity of transported tonnes of cargo/passengers during one day by an employee - measure of the types of performed transportation (e.g. transport by dumper) by an employee - measure of the types of vehicle driven by an employee - measure of the types of (e.g. mechanical, manual) work by an employee - measure of employee absence
<p>Output</p>	<p>FLEET OPERATION</p> <ul style="list-style-type: none"> - indicator of transport work (according to routes/ lines and assortment of transport) - indicator of maximum transport work - parameters of comparison of work of individual departments - indicator of the use of machinery and equipment (according to manufacturing cells) - productivity of the work of loading machines and loaders - indicator of an average overhauling period - indicator of average inter-service mileage - indicator of the number of loaded travels - indicator of empty travels - indicator of the total number of travels - indicator of the number of performed services (transports) - indicator of the size of transports - indicator of average capacity of all vehicles - indicator of average dynamic capacity of vehicles in operation - dynamic indicator of the use of capacity - statistic indicator of the use of capacity - indicator of the quantity of transported/reloaded cargo - indicator of the average distance of transport of one tonne 	<p>WEAR OF MATERIALS</p> <ul style="list-style-type: none"> - indicator of calculating fuel consumption according to drivers and vehicles - indicator of the wear of materials for a mileage unit - indicator of the average fuel consumption and wear of tyres by all vehicles - indicator of the average wear of spare parts by all vehicles - measure of over-burned fuel 	<p>WORK-TIME USE</p> <ul style="list-style-type: none"> - indicator of average time of work of drivers and technical service employees - indicator of average time of absence of employees - indicator of average overtime work in groups of drivers and helpers - indicator of the use of the time of work of employees at a service station - productivity of work

Specification	Fleet, machinery and equipment	Materials	People
	<ul style="list-style-type: none"> - indicator of the number of transported passengers/cargos by all vehicles - indicator of the average number of kilometres travelled by all vehicles - indicator of the average time of operation of vehicles - indicator of the average downtime of vehicles - indicator of the time of travel - indicator of the time of loading and unloading - indicator of the time of breaks in processes - indicator of stoppages - indicator of the time of work - indicator of the use of time of work - indicator of the average time of loading and unloading of one tonne - indicator of the average time of operation during 24 hours - indicator of the average time of one service - indicator of the average speed of vehicles - indicator of the average technical speed - indicator of average operating speed - indicator of loaded mileage - indicator of empty mileage - indicator of total mileage - indicator of the use of mileage 		
	<p>TECHNICAL INFRASTRUCTURE</p> <ul style="list-style-type: none"> - indicator of damage and losses in means of transport - indicator of the number of repairs and technical services in comparison to the standards (by vehicle) - measure of performed repairs - indicator of the average time of one repair - measure of failure frequency (according to vehicles and reasons) - indicators of the technical downtime of the fleet according to vehicles and reasons (e.g. the level of technical downtime in vehicle-days caused by services, repairs, lack of drivers, lack of documents) 		

	<ul style="list-style-type: none"> - measures of technical operation of vehicles (the level of performance of planned technical services and performed repairs of vehicles, regeneration of spare parts etc.) <p>SERVICE QUALITY</p> <ul style="list-style-type: none"> - measures of timeliness - measures of frequency of losses (losses of cargo in transport) as compared to the average) - measures of development tendencies (passenger flow, operating speed, delays, transport demand) 		
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Source: (own work)

comprehensive indicators are calculated here (even though partial measures may appear; they cannot be omitted, as they are indispensable to reflect the efficiency of the entire operational system). Indicators at this stage should relate to the fleet operation and the technical backup, as well as they should represent the quality of the performed services, the wear and tear of materials and the use of the employee work time. The analysed indicators may relate to numerous variables (time, revenue, number of travelled kilometres).

This stage is very important from the point of view of the operational system evaluation, as this is the point of return to the input stage and starting to plan transport services anew. The operational system should be planned on the basis of the optimal technical and economic standards which determine a feasible, maximal use of the fleet, machinery and equipment, as well as with the consideration of the best use of the employee work time.

Conclusions

Transport of cargo and passengers is considered as one of the most important systems of market economy. Road transport companies do not operate in a vacuum. They are subject to various micro- and macro-economic factors which determine their efficient functioning. They have to manage their means of transport in an efficient way, investigate the availability of human resources and competition. This is why it is important to constantly measure and evaluate operational systems of road transport companies.

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EFFECTIVENESS OF FUNCTIONING AND MECHANISMS OF CREATING CORPORATE VALUE IN THE SECTOR OF TRANSPORT OF GOODS, WAREHOUSING AND TRANSPORT-SUPPORTING SERVICES

Abstract

The paper analyses the condition and financial results of companies with the use of relative and absolute measures, which constitute a consistent group of the characteristics of a company's financial standing. The analysed entities represent five sections of PKD (Polish Classification of Business Activities) which belong to the transport of goods, warehousing, storage, and transport support activities. The research study aims to identify and quantify the mechanism (the impact of factors) of creating value, described on the basis of a relative measure – return on equity. The authors confirm three research hypotheses related to the key determinant of value creation, the dominant mechanism and its changes in the analysed 2007–2016 period.

Keywords: corporate value drivers, mechanism of creating value, effectiveness

Introduction

A company's development involves coordinated changes of its subsystems by adapting them to a continuously changing environment, which includes the introduction of new elements into the company's system, improvement of the quality of the existing elements, a change of the system's structure (Pierścioneek, 1996; Stabryła, 1996). Development is a time related process which consists of logically ordered phases and stages that make up a development cycle (Platonoff, Sysko-Romańczuk, 2003).

A company's development is shaped by a time related set of conditions and a subset of factors that determine the economic space of the company's development. In this set the conditions (resources, statics) and factors (streams, dynamics) are not treated separately, they are complementary and mutually dependent – substitutable within certain boundaries (Lange, 1965; Chomętowski, 1993). Streams represent consumption of resources that are measures of their use that results in progress. The company's effectiveness constitutes the quantitative characteristics of the company's development attributes – and it is its imperative (Janasz, 2008). From the financial perspective creating the company's value, multiplying its equity is considered a universal and comprehensive measure of the effectiveness of its activities (Copeland, Koller, Murrin, 1997; Rappaport, 2000).

The research behind this article is aimed at the condition and financial results of companies, using relative and absolute measures that constitute a consistent set of conditions describing the financial standing of companies. The investigated entities represent companies of five classes of sections of the Polish Classification of Business Activities (PKD) which belong to the transport of goods, warehousing, storage, and transport support activities. The analysed period is 2007–2016. The research is targeted at identification and quantification of the mechanism of creating value, described by a relative measure – return on equity. Three research hypotheses are confirmed:

- 1) return on equity is determined mainly by the net profit margin – the impact of the financing structure and productivity of assets has a minority share;
- 2) the steady state of the impact of factors on return on equity is not a predominant mechanism of creating value;
- 3) the key change of the value creation mechanism is described by the decrease in the impact of the net return on sale in favour of the impact of productivity of assets and the financing structure.

