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NON-MARKET FACTORS OF COMPETITIVENESS OF TRANSPORT, FREIGHT FORWARDING AND LOGISTICS COMPANIES

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Abstract

The paper presents non-market factors of competitiveness of transport, freight forwarding and logistics companies in relation to companies offering services in the market of logistics services and the diversity of these services. These factors include company internal factors such as the size of the company, structure of assets and capital, market activity, availability of resources, and intellectual capital. External factors having the nature of non-market activities include state policy towards companies, distinguished by determining and shaping the transport policy, regional and state legislative activity and fiscal policy by the state.

Key words: competitiveness, competitive factors, company internal factors, state policy.

Introduction

The essence of competitiveness is the growth rate of change, which has its source in the desire to fight for better position in the economic and social life. Competitiveness arises between constantly increasing needs and abilities to replace them.

Competitiveness can be considered in respect of products (services), companies, sectors, regions and countries. Competitiveness can be seen as the factor-based, namely the competitive capacity, understood as the long-term ability to compete and the outcome-based, that is a competitive position. Outcomes-based competitiveness is the external manifestation of the factor-based competitiveness.

The market is necessary for the existence of competitiveness and competitiveness itself is a feature and a mechanism regulating the behaviour of market entities. In short, competitiveness means the ability to compete, so to act and survive in a competitive environment. This concept can be understood as a whole, which consists of the following elements: competitiveness potential, competitive advantage, instruments of competing and competitive position. There are cause and effect relationships of two-way characters between these elements, i.e. condition or changing one element can be both cause and effect of the other. The competitiveness of companies is affected by a lot of factors that can be classified according to various criteria. From the point of view of competitiveness of the economy or economy sectors, the following factors are distinguished: macroeconomic (the government's economic policy, industrial, trade, fiscal policy, the regulatory system) and microeconomic (production capacity of companies, being equipped with production factors, marketing strategies, economies of scale). Due to the market nature of competitiveness factors, market and non-market factors are distinguished. The former play a role in the analysis of competitiveness determinants, they are also fundamental reference system of company market adaptation. These factors include primarily the price and quality of a service, product, service offer, the terms of service. The latter are both company internal and external factors. Company internal competitiveness factors include: the size of the company, the structure of assets and capital, access to raw materials, market activity, skills and knowledge of employees. External factors of competitiveness include the ones generally determining the state economic policy towards companies, defining the conditions for company operation and the market, for example transport factors. The factors for transport, freight forwarding and logistics companies include the transport policy, regional policy, legislative activity of the state and fiscal policy.

Non-market factors are a subject of discussion in this paper.

1. Entities offering services in the logistics services market

In contemporary developed economies, trading and manufacturing companies use a wide range of services provided by logistics operators, which has resulted in the emergence and development of the logistics services market.

The logistics services market in Poland is shaping and developing. As regards supply of services, there are large companies stemming from the former monopolists, trying to adapt to the conditions of free market com-

petition and new companies, mostly with foreign capital operating on an international scale. Logistics companies such as Raben, Schenker, Kűhn and Nagel entered the Polish market with a wide range of services. The range from transport and freight forwarding through customs agencies, storage, packaging and to door - a door delivery. These companies use flexible, modern management methods, they have certificates of quality and a huge potential of investment in logistics infrastructure. It allowed them to open the distribution centers, extend IT networks enabling efficient warehouse and inventory management, and tracking shipping routes. Owing to the dynamic entry of foreign companies, many Polish companies could not stand competition and suspended their activities. Big, important Polish transport and freight forwarding companies such as PKS or PKP adapted to new operating conditions. This resulted primarily from their previous long operation in the international market.

On the PKP railway lines, the form of intermodal and combined transport was extended in cargo transportation. For example, in 2013, 231,299.39 thousand tonnes of goods were transported by rail, which means that compared to 2011 by 7.24% less. Although there is the downward trend in rail transport, intermodal transport is growing. In 2012, 8 902.20 thousand tonnes of goods were transported, compared to 2011. It was an increase by 35.49% (Zielaskiewicz, Nowak 2013).

The supply of logistics services is formed by four types of companies, namely, logistics companies, stemming from logistics departments of large industrial and trading companies, storage companies, transport, freight forwarding companies and courier companies.

Logistics companies stemming from the logistics departments of industrial and trading companies were transformed into independent subsidiaries and they saw their further development in the provision of logistics services offered to their parent companies, with the possibility of serving even other companies.

Modern storage companies base only on the warehouse function. They have become an important link in the supply chain and offer a comprehensive distribution service. These companies can operate as independent units cooperating with other entities, but they can also be as a part of the holding structure of transport and freight forwarding companies.

Transport and freight forwarding companies are most suited to offer an integrated package of logistics services, due to the size and structure of their fixed assets. The highest form of organization in the logistics market is the logistics centre. Such centres are places where distribution and transport activities are concentrated. An optimal location for logistics service centres is multi-branch handling and storage terminals organized in major

transportation hubs. Most of them are road, rail and road-rail-sea terminals.

Compared to the companies that form the logistics services market, Polish companies are weaker than foreign ones, even though they try to match competition. The market of TSL companies is highly fragmented. For example, about 80% are the companies having from 1 to 4 licences for international transport. In their strategy of action, smaller companies may choose to be a subcontractor (cooperating with a larger company managing the fleet on the basis of permanent contracts), to seek opportunities for creating cooperation platforms, cooperating with several clients on the "home carrier/ freight forwarder " basis, to search for niches in the local market. Despite the presence of many small companies, we observe the processes of company mergers, consolidation, acquisition, the inflow of foreign capital and the customers' expectation of increasing standard of services. As a result, new large entities with a potential for using comprehensive logistics services at a European or global level operate in Poland.

Also, the range of services provided is expanding. In addition to basic transport, storage, inventory management and packaging services, the range of additional logistics services is expanding, such as consultancy, logistics delivery, cargo consolidation and deconsolidation, just in time deliveries, the flow logistics system.

Transport and freight forwarding is handled by smaller Polish companies, whereas companies with foreign capital deal with cargo logistics services. Companies providing comprehensive logistics services tend to be more creative, have a high return on sales (about 6-7%), and transport and freight forwarding companies with customs service as well as courier companies include those whose profitability exceeds 10%. According to revenue from core sales, top companies dealing with transport and freight forwarding of cars, rail transport and sea freight forwarding include companies with Polish capital. And companies dealing with rail and air freight forwarding, logistics and courier services are mostly with foreign capital. This is due to the fact that companies providing more specialized logistics services require considerable financial outlays to create databases throughout the country and to manage them efficiently.

2. Internal factors determining company competitiveness

2.1. The company size

A frequently highlighted feature of the company is its size in terms of value. A size is often a condition of entry into the market, unavailable for small businesses. A similar situation occurs in terms of market share. A market is understood as a place where we obtain raw materials and the

place where we send the finished products. Both of these types of market have a narrowed character due to the limitations of raw materials or a limited number of consumers and competition. The company size is an asset that allows it to overcome a number of barriers such as:

- economies of scale,
- diversification of products,
- capital needs,
- access to distribution channels,
- a worse cost situation regardless of the scale and state policy.

It is, therefore, an important element that allows you to occupy an area of the market as large as possible, so that it is possible to actively participate in its creation. However, this is still only potential. In the case of a saturated market or sale of a product commonly referred to by marketing specialists as "cash cows", the size of the company can be a burden, and thus lead to losing advantage over the smaller competitor. The same method of determining the size of the company raises a lot of controversy today. Most often, the size is determined by the valuation of the company, and this can be done by various methods and in any method, the result may be different. The starting point for the precise valuation of the company is its intrinsic value. It is the simplest value of the company, easiest to estimate, it is the intrinsic base value, mainly on the current net book value and expected cash flows in the future. It is independent of the actions taken by the company, universal for each company, relatively easy to estimate. Despite its advantages, it also has a number of drawbacks as it does not include data from the market environment in which the company operates, and isolating the company makes this value differ from the market value (Kowalska 2011: 246).

2.2. The structure of assets and capital

The structure of assets and capital is also an important feature of the company, contributing to the achievement of its objectives. This is a feature independent of the size, however, appropriate determination of the company structure may lead to a relative increase in its activity in the market. Generally, the assets can be divided into fixed assets and current assets. Fixed assets are not consumed in one production cycle, and they contribute directly or indirectly to the proper operation of the company. Both excessive value of fixed assets and their deficiency is sometimes detrimental to the company. Their excess makes the company bear the cost of their maintenance, and assets themselves are not fully used. Deficiency makes that it is necessary to use external fixed assets, which can also be costly and risky. Lately, however, the phenomenon of getting rid of unnecessary assets has been observed, and even moving whole departments outside the company

(so-called outsourcing). Such actions, however, must be preceded by a detailed risk assessment, which the loss of control over certain components being so far internal part of the company entails (Romanow, 2013). Another important element is the appropriate capital structure. Capital can usually be divided into equity and debt capital. In contemporary markets, there is rarely a situation when all activities are financed from own resources.

In this situation, current assets, by means of which current payments are made, would be funded from reserves, much of which would be unused for a considerable period of activity. For this reason, many companies choose to allocate elsewhere, and current payments are funded from short-term working capital loan, of course if conditions of granting the credit by banks or other institutions are favourable. Due to insufficient own funds, companies often decide to obtain long-term loans mostly for the purchase or improvement of fixed assets. These funds are also important components of debt capital, and it is sometimes expensive to obtain and maintain it. Excessive cost of managing debt capital can lead to a loss of company liquidity. While insufficient level will force the allocation of part of own funds for the current payment needs, and this may lead to increasing the cost of the unused potential. At the same time, a high share of loans in financing the activity may show that lenders assess the activity (investment) well. This allows the company to spread the risk over lenders. When a lender is threatened with bankruptcy, he is motivated to actively join in the company recovery programme.

2.3. Activity in the market

Another distinguishing feature of the company is often its activity in the market. This characteristic is independent of the size, although there may be correlation between these two characteristics. It often happens that companies with relatively small assets can achieve high revenues through the intensive use of their assets and high flow efficiency in the logistics chain which they participate in. It is important to have a proper structure of assets consisting of necessary components to conduct activity and outsource.

A streamlined company can focus on its core business area and pursue its strategic objectives. Such a company allows you to improve efficiency, which contributes to the better use of assets and to reducing costs. The simplest measurement of company activity is value of its income in relative terms. It can be measured either on the basis of the profit and loss account, then it is relatively easy to determine value of its revenues or based on the cash flow statement, which will be more precise. We must remember, however, that this value is the book value, which slightly deviates from the

actual cash inflows due to the fact that the accounting method is based on certain standards, and these may change or may be different in different areas.

2.4. Access to resources

Possession of rare goods is also a potential giving the company a chance of achieving success. Rare goods may include unique technologies, licenses or concessions. Unique technologies allow a company to fill a market niche or to compete more effectively in the market. In fact, the uniqueness of the technology can be used to improve the quality of production (services) or to create a substitute. Having a license or trademark is also a potential. In recent years, sales of licenses or trademark has become quite a common type of market expansion. A number of franchising contracts is growing, and many companies in many industries have become global corporations thanks to using their trademark. Having a state license to operate a business is often an important resource. Possession and distribution of concession is closely associated with the policy of the state where the company operates. The government can limit or even prevent the entry into specific sectors or restrict access to raw materials. The examples include state-regulated sectors such as road transport, railways, freight forwarding, and sale of alcoholic beverages. Less visible limitation of the entry by the state may result from the use of instruments such as air and water quality standards, safety regulations and product performance. For example, the requirements for the reduction of environment pollution may result in an increase in capital necessary for the entry, for achieving the required level of technology refinement and even for building devices of optimal size.

2.5. Intellectual capital

Competencies, abilities (capabilities), learning skills and knowledge are of key importance in gaining competitive advantage. For this reason, it is important for a company to properly manage human capital and knowledge (Kowalska, 2009: 145-146). The main objective of managing knowledge is a better use of employees' knowledge for the benefit of the company. Employees' knowledge is part of the company's intellectual capital, recognized as a measure of evaluating and increasing intangible assets. Intellectual capital is also the individual characteristics (employee's abilities), as well as the level of education. As it is difficult to measure both of these features, the usefulness of an employee in a particular position will be the common denominator. As for every position a person with different characteristics is expected, we can surely say that education as well as appropriate qualities

allow the company to reduce costs by a so-called learning curve. The learning curve or so-called experience curve is a reduction in unit costs as the company (employees) gains more and more experience in manufacturing a product. Costs decrease because employees improve working methods, become more efficient, arrangement of devices is improved, specialized equipment is developed; the manufacturing process, techniques of measurement and control of operations are improved, and also, changes facilitating production are made in the product structure.

Experience is a name of only certain kinds of technological changes and may refer not only to production but also to distribution, logistics, or other functions. As in the case of economies of scale, costs are reduced and experience increases not only in the entire company, but also in the various operations or functions that constitute the company.

Experience of an employee and his or her individual qualities are unquestionable advantage of every employee, but steady progress and development of the field of logistics has led to the emergence of the profession of "logistician". The specific character of this profession results from an increase in the service nature of the supply chain and the need for managers and employees to make a joint effort. Logisticians' activities cannot be limited to striving to achieve high reliability of action, but through their knowledge and skills they should ensure, inter alia: willingness to provide services, as well as understanding and knowledge of customer needs. That service-related attitude of logisticians introduces new logistics qualification standards, and in particular (Kisperska-Moroń, 2009: 183-185):

- good communication skills,
- exceptional adaptability,
- abilities of critical consideration of opportunities and better ways of performing tasks,
- the ability to make accurate decisions,
- establishing professional relationships,
- sensitivity to corporate culture.