1. Value and effectiveness – company aims and operations and development assessment

Economic effectiveness can be considered a factor most fully representing the effects of management rationality, and entrepreneurship is an efficient way of achieving effectiveness (Młynarski, Kaczmarek, 2013). All these categories are targeted at achieving the aims of a company's functioning, with the principal aim – its development.

Effectiveness is expressed by its measure. It is a static–dynamic measurement employing value measures, providing a basis for a management effectiveness economic balance and economic analysis of a company (Osbert-Pociecha, 2007; Dudycz, 2002).

The development identified with quality changes is accompanied by the growth of the quantity of the company's resources and the magnitude of streams of production factors. Treated as effective processes, qualitative changes should induce the company's value appreciation, its creation (Pierścioneek, 1996). As currently

confirmed, the company's value and development are processes convergent, mutually complementary and interdependent.

At present what is regarded as a pragmatic, quantifiable financial aim of a company is maximisation of its value, i.e. the value of the equity accumulated in it. This aim is defined on the ground of the company's financing strategies, equity management and economic profits for shareholders (Rappaport, 1986; Stewart, 1994). The value referred to shareholder benefits is determined as the created value (Cwynar, Cwynar, 2007). In this sense, the company's value creation can be considered a universal and comprehensive measure of the effectiveness of the company's functioning. Nevertheless, it is, one of its measures, a financial measure, in view of a broad understanding of effectiveness as a quantitative feature of the company's development characteristics.

2. Research methodology

The presented context of an approach to the effectiveness of companies and their collective entities (mezo-structures) has become a premise for comprehensive studies, the present article focusing on one of the mezo-structures – the "Transport and warehousing management" PKD section. It consists of PKD sections and classes formed of companies¹. Their effectiveness regarded as a development attribute and the factors describing and shaping it were quantified employing partial measures, including those combined into a deterministic structural system. They can become a basis for further analyses with the use of the synthetic measure of value (Kaczmarek, 2012).

Taking the increasing value to mean an effectiveness measure, the process to be evaluated is the creation of the direct share of the company owners (ROE). When relative accounting measures are deployed² the individual factors in this evaluation of a directly proportional impact (stimulants) include (Higgins, 1989; Block, Hirt, 1987):

- return on sale – reflecting the profit margin on sale;
- productivity – reflecting the assets management efficiency (capital circulation rate);
- financial support – reflecting the financial leverage effect.

The impact of the return on assets rate (ROA) – and, consequently, the company's employed capital – and the financial support rate (SF) on the return on equity (ROE) is the highest level of analysis generalisation using the relationships between profitability structural indicators. In this framework, the return on assets rate (ROA)

¹ The study was performed on mezo-structure objects (PKD divisions and classes) identified as PKD division "Transport and warehousing management", and the numerical material collected applied to non-financial corporations with the number of employed from 10 upwards, which submitted the required statistics reports (F-01/-01 and F-02 and SP). With the status as of end of 2016 these included 3097 companies. It is a complete database of companies included in the public statistics (economic entities employing fewer than 10 persons are included in sample surveys only). This database is referred to as the source of analyses done for the studies presented in the article (Pont Info Gospodarka SSiDP database).

² The range of value measures is taken from the available numerical data in public statistics.

is described and formed by the net return on sale (ROS) and the productivity of assets – PM (efficiency of managing it) (fig. 1).

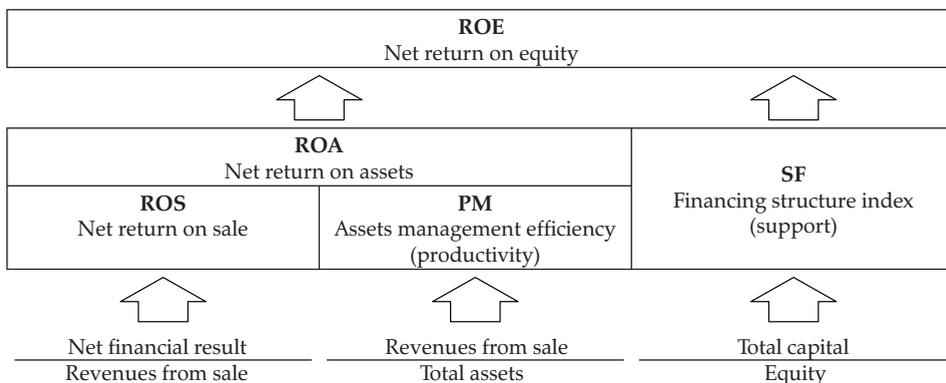


Figure 1. Elements of causal study of equity value creation (rate of return)

Source: (own elaboration)

The causal study of the changes of return on equity was done employing the deterministic approach, the method of logarithm finding. The starting point adopted was the balance between the dependent variable dynamics (D_{ROE}) and the product of the dynamics of explanatory variables (D_{ROS} , D_{PM} , D_{WF}).

$$\begin{aligned}
 D_{ROE} &= D_{ROS} \cdot D_{PM} \cdot D_{SF} \\
 \log D_{ROE} &= \log(D_{ROS} \cdot D_{PM} \cdot D_{SF}) \\
 1 &= \frac{\log(D_{ROS} \cdot D_{PM} \cdot D_{SF})}{\log D_{ROE}} \\
 D_{ROE} &= \frac{ROE_{t1}}{ROE_{t0}}; D_{ROS} = \frac{ROS_{t1}}{ROS_{t0}}; D_{PM} = \frac{PM_{t1}}{PM_{t0}}; D_{WF} = \frac{SF_{t1}}{SF_{t0}} \\
 R_{ROE} &= \frac{\log \frac{ROS_{t1}}{ROS_{t0}} + \log \frac{PM_{t1}}{PM_{t0}} + \log \frac{SF_{t1}}{SF_{t0}}}{\log \frac{ROE_{t1}}{ROE_{t0}}} \\
 R_{ROE} &= 1; R_{ROS} = \frac{\log \frac{ROS_{t1}}{ROS_{t0}}}{\log \frac{ROE_{t1}}{ROE_{t0}}}; R_{PM} = \frac{\log \frac{PM_{t1}}{PM_{t0}}}{\log \frac{ROE_{t1}}{ROE_{t0}}}; R_{WF} = \frac{\log \frac{SF_{t1}}{SF_{t0}}}{\log \frac{ROE_{t1}}{ROE_{t0}}} \\
 R_{ROE} &= R_{ROS} + R_{PM} + R_{SF}
 \end{aligned}$$

The use of a logarithmic function enables the transformation of the sequence of the product of explanatory variables dynamics into the sum sequence, which is followed by equating the dependent variable dynamics logarithm to one. Thereby, three partial deviations are determined (R_{ROS} , R_{PM} , R_{SF}) as the structural indicators, describing the effect of explanatory variables on the dependent variable (R_{ROE}).

3. Economic effects of mezo-structure functioning – transport and warehouse management

By the end of 2016 the “Transport and warehouse management” PKD section (section H) included 3097 corporations and 456 260 employees. It was, 6.6% and 9.2% of the entire group of non-financial enterprises, respectively. In terms of the basic economic criteria, the changes in the value of indicators of the share of this section in the years 2007–2016 indicate higher values of its potential (total capital, equity, except for the number of employees) than the results of its activities (revenues from sales, operating profit and net financial result).