Managers managing logistics processes as well as regular employees should constantly develop their skills, becoming part of a learning organization.

All of these features make the potential of the company. It may be difficult to measure these qualities, as a number of econometric methods have to be often used. In addition, the importance of these qualities itself is a subjective matter, and depending on the strategy adopted, different characteristics can be taken into account. These are the features that the company may acquire or reduce their value. However, regardless of the classification of these characteristics creating the potential, it is only a chance of

success. Whether it is used or not, it depends not only on the quality of these features, but on people managing this potential.

3. Factors related to the state policy affecting the state competitiveness

3.1. Transport policy

External factors, independent of the company and resulting from the state policy, are also important for the company competitiveness. For TSL companies, the transport policy is important, which is part of the state economic policy. It is about ensuring the harmonization of the conditions of individual transport branches competition, and primarily issues related to (Mindur, 2008: 480):

- the integrated system of management of infrastructure objects of different branches of transport,
- the system of financing the modernization and development of the entire transport infrastructure,
- structures of the transport companies organization,
- unifying technical and social standards for the whole transport
- developing modern and efficient transport systems covering all the European Union countries.

The transport policy of the country forecasts the total amount of funds of approximately EUR 26 billion in 2007-2013. About EUR 19 billion is from the budget of the Community, and the remaining amount of approx. EUR 7 billion represents the share of domestic public funds.

The European Union countries establish the common transport policy. The EU transport policy focuses on those objectives that promote EU integration, liberalization of the transport services market within the union, environment protection, ensuring safety of traffic and transportation, and guaranteeing equal treatment of its carriers and freight forwarders in relations with third countries. In 2007, the European Commission modified the assumptions of the transport policy, amending the provisions of the White Paper. The concept of co-modality was introduced, involving the efficient use of different means of transport on their own and in cooperation with others in order to use resources optimally and sustainably.

The competitiveness of transport, freight forwarding and logistics companies is also influenced by the following external factors resulting from the state policy:

- regional policy,
- state's legislative activity and its fiscal policy.

3.2. Regional policy

The regional policy of the state aims at maintaining the integrity of the state and a better use of its potential in the regions.

Transport accessibility is one of the key measures for assessing the transport system in spatial terms. It results mostly from the geographical location of regions and transport infrastructure. Transport accessibility also affects the relative benefits of the region, associated with the decisions taken in terms of location.

The regional policy of a given country is synchronized with the EU regional policy, which aims to reduce disparities between the levels of economic, social and spatial development, and thereby to increase the coherence between different regions of the European Union. It is a condition of the Community's economic potential and competitiveness.

The EU regional policy has three priority objectives:

- Objective 1: promoting the adaptation of structural regions whose development is retarded.
- Objective 2: supporting the economic and social conversion of areas facing structural problems.
- Objective 3: supporting the adaptation and modernization of policies and systems of education and employment outside the area of the Objective 1.

The main financial instruments of the European regional policy are the Structural Funds and the Cohesion Fund. The European Regional Development Fund (ERDF), the Cohesion Fund (CF) and ISPA have the largest share in financing the transport infrastructure development. The European Regional Development Fund is used to finance activities in the following fields: the development of infrastructure investments that create new jobs, the implementation of local development projects and support for small businesses. The Cohesion Fund includes national help rather than regional. The Cohesion Fund finances major projects in transport infrastructure and the environment protection (worth 10 million euros).

The ISPA programme was created based on the Cohesion Fund. The programme supports investments in environmental protection and transport. The amount of co-financing by the ISPA Fund depends on the resultant socio-economic parameters. The Fund may be involved in projects with a maximum height and with 75% of public expenditure. In justified cases, the European Commission has the right to raise its share in funding the project. In order to improve the efficiency of funds directed to less developed regions, more resources are concentrated on the Objective 1.

3.3. The state's legislative activity and fiscal policy

Legal conditions of company competitiveness in the market of transport services relate to compliance with the principle of doing business by individual entities. They may be a legal permission for state's protective or liberal activities, stimulating competitive carriers or freight forwarders in the market. Companies in the country feel the legal instability resulting from two barriers, namely: the lawmaking process and the exercise of rights by the state. The lawmaking process may be demonstrated by:

- instability of legal regulations, frequent change in rules preventing the anticipation and planning of activity,
- ambiguity of regulations – frequent amendments to legislation and the subsequent changes in regulations,
- vacatio legis – the employer leaves too short a period to familiarize with the new legal solutions,
- the freedom to undertake economic activity – a tendency to introduce administrative restrictions can be observed.

The barriers listed in the lawmaking process may affect the process of executing the law and become barriers to the development of companies.

National conditions for companies in the field of transport comply with EU regulations, technical regulations, standards and administrative recommendations do not create barriers to the free movement and development of transport services in the European Union.

As regards the fiscal policy, the state may stimulate the development of companies mainly by:

1. Lowering taxes imposed on natural and legal persons and simultaneously simplifying the tax system.
2. Reducing social security contributions and other payroll burdens.
3. Developing legal solutions stimulating the mobilization of capital for investment.
4. Supporting closed investment funds organizationally and financially at the regional level.

In Poland, a natural or legal person can conduct economic activity. The choice of the form of business results in different tax consequences. There are significant differences in the tax burden between natural and legal persons. Despite this diversity of tax rates, burdens for employers and employees are among the highest in Europe. Perhaps this is due to the fact that taxes of all kinds are an important source of revenue to the state budget and are an important instrument of the state policy towards companies and citizens. Within the fiscal policy, the state can introduce all sorts of subsidies and grants and tax exemptions that are an element supporting the company.

Most often they involve entire industries or branches. However, there are exceptions which make it possible to gain an advantage over a competitor not taking advantage of such privileges.

The competitiveness of Polish companies is therefore dependent on activities of entrepreneurs but not only. The socio – economic system is a closed system, failures in the social area cause effects in the economic area, and vice versa. Increasing competitiveness in the economic area is therefore in the interest of all of us. It is about the internal market, which in the era of globalization and ever faster flow of information becomes tight and in order to remain competitive, it is necessary to take steps towards greater openness to the world.

Conclusions

Transport, freight forwarding and logistics companies are dynamically developing in the Polish and international market. This development can be manifested by high growth rate of motor transport, the expansion of courier service companies, development of the road and rail infrastructure, the implementation of information technology, and the improvement of customer service. The growth rate of this development is shaped by a competitiveness factor and companies' ability to compete in the market. The main market factors are product price, quality and services. They determine the competitive advantage of a company or sector in the market. Non-market factors determine the competitiveness potential and competition position. Internal, non-market factors determine the company's potential.

The evaluation of the company's potential is sometimes difficult, and its size is a subjective matter. The potential of the company determines a chance of success, and its use depends on those who manage this potential. The state policy is a non-market factor of competitiveness determining mainly the survival of companies in the market and is an instrument of competition.

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MOBILITY – A CHALLENGE FOR CITIES

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Abstract

Mobility conditioning both the level of citizens' life and cities' development opportunities is the problem discussed in this paper. Conditions and challenges that cities experience in order to meet the requirements of the growing mobility have been discussed on the basis of the above.

Key words: benchmarking, congestion, a city logistics, a city, mobility

Introduction

The mobility of people is increasing very rapidly. In 2005 about 7,5 billion trips were conducted in urban areas. In 2050 we expect the 3 to 4 – fold increase of the number of trip kilometers per a passenger in urban areas in comparison to the year 2000 (Pourbaix, 2012: 8-10). Regardless of this, the accessibility to the urban areas appropriate services or other activities is getting complicated. This causes that not only the citizens' living standards are getting worse but also the number of external effects in cities are influenced negatively. This aspect also influences the urbanization pace affecting the city mobility systems. The conclusion of the mentioned facts is such that virtually every city, sooner or later, will face the necessity of revising its attitude towards the problems of citizens' mobility and creating or modifying the mobility plan as well as systems aiming at these plans implementation.

1. Essence of mobility

Practically, every activity of a man is connected with the necessity of mobility – hence, the mobility limitation is harmful for people[1]. Freedom

[1] One of the most vexatious penalties is the deprivation of liberty – it means the impossibility to dislocate according to the prisoner's will. The imprisonment penalty has been used in legal systems for many years. The penalty was executed in the form of casing into a dungeon or closing sb. in a tower. Nowadays the penalty is executed in specialized guarded complexes – penal institutions (Szołtysek, 2011: 14).

of mobility is the inseparable attribute of a man's freedom. Therefore, this refers to the right of mobility. Peoples' mobility, according to the popular definitions, is the tendency to change the place of residence or work. This tendency is connected with a dislocation, so it means: the distances covering. In those considerations the mobility refers to all types of dislocations – those that are routine and ordinary, those that are more important for the reorganization of a personal life, for example, the change of a place of residence as well as those of which a journey itself is the main goal (Szołtysek, 2011: 14). The first dislocations are obligatory, the second ones are facultative. If we are to look for help in some concepts, it is presumably done in order to reduce problems in frequently occurring mobility – obligatory dislocations. According to a big number of authors, mobility is inseparably connected with transport. "Mobility understood as potential «distance overcoming» is realized in the form of the road, rail and air transport i.e. with the implementation of various communication means as the response to the emerging and changing needs in this scope" (Blaik, 2010: 87). It is worth paying attention to another aspect of mobility. First, mobility appears as an idea, a kind of a plan, maybe not very well specified. Sometimes it is a supervened opportunity. This stage can be an initiator of the next efforts leading to the distance overcoming but it can also be finished at the stage of thinking. It does not mean that in this case people do not experience the journey excitation. Therefore, mobility, in my opinion, is the state of mind whose astonishing potential causes that people can travel in time and space, even to the unrealistic lives. Our senses let us construct new sceneries and create scenarios, reproduce images that have been seen only one time– it is the aspect of our non-material mobility. "In order to travel, it is enough to exist. I travel from day to day in a train of my body or my destiny looking at streets and squares, gestures and faces, always the same and always different, so they are in fact as landscapes. When I imagine I see. What I do more, do I travel? Only the extreme weakness of imagination could justify the need of a place of residence change in order to feel" (Melberg, 2006). Finally, the thing that is often ignored in considerations on mobility, this is the mobility objective. Availability is the overriding objective of mobility. We dislocate, in fact, in order to take advantage of something that is not available in the place of our primary residence. When we are able to invalidate space as a barrier that separates us from the place of meeting the needs, then the mobility will lose its importance. Barriers in mobility very often (i.e. nuisances in dislocating) influence the change of a value of those goods or services that are attractive during dislocations.

2. Mobility in a city

A city means social organizations. Bartnik claims that: "a city is the overpassing of distances among people, space-time, barriers and finally severe bad luck. It is a life rock, a foothold, a constant element of the universal transience" (Bartnik, 1993: 53), but according to Mumford "a city is a place of the maximum concentration of this what provides for a given community power and culture. (…) In a city people's experiences are transformed into signs and symbols, into patterns of behavior as well as models of order" (Mumford, 1996: 5-7). A city, apart from its social sphere, possesses the material base. Wallis, who observes this relationship, defines a city in the following way: "A city is a complex system consisting of two autonomous urban and social subsystems that are organically linked, that cooperate on the bases of feedbacks" (Wallis, 1967: 138) treating the urban subsystem as a set of material elements that have been created by a man and a set of natural elements that construct the city space structure. Therefore, it should be considered that the geographical space (physical), which is occupied by people, is the physical environment (mainly transformed by people), where all processes connected with the creation of urbanity, are implemented. Cities cannot function without people or in isolation from them. It is difficult to imagine the future and construct the development scenarios without cities. According to some prognostics, the deepened European integration or even increasing the role of Europe in the world will let maintain the polycentric nature of the European space, where the well-linked by means of transport nets medium-sized cities, are and will play the key role. Such cities will develop in a sustainable way (especially in the context of the energy or the waste) and the residents' mobility will be supported by smart solutions in the scope of the transport infrastructure (Żuber, 2013: 69). In many considerations on cities I quote a definition that seems to be a quintessence of a city and urbanity: "A city is a *common space* that *belongs to* a residing *society* that *has the right* to guarantee a society the appropriate conditions of political, social, ecological fulfillment, taking into consideration the obligation of solidarity at the same time"[2]. These designates written in italics will be mentioned later.

Mobility is the indication of the social life, and in fact, it is the element that changes this life. A car occupies the specific place while talking about dislocations in modern cities. Urry claims that the modern social life analysis without researching the importance of motoring, which is "the complex of linked together machines, social practices and methods of living not in

[2] Definition mentioned by The European Charter for the Safeguarding of Human Rights in the City adopting the stance of the European Charter of Local Autonomy.