The “Transport and warehousing management” section is composed of five PKD divisions which are predominated by “Land transport and transport via pipelines” (PKD 49, 2407 enterprises, 252 215 employees), and “Warehousing and transport supporting services” (PKD 52, 622 enterprises, 114 098 employees). The other divisions – except for a relatively high share of “Postal and courier activities” in terms of the number of employees – play a definitely smaller role in the creation of the potential and results of the entire section (tab. 1).

Table 1. Structure indicators of divisions of “Transport and warehouse management” PKD section in 2016 (%)

PKD divisions	EN	EP	GS	OP	NP	TA	EQ
49 Land transport and transport via pipelines	77.7	55.3	57.6	61.5	63.2	46.3	57.3
50 Waterways transport	0.7	0.3	0.9	3.2	4.8	0.8	1.4
51 Air transport	0.6	0.8	4.4	6.5	9.3	2.6	0.3
52 Warehousing and transport supporting services	20.1	25.0	31.1	28.0	24.0	47.0	38.3
53 Postal and courier activities	0.9	18.6	6.1	0.8	-1.3	3.3	2.7

Notes: EN – number of enterprises, EP – number of employees, GS – revenues from sales, OP – operating profit, NP – net financial result, TA – total assets, EQ – equity.

Source: (own elaboration based on the Pont Info Gospodarka SSiDP database)

The first two divisions create the potential, determine the results and define the trends of changes prevalent for the entire section which is further confirmed not only by the structure indicators but also by a high correlation of time sequences which is statistically significant as well. The Pearson correlation coefficient for the revenues from sales of the PKD 49 and 52 sections and divisions was 0.997 and 0.977, respectively. The correlation coefficient in the scope of the operating profit generation was 0.968 and 0.767, respectively.

The analysis that follows is focused on PKD classes formed by companies for transportation of goods, warehousing and transportation supporting activities³.

The share of these PKD classes in the revenues from sale of the entire PKD section amounts to 76.8%, excluding warehousing – 70.5% and excluding support

³ Owing to zero or close to zero values of structural indicators for three PKD classes (50.20 – Sea and coastal freight transport, 50.40 – Inland waterways freight transport of goods, 51.21 – Air transport of goods) are not discussed in further detailed analysis and conclusions.

activities – 45.8%. This means that it is the share generated only by the companies for transportation of goods, carried out with six different means of transport. The estimation of the key structural changes reveals that in the years 2007–2016 the significance of land transport in the revenues from sale increased (from 56.0% to 80.7%), while the share of rail transport decreased (from 27.8% to 11.3%) and transport via pipeline also decreased (from 12.0% to 6.2%) in the freight transport and transit. The prevalence of land transport over rail transport is reflected by the comparison of their revenue on sales – 2.01 in 2007 and 7.14 in 2016.

4. Results and financial condition of mezo-structure in PKD classes approach

From the point of view of revenues from sale as the result of economic activity, the companies in the most favourable condition are the companies in the land transport (PKD class 49.41), warehousing (52.10) and support activities (52.20). The calculated mean periodical change rate (STZ) and the change rate over a period (TO) are positive and with high values, especially for warehousing. A slight increase can be observed in transport via pipeline (49.50), while the revenues from sale of rail transport dropped dramatically (49.20) (tab. 2).

Nevertheless, there is an increase in the operating profit of rail transport which indicates improvement in cost management. In transport via pipeline, and support activities for transportation in particular, the high amplitude of operational profit fluctuations is characteristic, and negative values of STZ and TO apply only to transport via pipeline. The most favourable results were recorded by road transport companies and warehousing, where the relatively high sale revenues growth rate corresponded to a high operational profit growth rate. In the transport support activities and warehousing, on the other hand, the highest assets growth resulted from incurring capital investments.

Table 2. Change rate indicators in key categories characterising companies of PKD classes in 2007–2016 (%)

PKD classes	GS		OP		TA	
	STZ	TO	STZ	TO	STZ	TO
49.20 Rail freight transport	-0.97	-12.80	1.02	15.31	2.18	35.19
49.41 Land freight transport	8.61	217.95	4.04	74.01	8.08	196.62
49.50 Transport via pipeline	0.59	8.61	-0.92	-12.12	2.61	43.51
52.10 Warehousing and storage of goods	20.66	1285.67	9.18	242.05	18.16	933.55
52.20 Support activities for transportation	6.05	127.48	2.09	33.57	13.99	525.63

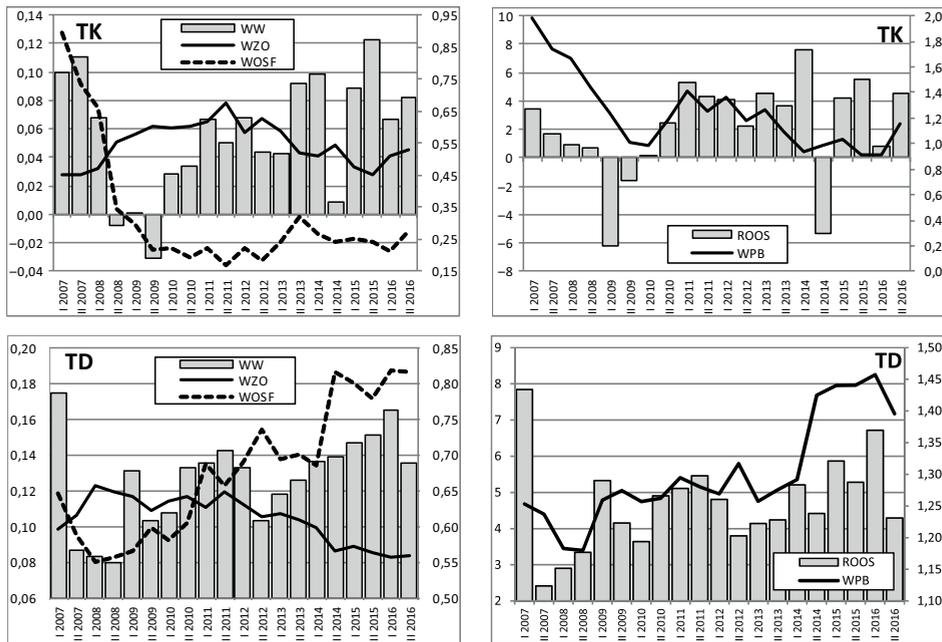
Notes: GS – revenues from sales, OP – operating profit, TA – total assets, STZ – mean periodical change rate, TO – change rate over period⁴.

Source: (own elaboration based on the Pont Info Gospodarka SSiDP database).

⁴ Mean periodical change rate (STZ) and change rate over period (TO), half-yearly observation, $i=1, \dots, n$:

$$STZ = \left(\sqrt[n-1]{\frac{x_n}{x_1}} - 1 \right) \cdot 100; TO = \left(\frac{x_{i+1} - x_i}{x_{i+1}} \right) \cdot 100$$

Rail and road freight transport companies differ significantly as to the key financial indicators describing and characterising the economics and efficiency of assets and management of their financing sources. Rail transport suffered a period of severe crisis in the years 2008–2010, manifested by the unprofitability of operational activities (ROOS down from +3.40% to -6.19%), an increase in total debts (WZO from 0.45 to 0.60) and sudden reduction of current liquidity (WPB from 1.98 to 0.99) as well as the assets-capital structure ratio (WOSF). Operational profitability was reached in subsequent years (except for the second half of 2014), the debt was limited and the assets-capital structure stabilised. However, the liquidity decreased again. Road transport, on the other hand, is described by a path of gradual growth of operational profitability (average ROOS 4.69%), with satisfactory and increasing current liquidity (average WPB 1.30) debt limitation (average WZO 0.61). A considerable improvement of the assets-capital structure (WOSF), approaching the normative value of unity can also be observed (fig. 2).