a real estate house but in a mobile semi private capsule, is not possible. (…) Many journeys include many functions that are mixed and require control. Instantaneous time and new types of space, which are introduced by motoring, become central elements for the social life configuration. People live and cooperate through their cars moving here and there. A car is not a simple extension to an individual because it, in a given way, reconfigures forms of socializing. Social life usually was connected with different forms of mobility but a car transforms the social life in a characteristic connection of flexibility and compulsion" (Urry, 2009: 260). In 2010 825 million of cars, 70% of which belong to the developed countries, were used in the world. By 2035 the number of light cars (cars, SUV, minivans and vans) will have increased to 1,6 billion and by 2050 till 2,1 billion vehicles. Annually about 63 million of new cars (2012) are sold in the world. (Scotiabank, 2013). Modern cities in developed countries are becoming the victims of motorization. In Poland at the end of 2012, there were 580 registered cars for 1000 Warsaw residents. The number of registered cars in Poland has increased 3.5 times to 18,7 million since 1990. It is 486 cars for 1000 residents. If we take into consideration the fact that 1,3 million Poles live and work out of Poland, the number increases to 503,8. Such a result places us in the European top leaders (KPMG, 2012). Cars availability in cities is not the same in the world. Its diversity refers to a sex, an age, a level of disability or the amount of income. In the developing countries travelling by private cars is accessible for the small group of people, who possess high income (mainly men) (Peters, 2011). Such a situation is being changed slowly, especially in emerging economy countries like China, India and Brazil, where women possessing average incomes, drive and dispose cars in great extent. The number of women who drive cars in Russia, where possessing an own car is the indicator of the social status, increased by 50% in the period of 2000-2006 (Rodgers, 2006). Similar trends are observed in Mumbai (a capital of Maharashtra in India), where in the community dominated by men, the change of the way of making decisions about the purchase and the use of a car by women possessing higher incomes occurs. This way the image of the motorized mobility as a binder of the urban essence appears. It stamps its influence not only on the quality of the urban society, its cohesion and the level of city life satisfaction but also the city structure in the tangible dimension.

3. Mobility in cities and a city as an idea of common existence

Dislocations in cities create the complicated enough net of connections implemented in various ways. The denser the net is, the bigger mobility of

cities users occurs. The bigger level of mobility can be evaluated in various dimensions. At first it is freedom (freedom of dislocation). The greatness of a man comes from their freedom, referring it to the idea that freedom is the basic privilege of a man and a society's objective is this freedom warranty. Therefore, the level of people's life consists of many libertarian elements. The principle of liberty is usually considered in two aspects – positive and negative. The positive meaning refers to the freedom of doing everything that is not forbidden by the law[3]. In the negative meaning, the principle of freedom indicates that the injunction of a given activity for an individual can happen only when it is in connection with the law[4]. In both cases freedom must be related to mobility – implementation of many aspects of freedom requires dislocation. Cities must guarantee liberty by strengthening the liberty execution through the mobility warranty. At second – in the aspect of individual mobility limitation, the bigger the number of dislocations is, and as a matter of fact, the bigger the density of dislocations is, the higher probability of mutual dislocation impediment occurs. Then the city congestions called "traffic jams" happen. Every city user observing changes in his environment can state that the number of traffic jams increases year by year, that the dislocation is more difficult and that the time devoted for travelling is extended. This phenomenon is called congestion. Vehicles and pedestrians can feel the congestion when the transport infrastructure efficiency is exceeded, what means that the demand for taking advantage of an infrastructure object exceeds the object's capacity and the object is fully occupied (Szołtysek, 2009: 135). The congestion is defined as a mutual obstruction of the traffic caused by vehicles in connection with the existing objective dependence between the speed of vehicles and the volume of vehicles flow in such conditions when the level of the transport system utilization capacity comes up to its exhaustion (Dargay, Goodwin, 1999: 160). The essence of the transport congestion is therefore the mutual reaction between the transport infrastructure and vehicle users. It causes the negative economic and exploitation results that are indicated by the increasing number of users (Ciesielski et al. 1992: 88). The congestion influences the reality, the way the cities and their users function as well as the development opportunities (it decreases the opportunities of competition among other cities), cities' budgets, city entities and finally the residents' life quality (including also the financial sphere). For example, the costs of

[3] A man does not have to indicate the legal bases of their actions (such a legal base must be (any actions of the public authority bodies must be undertaken on the basis of such legal bases), on the contrary-in order to stop man's actions, it is necessary to indicate the law regulation, which constitutes the appropriate injunction.

[4] Always this person, who appeals to the existence of such an injunction, must indicate the legal bases.

congestion in Canada reach 4,5 billion USD annually and they occur in three big urbanized centers (Toronto – 43%, Montreal – 21% and Vancouver – 17%) (Urban Transportation Task Force, 2012). In the USA the congestion enlarges the Americans' journey time in cities by the additional 11 billion hours annually and it increases the fuel purchases by 11 billion liters more. It creates the congestion costs of 121 billion dollars in 2022 (Schrank et al. 2012). The crucial influence of congestion on the developing countries' economics can be exemplified by Cairo, whose congestion costs for Egypt are 4% of the Gross Domestic Product (World Bank, 2012). In Sao Paulo in Brazil the part of the richest residents is forced to use helicopters regularly in order to omit traffic jams (Aziakou, 2013). The implementation of defined development goals is the objective of the city management. At third, finally, - in the aspect of the efficiency processes (city co-management), we deal with the complex phenomena that are linked with mobility. It results from the idea of the local government that the city governance is a specific combination of three dependent forms: management, leadership and administration. Therefore, the city management can be defined as" „influencing the hierarchy, the system of values, interests, aspirations, attitudes and the local government entity's organizational behavior (a community residing in a city – author's case) (Brol (pub.) 2004: 168-169):

- managing the resources or only disposing them in the framework of the economic autonomy specified scope,
- legal bases appropriate for the state authority in the framework of conferred entitlements and the commune provisions,
- personal authority of people who belong to the management bodies; the main objective (city management policy) is shaping the efficient social and economic systems serving the city community.

The mere fact of occupying the space gives a man the right to co-share this space, so to say, to obtain specific benefits. The bigger the extent of benefits meeting the specific man's needs is or the greater satisfaction the benefits provided to a man is or the bigger the extant of a ma's happiness is, the the bigger the advantages resulting from the possession are. Any number of people create any number of subjective valuations. But co-sharing a space (but not only) requires to reach a compromise with the rest of the co-owners. This compromise is possible to reach not by means of management but through common relations and high level of tolerance (Szołtysek, Otręba, 2012: 120-121). What compromise do the city users reach in the area of mobility? It is about searching for a compromise between an individual comfort being the result of a dislocation by individual transport means and the public transport characterized by „the lack of comfort". Cities undertake attempts of shaping transport behaviors of their users (mainly