Symbol	Name	Units	Calculation mode
ROOS	Operating profit on sales	%	Operating profit/sales revenues
WW	Solvency	unitless	Financial surplus/total liabilities
PB	Current liquidity	unitless	Current assets/current liabilities
WZO	Total debts	unitless	Outside capital/total capital (liabilities)
WOSF	Assets-capital structure	unitless	Equity/outside capital: fixed assets/current assets

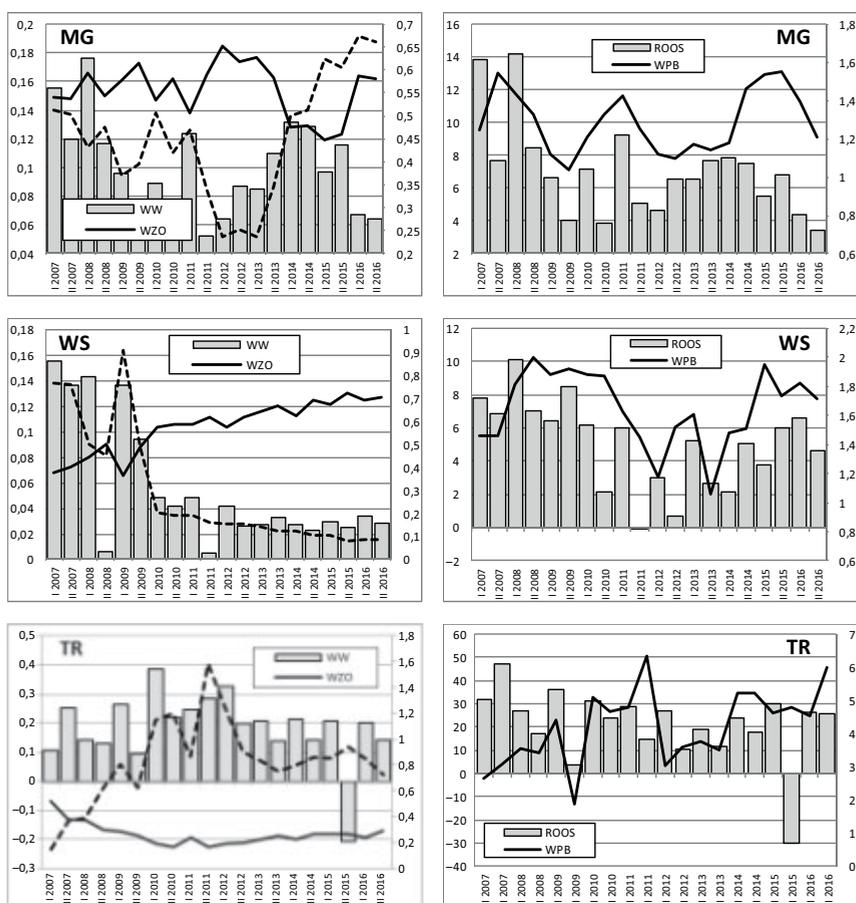
Notes: TK – (49.20) Freight rail transport, TD – (49.41) Freight road transport

Figure. 2. Basic financial indicators of freight rail and road transport companies in 2007–2016 (6 months data)

Source: (own elaboration based on the Pont Info Gospodarka SSiDP database)

In the period 2007 – first half of 2014 warehousing and storage companies – despite increased revenues from sale – experienced evident reduction of operational profitability (ROOS down from 13.86% to 3.42%). At fairly strong fluctuations, the current liquidity (average WPB 1.29) and total debts (average WZO 0.56) showed safe values, despite assets growth expansive policy (10.2 times), which resulted finally in an increase in the assets-capital structure index (WOSF).

In transport supporting companies the operational profitability (ROOS) deteriorated in the years 2011–2012, as did the current liquidity (WPB) for the years 2010–2014, at a satisfactory average value of 1.65. On the other hand, the assets intensive growth (6.3 times) resulted in considerable growth of debt from 0.38 to 0.71 and sharp deterioration in the area of assets–capital structure (WOSF) and solvency (WW) (fig. 3).



Notes: MG – (52.10) Warehousing and storage of goods, WS – (52.20) Transport supporting services, TR – (49.50) Transport via pipeline. Financial indicators calculation mode – as for figure 1.

Figure 3. Basic financial indicators of transport via pipeline, warehousing and transport supporting companies in 2007–2016 (6 months data)

Source: (own elaboration based on the Pont Info Gospodarka SSiDP database)

Transport via pipeline companies are specific in terms of their stock of assets, financing sources, and, mainly, the market on which they operate. Revenues from sale increased gradually (8.6% over the analysed period), while the operational result decreased significantly (-12.1%). Nevertheless, the operating profitability from sales (ROOS) continues to be at very high levels (average 21.1%, slight downward trend), and the current liquidity (WPB) has been improving since 2013, also at very high values (average 4.2 – overliquidity). Debts (WZO) remain at a very low and stable level (average 0.26). Solvency assessment (WW) is satisfactory, as is the assets–capital structure (WOSF) stabilisation since 2013 (WOSF).

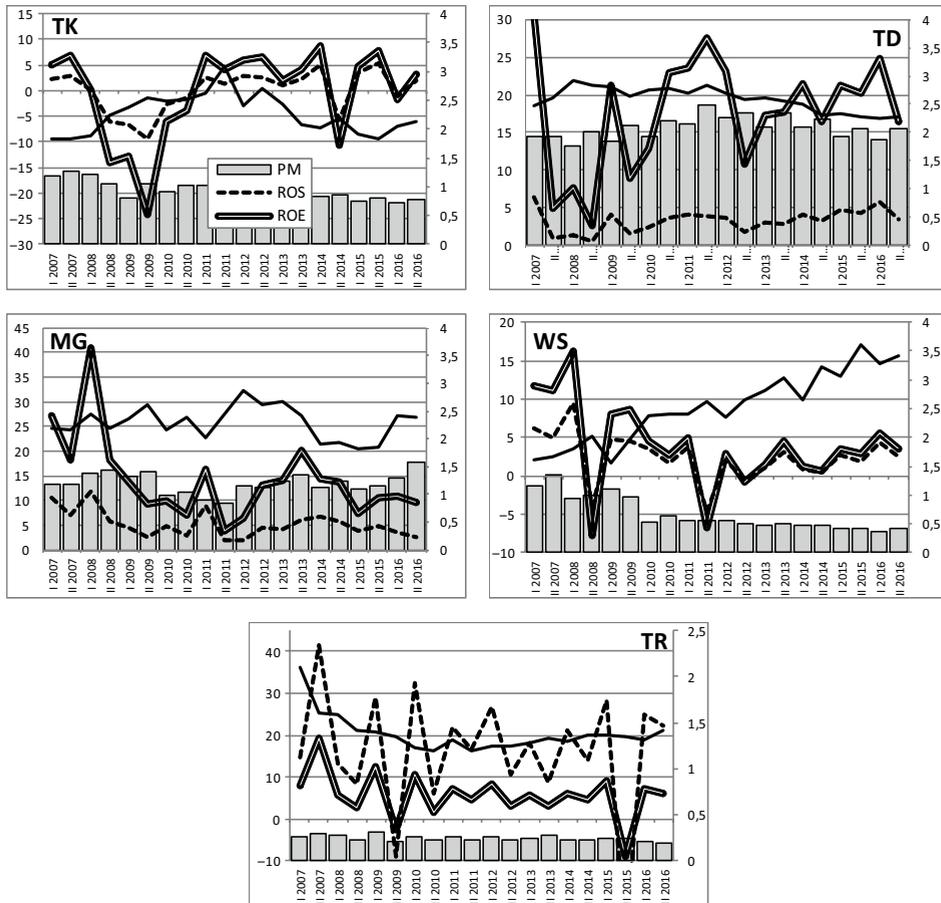
5. Causal analysis of operational efficiency