residents). City users make decisions on dislocations not always in the rational way. In most cases these decisions are made by the users themselves. They do not share the general recomendations, especially when they have to decide on the journey lower standard. Cities‘ authorities‘ appealing to the users transport awarness in connection with threats related to the increase of the individual urban dislocations can influence the rationalization of travelling methods (Szołtysek, 2011: 149). Herein, the secondary but ideologically important problem appears. It is the problem of this freedom limitation through the reduction of dislocations realized by means of individual vehicles in the cities space. Authentic freedom is a responsible freedom. It is also *the ability to choose the appropriate value.* A man, thanks to freedom, is able to undertale the self targeting, the self limiting, the internal and external development. Moreover, responsible freedom is the pro-social freedom that has regard to the common good, that is the result of self-control and self-subordination to the social life postulates. Earlier in this paper I mentioned the city definition that included the solidarity problems of those people who choose a city as the arena of their self-realization. It is one of the most important principles that constitutes a city as an dea of the common living. The realization of the common good is the city initiation. The center of such a good is a good of an individual as well as a set of values that condition the individual's comprehensive development. Three huge areas – social, political and environmental are the city determinats. The common good must be implemented through the efforts of all society members who are able to cooperate consistently. It means that striving for the democratization of dislocation methods is a good political choice[5]. This concept is connected with the equal availability to the transport infrastructure – the most democratic mean of transport is a bicycle. This principle possesses also the nature of a legal norm. Its role is the common goods security differantiating the man's rights and obligations. The principle of solidarity coordinates the social life functioning because it paves the range of community members‘ subjective entitlements and commitments. The principle of solidarity meshes with the idea of justice. Authentic solidarity can be mentioned only when justice requirements are respected. Is the dislocation „forcing“, which is not acceptable by any groups, the personal freedom limitation? Freedom of an individual should be the responsible freedom. Freedom requires understanding and a situation acceptance. Hence, it is necessary to be aware of the travelling method variants as well as the consequences of social and

[5] I consciously use the concept of „democratization „ referring to the term of Mirsky who claims that democracy is: „not […] a competition or participation system but a definition of a good political system which is honest, egalitarian, stabile and fair. What legitimizes the government is the morality and fulfilling the administrative obligations, not a pluralism and membership" (Nathan, 1998: 28).

presonal choices. A man should not select anything without taking into consideration the intellectual situation discemment. Shaping the mobility awarness is also crucial. Authentic freedom requires rooting in values and it must take into account the requirements ot the social common good.

4. Methods of mobility implementation in cities

In cities people dislocate on foot, by individual transport means or by the public transport. The share of the particular methods of dislocation within urban trips depends on many factors such as: demographic aspects, urban structure, citizens' mobility, impact of dislocation methods on the city environment. Every trip consists of the chain of primary dislocations that are performed on foot or by the transport means but the city trips consist of one or many dislocations creating the chain of dislocations (Szołtysek, 2009: 61). The idea of a chain, which is close to real dislocations and realized in cities, which brings to mind the known for many centuries mechanism of a goods chain. This is a situation, where every subsequent couple of transport connections is conducted on the basis of independent from other couples rules. It requires the separate organizational efforts and unnecessary (from the network point of view) energy input. Chain dislocations – dislocations of these connected into one totality couples through any integration mechanism, are desirable city trips. Nowadays peoples' dislocations in cities are conducted in the following groups:

1. Non-motorized dislocations – any dislocations which are run with the application of a human or animal power- dislocations by bicycles, rickshaws, carriages pulled by a bicycle, animals or finally dislocations on foot;
2. Public transport dislocations – consciously paid services that are publically accessible, realized on defined routes in connection with time schedules. Public or private organizations involved in all types of public transport are operators – dislocations by buses, trams, trolleybuses, subway, water transport or light aircrafts;
3. Informal motorized transport – private cars functioning on the formal and informal basis. The cars do not possess permissions; they do not comply with formal requirements (i.e. in the scope of technical norms, safety, insurance or categorized driver's licenses). Even in cases when such carriers possess transport licenses, they very often omit scheduled routes, charge fees illegally and do not give receipts, etc.;
4. Private motorized transport – engine vehicles used by individuals or companies to transport people.

Such a division is known from the cities functioning practice. Although within theoretical considerations, the third mentioned group of vehicles that meet the requirements of this group to groups 1, 2 or 4 is often omitted. The division of transport duties in cities is perfectly defined in theory. The attitude to this division depends on the scientific discipline represented by the particular author. Some differences are explicit, especially in the transporters' and logisticians' attitudes. These differences go beyond the scope of discussions that is why I consciously omit them. Some development conditions of individual groups in modern cities are worth mentioning. Not motorized transport, but in fact dislocations, is the substantial method of travelling in cities of developing countries. For example, in Dakar (Senegal) travelling on foot and by bicycles constitute 71% of all city dislocations, in Doula (Cameroon) – 60%, about 65% in Chinese cities but in India cities (Ahmedabad, Bangalore, Delhi, Mumbai) these dislocations constitute about 1/3 of all trips. In the Latin America countries the journeys on foot and by bicycles constitute about 1/3 of dislocations in Santiago (Chile), Rio de Janeiro (Brazil) and Guadalajara (Mexico). In richer cities this division is much more lower – Buenos Aires (Argentina) – 9%, La Paz (Bolivia) - 10% or Caracas (Venezuela) – 18% (Hidalgo, Huizenga 2013). In these countries a car is an indicator of a social position. Hence, the upward trend in the scope of not limited usage of private cars together with the increase of the population income should be taken into consideration. In the developed countries the increase of travels on foot and by bicycles share as the result of the life style changes as well as the propaganda actions occurs. So, this share in the case of the Australian cities equals 6%, USA and Canada – 12%, France, Austria – 25%, Norway– 26%, Finland – 31%, Germany and Denmark –34%, a Holland 51% (Buehler, Pucher 2012a). Here the mechanism is reversed referring to the cities of developing countries. The advantages of this dislocation method are popular, both from the point of view of these advantages for the travelers themselves (comfort, satisfaction, health improvement, lowering journey costs etc.) and for the city (the decrease of congestion, the decrease of number of parking spaces, saving of energy, the natural environment and city space, protection, the increase of goods and services accessibility). Public transport dislocations meet numerous problems generally connected with the decrease of popularity. In developing countries this type of dislocations is organized at an unsufficient level. Small or medium enterprises are operators that invest inadequate financial means devoted to the development of the stock. The customer service level is rather low, public subventions are minimal. Some actions supporting this group of transport have been noted in Dakar (Senegal), Johannesburg

(South Africa) and in Lagos (Nigeria). Some warranties for the credit lines to purchase the stock have been suggested (UIPT, 2010; Allen, 2011a).