In the section of the paper on methodology a deterministic model of the causal analysis of the operational efficiency of companies in the aspect of a relative measure of value creation – return on equity – is presented. Using this model, the characteristics of rail freight transport companies are discussed at first. The considerable net sales unprofitability (ROS) in the years 2008–2010 led to a decline in the return on equity (ROA) due to the low equity management efficiency (productivity PM), which dropped from 1.27 to 0.81. Reaching and increasing the ROS in subsequent years, at a further unfavourable impact of the PM (decrease to 0.73), in the context of depreciation of the financial structure ratio (SF), resulted in sharp fluctuations and a decline in the returns on equity (ROE). Over the analysed period there was a considerable difference between ROS and ROA because of the impact of the productivity factor (PM, average 0.94), and the average financial structure (SF, average 2.26) reflected a slight surplus value of the external capital over equity. The contribution of SF in the creation of changes in ROE over the analysed years 2007–2016 reached the level of 17.3%, while the contribution of PM was only 1.5% and the predominant contribution of ROS at the level of 81.2% (fig. 4).

Road freight transport companies employ a different mechanism of creating their return on equity (ROE). As an average value (17.6%) it is relatively the highest among the analysed PKD classes. The assets management efficiency which is twice as high as in the rail transport (PM average 2.09) results in the return on assets (ROA, average 6.92%) higher by this factor, at a fairly stable and relatively low debt ratio (SF, average 2.59, a shift in the structure in favour of external capital). ROS fluctuations are thus translated into ROE fluctuations of a higher amplitude due to the accumulated impact of the capital management efficiency factor and the structure of its origin (average 5.31). The contribution of factors in the creation of ROE changes in road transport was relatively stabilised –it was 25.4% for PM, 31.7% for SF and 42.9% for ROS.

The return on equity reached by the warehousing and storage companies (ROE, average 14.29%) was relatively high, however, at a slow capital net turnover (PM, average 1.20) due to investing the capital mostly in long term investments (building structures). This results in similar curves of ROS and ROA, while the financing structure (SF, average 2.29, revising the structure in favour of external

capital) causes the multiplier effect of ROA at the ROE ratio. SF fluctuations intensified in the last three years, hence the impact of this factor on ROE changes was 32.1%, PM 7.7%, while the impact of ROS of 60.2% was decisive.



Symbol	Name	Units	Calculation mode
ROS	Net return on sales	%	Net financial result/sales revenues
ROA	Net return on assets	%	Net financial result/total assets
ROE	Net return on equity	%	Net financial result/equity (net value of assets)
PM	Productivity (efficiency of assets management.)	unitless	Sales revenues/total assets
SF	Financial structure	unitless	Total capital (liabilities)/equity

Notes: TK – (49.20) Rail freight transport, TD – (49.41) Road freight transport, MG – (52.10) Warehousing and storage, WS – (52.20) Transport supporting activities, TR – (49.50) Transport via pipeline.

Figure 4. Efficiency of freight transport, warehousing and transport supporting companies by PKD classes in 2007–2014 (half-years, PLN million)

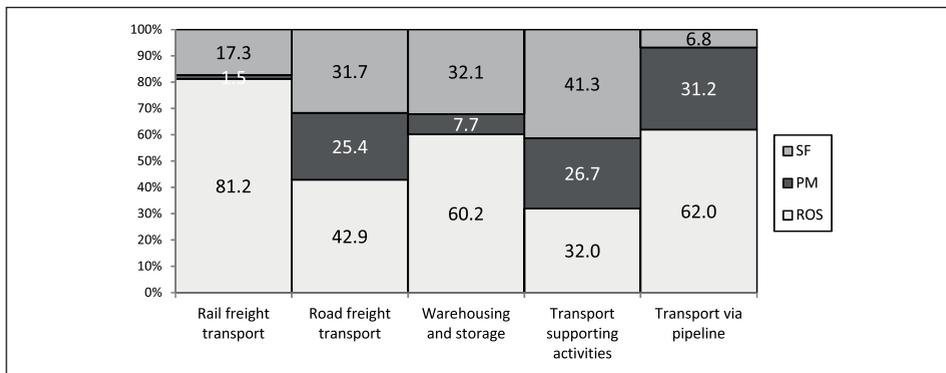
Source: (own elaboration based on the Pont Info Gospodarka SŚiDP database)

In the case of transport supporting companies, where a considerable growth of assets was seen over the analysed period, the changes that affected ROA resulted from changes of the PM and SF factors in opposite directions. The former had a declining trend (-63.8%), while the latter had an ascending tendency ($+113.7\%$). The low and decreasing value of PM (average 0.67) made the ROS and ROA curves approach each other, whereas since 2010 the increasing SF (average 2.53) made also ROE closer to them. ROS contributed to the ROE changes in 32.0% , PM in 26.7% , and SF in 41.9% (the most balanced proportions among the discussed PKD classes).

In the transport via pipeline companies the significant amplitude and high value of ROS (average 16.09%) were outweighed by changes in different directions, and chiefly the low capital turnover (PM, average 0.25, considerable stock of assets – objects of infrastructure), which resulted in ROA much lower than ROS (average 4.10%). With an insignificant share of external capital in financing the operation (WZ, average 0.26), the financing structure rate slightly exceeded the value of unity, and with declining tendency (SF, average 1.38) ROE increased at a gradually lower rate (average 5.74%). The ROS contribution in ROE changes was 62.0% , the effect of PM 31.2% , while the impact of SF merely 6.8% .

Conclusions

Companies that belong to the analysed PKD classes (freight transport, warehousing and transport supporting services) operate following different ideas of management of assets and the origin of capital. This results in generating different mechanisms of creating their values in terms of a relative measure in the form of the return on equity (ROE). The capital appreciation determined an increase in the value of these companies. It is also a synthetic measure for benchmark analysis of the efficiency of capital investment in business enterprises, that is, business activity as a company.