In the Latin America cities the system of dislocations is quite well organized. The private sector importance is increasing - Montevideo (Uruguay), Bogota (Columbia) or Rio de Janeiro (Brazil). In the developed countries most of the cities conduct remedial works or actions diversifying the public transport systems. The level of the public transport usage differs – starting from 237 trips per 1 citizen in Switzerland annually to 24 trips per 1 citizen in the USA annually. Despite the investments in the public transport development in the North America countries – especially railway or comfort busses connections; the share of people who dislocate choosing these types of transport is still low. For example, the percentage of public transport daily travels was 6% in 2001 in Melbourne, 9,4% in Manchester, 14,7% in Amsterdam, 18,8% in London, 21,6% in Stockholm, 24,6% in Berlin, 34% in Vienna, 43,3% in Prague, 49,3% in Moscow or 51,6% in Warsaw (UIPP, 2006). Using the public transport to travel in cities has various premises that have been mentioned in many theses. The informal transport is broadly applied in many developing countries but the smaller the GDP is, the bigger the number of smaller entrepreneurs' transport offers is. In Africa this type of activities is dominating in cities. I am talking about the minibuses or the co-shared taxies that drive according to the time schedules and stop on demand and about prices that depend on the demand. In Nairobi (Kenia) the biggest usage of the informal transport was noted – 662 trips per 1 citizen annually, ¾ of the whole public transport and 36% of the transport labor. In Harare (Zimbabwe) the minibuses serve about 90% of the passenger transport market in cities (Pirie, 2011). In Alger (Algeria) the share of transport by taxies and minibuses, and generally motorized dislocations in cities, equals 56%. In Cairo (Egypt) the share of the informal transport increased from 6% in 1978 to 37% in 2001and next it increased more. (Huzayyin, Salem, 2013). In Lagos (Nigeria) the public transport became a bankrupt as a result of a lost competition with the informal transport which offered low prices, was overloaded and applied the aggressive method of driving (Pirie 2011). In many Asian cities the public transport does not exist. Minibuses and microbuses serve about 5-10% of all trips in Thailand and Indonesia and about 50% in Philippines (Kirby et al. 1972; Cervero, 1997). In the developed countries this type of tenderers who fulfill the market niches also functions. Usually cars owners, who possess low incomes, treat such services as a way of the household budget supplement. They offer their services near airports or railway stations. In the 90's of the last century in Eastern Europe the informal transport started to play the important role occupying those market parts which were fired by the weakening bus or tram transport

companies. Nowadays these carriers' actions are involved in the process of "civilizing". Finally – private motorized transport. The mechanism of shaping the usage of these types of vehicles has been described earlier. In this scope, in order to present the situation in cities, the following Table 1 data are worth studying.

Table 1. Number of vehicles in cities

	Motor vehicles			Cars			Cars as % of motor vehicles
	Total	Per 1000 inhabitants (million)	% of total	Total	Per 1000 inhabitants (million)	% of total	
TOTAL	1047	159	100	825	125	100	79
Developed countries	604	656	58	492	535	60	81
Transitional countries	98	303	9	83	259	10	85
Developing countries	345	64	33	249	47	30	72
Africa	35	40	3	26	29	3	74
Asia and Pacific	213	54	20	150	38	18	70
Latin America and Carribean	96	180	9	73	137	9	76

Source: World Bank, 2013

In cities this way of dislocations is not a good solution when it is about the caused by them congestion. Therefore, the city logistics offers some ideas i.e. the integrated city travel created from the chain of individual dislocations. The city logistics' task is to integrate dislocations in order to cause that a complicated (at the first glance) journey is organized by the internal factors that are independent of a traveler. Discomfort connected with the dislocation intervals (change of connections and waiting, access to information, exposure to environmental impact etc.) has to be the least severe. Rules tested within the multi-modal cargo transport[6], which thanks to the application of the internal integration philosophy, let increase the cargo effectiveness and which unload the transport parties from the perplexing legal and organization actions, can be applied (Szołtysek, 2011: 101). An organized journey with the usage of at least two means of transport, integrated by one organizer on the basis of the uniform price and one document, with one unified responsibility, presents a target of an urban trip. It also should

[6] Transportation also called in the course literature as the „broken" individual and public communication in the range of one trip constitute the evidence of complementarity of two types of transport in the realization of a specific trip.

be added that the public transport share in the whole chain of dislocations (from the city interests' point of view) must have the increasing tendency. The concept of multimodality creates conditions where the transport service is realized in the most efficient method. These requirements perfectly fit the needs of a city, which is interested in increasing the city users' satisfaction. Therefore, a city which is experienced enough in organizing the public transport should enlarge its spectrum of obligations connected with delivering the efficient communication within the whole chain of dislocations (including the individual means). A city should adopt the role as an organizer and an integrator. Offered solutions are described in the literature (e.g. Szołtysek, 2009; Szołtysek, 2011).

Conclusions – Does searching for benchmarks in cities make sense?

The cursory analysis of this text indicates that cities in their organization differ from each other significantly. These differences result, first of all, from the development level of a given country as well as the citizens' wealth. Other cultural, legal and other conditions belong to the above. Hence, the choice of benchmarks should take into consideration these differences. Looking for benchmarks in the geographical proximity can be risky in the situation when macroeconomic indicators significantly differentiate these standards. In the case, especially, when the socioeconomic past is considerably different, the adoption of such a benchmark is relatively burdened with a big risk of rejecting solutions, which would require the behavior modifications (i.e. transport behavior). The change of such behaviors is a long lasting process requiring the individual approach. The European Union implements many pilot projects, which aspire to become benchmarks. Such benchmarks are worth using, especially when taking into account not only the method of solving a substantial problem but also the implementation methods, including obtaining the social compromise in connection with the implemented or planned projects. It is worth using the researched phenomenon criteria evaluation list while choosing a benchmark,. For example, for the public transport it is possible to take into consideration the criteria mentioned in the Table 2.

Table 2. Criteria for the cities' benchmarking needs

Criteria	Description
General criteria	
City area	City area within administrative borders
Population	City population within administrative borders

Demographic specificity	Characteristic elements that influence the transport functioning, population spatial distribution, migration balance among the city parts or a wider metropolitan area.
Individual transport	
Individual transport	Number of registered vehicles and motorcycles
Average speed	Average speed of individual vehicles in chosen intervals
park&ride	Number of seats in the P&R system
Speed limits	Length of streets where special speed limit to 30km/h is in force
Public transport	
Lines of public transport	Length of public transport lines (buses, trolleybuses, trams, subway, rail way, urban rail way, water tram)
Priority for the public transport	Length of separate lines for buses, length of separate tramways, number of crossroads with the priority system for the public transport
Average speed	Average speed of public transport vehicles in chosen intervals
Nodal points	Number of stops for every type of transport
Stock	Number of vehicles (branch-division) that serve the administrative area of a given city
Accessibility for users with special needs	Percentage of the public transport low-floor vehicles (various types)
Transport behavior and the level of the public transport integration	
Branch structure	participation (as well as the changes dynamics) of the particular methods of dislocation, including pedestrians routes and cycling roads, participation of all forms of dislocation with the application of transport means (vehicles) of the particular branches
Cycling roads and pedestrian routes	Length of cycling roads and pedestrian routes excluding the vehicular traffic
Single trip cost	Cost divided into types of public transport, number of single tickets that are possible to purchase for the same price as a parking fee in a center (1h)
Network ticket cost	Cost and range of a purchased service
Tariff and fare integration	Number of carriers operating in given areas and a description of applied tariff and fare systems, functioning of a transport union that organizes transport in a metropolitan area, accessibility of the e-ticket and various forms of the electronic urban card.

Source: Kaszubowski, 2011: 1077-1078.