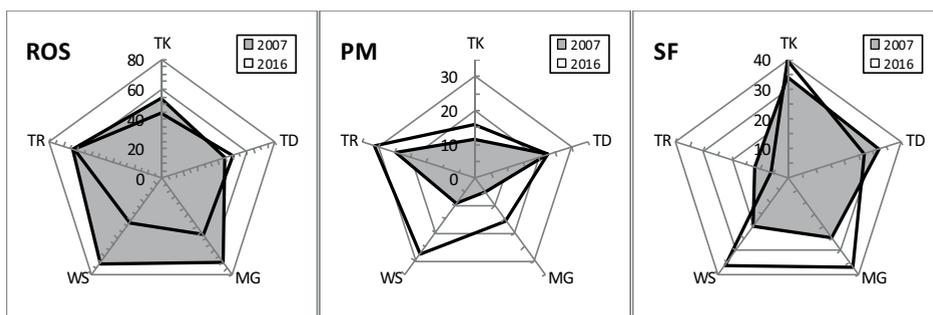


Notes: financial indicators – as for figure 4.

Figure 5. Indicators of factor impact structure on net return on equity by PKD class in 2007–2016 (%)

Source: (own elaboration based on the Pont Info Gospodarka SSiDP database)

In road freight transport companies each unit of the generated return on sale is on average multiplied 5.31-times (the most favourable result among the analysed PKD classes) per the number of units of return on equity (ROE). The companies of this PKD class, like the transport supporting companies, demonstrate the most balanced impact of ROS, PM and SF on ROE. The warehousing companies had the average value of the cumulated multiplying factor of 2.71. It was determined by assets slow circulation (PM) of a relatively high rate and long restitution cycles. The contribution of SF in ROE changes was similar to that in the road transport, while ROS changes (60.2%) played a more important role in warehousing. The largest disproportions were found between companies for rail transport and transport via pipeline. In the former, ROE changes are shaped by ROS (81.2%), with a minor contribution of productivity (PM) and an insignificant contribution of SF. On the other hand, in transport via pipeline the contribution of PM is close to 1/3, despite a low turnover of slowly rotating assets (building infrastructure). The SF impact, however, is marginal, which is why high ROS rates determine 62.0% of ROE rates (cumulated multiplying factor 0.36) (fig. 5).



Notes: TK – (49.20) Rail freight transport, TD – (49.41) Road freight transport, MG – (52.10) Warehousing and storage, WS – (52.20) Transport supporting activities, TR – (49.50) Transport via pipeline. Financial indicators – as for figure 3.

Figure 6. Changes of indicators of factor structure impact on net return on equity of PKD classes in 2007 and 2016 (%)

Source: (own elaboration based on the Pont Info Gospodarka SŚiDP database)

The dynamic approach, hence, the changes of the impact of factors on return on equity, indicates a considerable decrease in the significance of ROS in the companies providing transport supporting services (–34.0 p.p.) and warehousing (–22.9 p.p.). In both cases there was a simultaneous counter change – an increase in the PM impact (+18.2 p.p. and +10.5 p.p., respectively). In respect of transport supporting services it was also the impact of SF that increased (+15.9 p.p.), similarly to warehousing (+12.4 p.p.) (fig. 6).

The identified characteristics of the companies of the five analysed PKD classes recognised as freight transport, warehousing and transport supporting services and which confirm the formulated hypotheses include:

- 1) return on equity (net) is determined mainly by the net profit margin (accumulated share, average 55.7%), the financing structure (25.8%) and the productivity of assets (18.5%);
- 2) the steady state of the impact of factors on the return on equity (net) is not a predominant mechanism for freight transport and warehousing companies, which makes it close to supporting services;
- 3) the key change of the value creation mechanism is described by the decrease in the impact of the net return on sale (-20.4%) in favour of the impact of productivity of assets (+54.1%) and financing structure (+18.3%), which applies rather to warehousing and supporting activities than to freight transport.

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WORKING CAPITAL MANAGEMENT IN TRANSPORT INDUSTRY COMPANIES LISTED ON WARSAW STOCK EXCHANGE

Abstract

Working capital management in transport companies stems from a variety of factors, the structure of assets being one which should be distinguished. In the transport companies listed on the Warsaw Stock Exchange there is a strong tendency to maintain positive working capital. The method of comparative analysis used in the article is based on purposive sampling cases. The aim of this article is to empirically verify the hypothesis that large transport companies listed on the Warsaw Stock Exchange maintain positive working capital.

Keywords: working capital, working capital management, transport enterprises, transport economics, transport industry

Introduction

An appropriate level of working capital allows maintaining a balance in the company. Management of the working capital amount mainly depends on the size of the company, the cash conversion cycle, the adopted strategy of financing of current assets and the character of the industry, and the company itself. The article describes how the above mentioned factors affect working capital management in transport companies whose character is reflected in the assets as well as in the method of their financing.

The aim of this article is to empirically verify the following hypothesis: large transport companies listed on the Warsaw Stock Exchange maintain positive working capital.

1. Working capital management in companies

Working capital is the reflection of financial stability of the company. Describing the influence that working capital has on the company's activity, especially in the context of its liquidity and stability, requires clarifying the terminology related to it. From the accountancy point of view, working capital (abbreviated WC) is the difference between constant capital and fixed assets. In other words, it is the part of current assets which is financed by the owner's equity and long-term liabilities (Kurowski, 2004, p. 160).

The value of working capital can be determined as positive working capital, negative working capital or a balance level. The zero value of working capital means that fixed assets are financed by constant capital, and current assets are financed by short-term resources. Such a situation is short-lived and usually transient. In the long run, usually there are inclinations towards a positive or negative value of working assets. Negative working capital means that the company has more liabilities than means to cover them. In such a situation, the risk of the necessity to sell fixed assets in order to meet short-term liabilities rises, although it does not ensure the ability to meet liabilities quickly (Łukasik, 2009, p. 99).

The most profitable situation for companies is to maintain positive working capital. In such situation, a part of current assets is financed by fixed assets. Positive net working capital results in avoiding potentially high costs of gaining the capital to finance current activities, which affects the financial stability of the entity (Bień, 2009, p. 87).

Working capital management means maintaining its appropriate level for a given company (Davis, Wiankowska-Ładyka, 1993, p. 21). To be more explicit, working capital management is reduced to synchronization of the pace of liquidating current assets and covering long-term as well as short-term liabilities, so that the company should remain solvent (Krzemińska, 2002, p. 96).

Net working capital should be managed in such a way, so that the capital structure should not affect the company's functioning and development in a negative way (Wojewnik-Filipkowska, 2008, p. 58). Among the most important factors which form the working capital we can distinguish (Michalski, 2013, p. 121): the size of the company, the cash conversion cycle, the strategy of current assets financing, the character of the industry.

The size of the company affects working capital management, as working capital is managed in a different way in large, medium and small enterprises. The main differences appear in: financial possibilities, risk tendency, differences in the owner's equity supply, as well as the possibility to increase it, the access to borrowed capital and capital markets. The differences stemming from possibilities and difficulties in financing small, medium and large enterprises should result in different methods of working capital management. Large companies aim at maintaining positive working capital in the long run, however, it does not mean that there is no possibility of balanced or negative working capital. This may occur due to e.g. investments they undertake (as large companies are prone to more risk-taking) which causes changes in fixed assets and amounts of liabilities (Jerzemowska, 2013, p. 253).

Working capital management depends on the choice of sources of financing of assets (especially current assets) in the company. The strategy of financing of current assets is the resultant of market conditions and individual tendency of the company. There are three strategies of financing of current assets: aggressive, moderate and conservative. The aggressive strategy is preferred in large companies, as it contributes to the highest increase in the wealth value of the owners. The essence of this strategy is short-term financing of a significant amount of constant and a part of variable demand of the company for sources of financing of current assets (Michalski, 2013, p. 121).

Working capital management is also affected by managing the cash conversion cycle through managing of: cash, reserve, receivables, liabilities (Hamrol, 2007, p. 119). Working capital management, with its individual elements which affect it, aims at creating conditions to maintain the lowest working capital possible, while ensuring the company's liquidity. Nevertheless, it does not mean that the above mentioned methods of working capital management are mutually exclusive.

Working capital management in transport companies is strongly determined by the character of their operation and the industry in which they operate. Fixed assets play a very important role in the assets of transport companies (Kozłak, 2007, p. 160). Another characteristic feature is a large proportion of the owner's equity in the source structure of financing of transport companies.

2. Analysis of working capital in selected companies listed on Warsaw Stock Exchange

The authors carried out research on the basis of purposive sampling cases. The main criterion was the branch of the company's activity (transport); furthermore, accessibility of the data from at least the last 4 reporting periods was taken into account. This allowed distinguishing 5 companies listed on the Warsaw Stock Exchange:

- PEKAES SA;
- OT LOGISTICS SA;
- PCC INTERMODAL SA;
- Trans Polonia SA;
- PKP Cargo SA.

The range of the companies' offers is broad: from typically transport services, e.g. relocation or storing, to forwarding and logistics and services not related to transport at all. Such a varied offer also determines the structure of assets of specific companies. Due to this fact, it is necessary to present a short description of the selected companies.

PEKAES SA is the controlling entity in the PEKAES SA @Corporate Group, whose main activity are complex forwarding, transport and logistics services on the national and international market. The entity also provides services in retail fuel sales and hotel services. Other companies that constitute this corporate group

conduct the following activities: reloading, storing, rail transport, eco-pea coal production and property renting (*Raport finansowy Pekaes SA*, 2016).

The second company studied is OT Logistics SA, the controlling entity in the corporate group with the same name (previously the Odratrans Group), which consists of several dozen companies with various profiles. OT Logistics is a logistics company, whose main activity is inland navigation transport. Additionally, OT Logistics SA provides services which support ship transport, forwarding, logistics, sand and gravel extraction, fleet lease, property renting and storing. The OT Logistics Group is a transport group with an international scope, concentrated on transport, forwarding and logistics. This corporate group provides services in Poland, Balkan Peninsula countries, Great Britain and the USA. It has been listed on the Warsaw Stock Exchange since 2013. On the 31st of December 2015, the group consisted of 22 companies, alongside the controlling entity (*Raport finansowy OT Logistics SA*, 2016).

PCC Intermodal's activity is organization of national and international transport on the basis of regular, Polish and foreign, rail connections (container trains) between maritime and inland reloading terminals, and car transport synchronized with them. In 2009, the company was the first in the industry to make a successfully debut on the Warsaw Stock Exchange (PCC Intermodal, 2017).

Trans Polonia SA, listed on the Warsaw Stock Exchange since 12 September 2008, is a part of the Trans Polonia Group, an international transport-logistics operator. The Trans Polonia Group provides services in the transport of: liquid fuels, petrol, fuel oil and LPG; liquid chemicals; bitumen mass; liquid food products. The Trans Polonia Group is one of the biggest suppliers of highly expert logistics services in the petrochemical industry in Central Europe. Trans Polonia invests consistently in modern equipment to transport liquid raw materials and fuels, developing a fleet of 500 road tank trucks (Transpolonia.pl, 2017).

Another company studied for this article is the PKP CARGO Group. It is the largest rail cargo transport operator in Poland and the second largest in the European Union (railway stock: 2600 locomotives and almost 67 000 railway cars). The company offers integrated logistic chains which comprise different kinds of transport. The offer also consists of logistic services in the transport of all types of cargo, raw materials and other materials. The financial data of the selected enterprises are shown in the table below.

Table 1. The financial ratios of the selected companies (PLN '000)

Company	Data range	Index	2015	2014	2013	2012	2011
PEKAES SA	A	NCA	230 423	251 209	261 462	166 605	176 839
		CA	219 184	177 658	131 457	187 040	214 914
		Eq	332 147	306 092	284 915	271 163	301 258
		LTL	34 188	45 722	16 366	11 755	12 320
		STL	83 272	77 053	91 638	70 727	78 175
		WC	135 912	100 605	39 819	116 313	136 739
		% WC	30%	23%	10%	33%	35%
		CR	2.6	2.2	1.4	2.41	2.33
		% NCA	51%	59%	67%	47%	45%

Company	Data range	Index	2015	2014	2013	2012	2011
PEKAES SA	C	NCA	237 578	269 710	272 184	194 317	170 884
		CA	237 301	192 687	163 319	171 583	258 505
		Eq	331 738	310 739	287 044	275 853	309 699
		LTL	52 170	63 781	53 177	12 482	11 671
		STL	90 971	87 877	95 282	77 565	108 019
		WC	146 330	104 810	68 037	94 018	150 486
		% WC	31%	23%	16%	26%	35%
		CR	2.6	2.2	1.7	2.6	2.4
		% NCA	50%	58%	62%	53%	40%
OT LOGISTICS SA	A	NCA	344 681	345 333	247 308	222 003	218 541
		CA	109 389	66 591	53 403	13 253	42 901
		Eq	220 966	206 082	190 376	139 865	137 135
		LTL	184 971	175 795	23 353	78 426	88 197
		STL	46 382	28 171	84 940	14 041	29 718
		WC	61 256	36 544	-33 579	-3 712	6 791
		% WC	13%	9%	-11%	-2%	3%
		CR	2.36	2.36	0.63	0.94	1.44
		% NCA	76%	84%	82%	94%	84%
	C	NCA	488 909	479 524	346 371	323 630	299 403
		CA	226 798	232 166	154 810	130 510	127 757
		Eq	279 850	271 383	249 143	199 201	171 125
		LTL	255 725	258 637	79 283	146 134	145 755
		STL	180 132	181 670	172 755	108 805	110 280
		WC	46 666	50 496	-17 945	21 705	17 477
		% WC	7%	7%	-4%	5%	4%
		CR	1.26	1.28	0.90	1.20	1.16
		% NCA	68%	67%	69%	71%	70%
PCC INTERMODAL SA	A	NCA	270 161	169 502	94 607	85 516	75 400
		CA	46 385	45 463	29 879	24 063	44 213
		Eq	86 478	81 498	74 080	73 625	88 087
		LTL	187 134	101 308	25 949	12 965	6 772
		STL	42 934	32 159	24 457	22 989	24 754
		WC	3 451	13 304	5 422	1 074	19 459
		% WC	1%	6%	4%	1%	16%
		CR	1.08	1.41	1.22	1.05	1.79
		% NCA	85%	79%	76%	78%	63%
	C	NCA	270 239	169 620	94 655	85 516	nd
		CA	46 838	45 556	30 085	24 063	nd
		Eq	86 541	81 531	74 098	73 625	nd
		LTL	187 216	101 421	25 949	12 965	nd
		STL	43 320	32 224	24 693	22 989	nd
		WC	3 518	13 332	5 392	1 074	nd
		% WC	1%	6%	4%	1%	nd
		CR	1.08	1.41	1.22	1.05	nd
		% NCA	85%	79%	76%	78%	nd

Company	Data range	Index	2015	2014	2013	2012	2011
TRANS POLONIA SA	A	NCA	30 865	37 318	28 732	20 332	13 401
		CA	9 763	8 658	13 188	15 794	13 581
		Eq	22 870	21 752	19 493	17 013	10 600
		LTL	10 370	15 272	12 657	8 060	6 328
		STL	7 388	8 952	9 770	11 053	10 054
		WC	2 375	-294	3 418	4 741	3 527
		% WC	6%	-1%	8%	13%	13%
		CR	1.32	0.97	1.35	1.43	1.35
	C	% NCA	76%	81%	69%	56%	50%
		NCA	33 964	38 909	28 732	20 179	13 401
		CA	24 849	20 259	13 188	16 209	13 581
		Eq	24 509	23 374	19 493	17 004	10 600
		LTL	12 113	17 037	12 657	8 060	6 328
		STL	22 191	18 757	9 770	11 324	10 054
		WC	2 658	1 502	3 418	4 885	3 527
		% WC	5%	3%	8%	13%	13%
CR	1.12	1.08	1.35	1.43	1.35		
% NCA	58%	66%	69%	55%	50%		
PKP CARGO SA	A	NCA	4 458 145	4 129 487	3 905 419	3 895 392	nd
		CA	603 171	1 224 649	1 489 252	1 275 897	nd
		Eq	3 072 316	3 256 319	3 362 966	3 038 499	nd
		LTL	1 150 212	1 034 276	1 032 724	1 244 910	nd
		STL	838 788	1 063 541	998 981	887 880	nd
		WC	-235 617	161 108	490 271	388 017	nd
		% WC	-5%	3%	9%	8%	nd
		CR	0.72	1.15	1.49	1.44	nd
	C	% NCA	88%	77%	72%	75%	nd
		NCA	4 979 501	4 254 465	4 049 895	4 053 981	nd
		CA	1 133 161	1 425 867	1 693 721	1 569 788	nd
		Eq	3 353 866	3 395 293	3 508 894	3 214 672	nd
		LTL	1 586 088	1 165 414	1 166 736	1 383 172	nd
		STL	1 172 708	1 119 625	1 067 986	1 025 925	nd
		WC	-39 547	306 242	625 735	543 863	nd
		% WC	-1%	5%	11%	10%	nd
CR	0.97	1.27	1.59	1.53	nd		
% NCA	81%	75%	71%	72%	nd		

A – data from Stand Alone Financial Statements;

C – data from Consolidated Financial Statements;

NCA – non-current assets;

CA – current assets;

Eq – equity;

LTL – long-term liabilities;

STL – short-term liabilities;

WC – working Capital;

%WC – share of working capital in balance sheet total;

CR – current ratio;

%NCA – index of the share of non-current assets in total assets;

nd – no data.

Source: Own elaboration based on financial reports of the companies (*Raport finansowy OT Logistics SA, 2016; Raport finansowy Trans Polonia SA, 2016; Raport finansowy PCC Intermodal SA, 2016; Raport finansowy Pekaes SA, 2016; Raport finansowy PKP Cargo SA, 2016*)

In the studied period, two entities (PEKAES SA, PCC Intermodal SA) presented positive working capital on the controlling level as well as for the corporate group. The remaining three cases had negative working capital only once during the 5 studied years.

Negative working capital was noted in OT Logistics in 2013, in the controlling company as well as on the corporate group level. The reason for the occurrence of a negative working capital was a considerable decrease in long-term liabilities caused by transfer of PLN 59 980 000 from the issued bonds from long-term liabilities to short-term liabilities. In 2014, the company issued debt securities again, with the value of PLN 150 million which caused an increase in long-term liabilities and the return of the working capital to a positive level.

In 2014, Trans Polonia SA, had negative working capital of PLN 294 000 comprising only 1% of the balance sheet total. Negative working capital occurred only on the controlling entity level. In 2014, the company's fixed assets increased by PLN 8.5 million which was caused by an increase in the lease values of the means of transport. In the following year, the value of assets dropped by PLN 6.5 million which was also related to a decrease in the lease level of vehicles.

The biggest negative working capital among all the entities studied was noted in 2015 in PKP Cargo SA, both in terms of value: PLN 235.6 million as well as its proportion in the balance sheet total: 5% (in the entire corporate group PLN 39.5 million and 1%, respectively). The owner's equity dropped by PLN 184 million which was caused mainly by reducing the retained earnings by PLN 229 million. Fixed assets increased mainly as a result of the increase in investments in subsidiaries and associated entities by PLN 471.8 million.

On the corporate group level, fixed assets increased by PLN 725 million mainly due to the increase in tangible fixed assets by PLN 675 million in comparison to the previous reporting period. Constant capital also increased (379 million), mainly due to an increase in long-term liabilities. However, this increase was smaller than the increase of fixed assets what resulted in a negative working capital.

Conclusions

The main aim of the study presented by the authors was to determine how working capital is managed in large companies listed on the Warsaw Stock Exchange. In order to obtain more complete results, the analysis was extended by a study of the liquidity and proportion of fixed assets of the companies. The studies allow concluding the following:

- 1) The authors have forwarded a hypothesis that the transport companies listed on the Warsaw Stock Exchange aim at maintaining a positive working capital. Some of the entities studied for this article maintained a positive working capital all the time and some presented a single departure from the desirable level. The study allows assuming that the hypothesis is correct.

- 2) A considerable proportion of fixed assets in the asset structure of the studied companies is caused mainly by the characteristics of the transport industry.

Fixed assets are composed mainly of tangible fixed assets, which means vehicles and the transport infrastructure.

3) The character of the industry does not unambiguously influence the level of liquidity maintained by the companies analysed for this study. The sample comprises both entities whose liquidity was maintained and entities in which problems with covering current liabilities may occur. In the studied period, PEKAES SA noted current liquidity indicators of the controlling entity on the level of 1.4–2.6, whereas the level for the entire corporate group was 1.7–2.6 (in some periods excess liquidity occurred). The indicators of PKP Cargo show a less stable liquidity situation of the company which is noticeable especially in 2015, when the current liquidity indicator of the controlling company was 0.72.

In the study carried out, the authors took into consideration the financial data of the controlling entities as well as of the entire corporate groups. This allowed observing that negative working capital occurs more often in controlling entities than in corporate groups. For this reason, it can be concluded that the source structure of financing of corporate groups is safer than in the case of controlling entities.

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