The ultimate usefulness of an adopted standard in new conditions will be possible to check after the defined period of time. It should be remembered that the newly implemented program can finally present different from the adopted standard results. By skillful city management, we should be prepared to neutralize the negative results, not discourage users in the scope of undertaking the next initiatives, which lead to the modification of transport behaviors. Shaping the behaviors requires the detailed understanding of the broad context of the city mobility.

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MODELLING BUSINESS PROCESSES IN LOGISTICS WITH THE USE OF DIAGRAMS BPMN AND UML

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Abstract

The paper researches the suitability and sufficiency of BPMN and UML languages in business process modelling in logistic. There were two examples of process modelling: supply chain logistics and production logistics. Logistics system is modelled at the highest domain level using case study in container transport and exemplary production process to examine the both modelling languages in many aspects. Modelling is carried out in a modular basis for hierarchical systems generally using BPMN 2.0 and UML 2.0. Complementary use of both modelling tools was seen necessary for business process flow and information process design. The proposed models provides many benefits for modellers, analytics and actual practitioners of logistics activities.

Keywords: BPMN diagram, UML activity diagram. business process modelling, logistic process, information system

Introduction

Business process modelling is the important element in Business Process Management at their implementation phase as well as the activity of representing the processes of an enterprise. The experiments in the real world are usually very expensive and do not allow to take into account full number of parameters these processes. Business Process Management (BPM) requires a specific description language, the graphical representation of such a description is the best way to communicative presentation of the proposed solution.

Process modelling becomes more and more an important task not only for the purpose of software engineering but also for many other purposes besides the development of software. Therefore it is necessary to evaluate

the quality of process models from different viewpoints. This is even more important as the increasing number of different end users, different purposes and the availability of different modelling techniques and modelling tools leads to a higher complexity of information models.

In the information system design process there are used two approaches:

- Object oriented approach, in which there are identified objects and used such facilities as abstraction, encapsulation, inheritance and polymorphism.
- Functional oriented approach, in which there are identified functions and activities of system. A group of primitive activities can be assigned to a particular role.

In the actual design process, both approaches are used simultaneously with a focus on one of them. In the object-oriented approach, objects are identified, and for them, in turn, are defined responsibility implemented using the identified functions (or methods). Such an approach in modelling business processes can be incomprehensible for the business side. A good support for business process modelling is activity-oriented approach. It tend to define a business process as a specific ordering of activities (i.e. tasks).

At the present, there are several modelling languages which define the basic elements for constructing business process models. The mains are in historical order:

- Petri nets and colour Petri nets (Petri 1962).
- Event-driven Process Chains (EPC) used within ARIS framework (Aalst 1999).
- UML Activity Diagrams, the process modelling language of UML (OMG 2007).
- Yet Another Workflow Language (YAWL) is built on the workflow pattern analysis (Aalst, Hofstede 2002; Aalst et al. 2003).
- Business Process Execution Language for Web Services (BPEL4WS) to model executable processes (OASIS 2007).
- Business Process Modelling Notation (BPMN) to describe the business processes using notations standardized by OMG (OMG 2011).
- Business Process Modelling Language (BPML) is a language for business process modelling. BPML was a proposed language, but now the BPMI (Business Process Management Initiative) has dropped support for this in favour of BPEL4WS (BPML 2002).

The considerations made in this article will be focused on two notations: UML activity diagram and BPMN. To effectively describe business processes, the UML language undergone a significant evolution from simple graphical language describing software project to very complex tool to describe the various elements of business processes. However, UML supports

primarily object-oriented approach. The most important UML diagrams include the use case diagram, activity diagram, state diagram and class diagram. From the point of view of business process modelling activity diagram is the most interesting. Table 1 presents a comparison of the activity diagram elements with elements of BPMN diagram.

Business Process Modelling Language as a metalanguage for modelling business processes and business data provides an abstracted execution model for collaborative and transactional business processes based on the transactional finite-state machine concept. The UML takes an object-oriented approach to the modelling of applications, whereas BPMN takes a process-oriented approach to modelling of systems. The BPMN has a focus on business processes description, the UML has a focus on software design modelling. Thus, both notations are not competitive, but are different views on systems. The BPMN and the UML are compatible with each other. A business process model does not necessarily have to be implemented as an automated business process in a process execution language. It is a way for the exchange of knowledge between engineers and representatives of various fields. There is the case, in which business processes and participants can be mapped to constructs such as use cases and behavioural models in the UML.

BPMN is a standard set of graphical diagramming conventions for describing business processes. It allows to visualize a rich set of process flow semantics within a process and the communication between independent processes. It has been designed to support capture of sufficient detail to allow it to be the base of an executable process description. There are several languages aimed coding and implementation of the models described BPMN diagrams. Among others these are BPEL and BPML.

BPEL is language based on XML standard. It was design for describing a business process in which most of the tasks represent interactions between the process and external Web services. The BPEL processes themselves are represented as a Web services, and are realized by a BPEL engine which executes the process description. A translation to BPEL is specified in the BPMN standard, because BPEL is currently considered the most important standard for execution languages. But by design there are some limitations on the process topologies that can be described in BPEL, so it is possible to represent processes in BPMN that cannot be mapped to BPEL.

BPML was developed by the Business Process Management Initiative to model business processes and it is also based on XML standard. It has been dropped in support of Business Process Execution Language. Activities in a BPML perform specific functions and are either simple or complex. Simple activities such as action, assign, call, compensate, etc., cannot be further decomposed and perform a single operation. Complex activities such as all,

sequence, flow, switch, pick, etc., are composed of one or more activities and direct the execution of an activity from another activity set. BPML and BPEL are intended for mission-critical applications by supporting synchronous and asynchronous distributed transactions.

Why BPMN has become so popular? Users expect notation, which will allow modelling of advanced composite business processes. A proposed notation emerges not to solve not only old problems. It should be competitive in traditional applications and open new opportunities. A model can be analyzed and improved organization's processes.

BPMN provides a notation that can be readily understandable by all users: from the business analysts who model the processes conceptually, to the technical developers responsible for implementing the technology for the processes, to the people who will manager and monitor the processes. Both the business and technical sides of the organization can find a common language. They can both understand and that meets their respective needs for precision and notation flexibility. This shared language give the opportunity to use new ways of working together. It results in the deployment of new and more flexible applications.

1. BPMN and UML Activity Diagram notation

BPMN generally defines an abstract model and the grammar used to express a generic process. As such, it can be used to define enterprise business processes, complex Web services and multiparty collaborations.

The BPMN can approach by organizing elements in four categories:

- Workflow elements:
  - activities,
  - events,
  - gateways,
  - sequence flow,
- Organizing elements:
  - pools,
  - swimlanes,
  - groups,
- Readability elements:
  - annotation,
  - links,
- Special behaviour elements:
  - messages,
  - message flow,
  - signals,
  - timers,

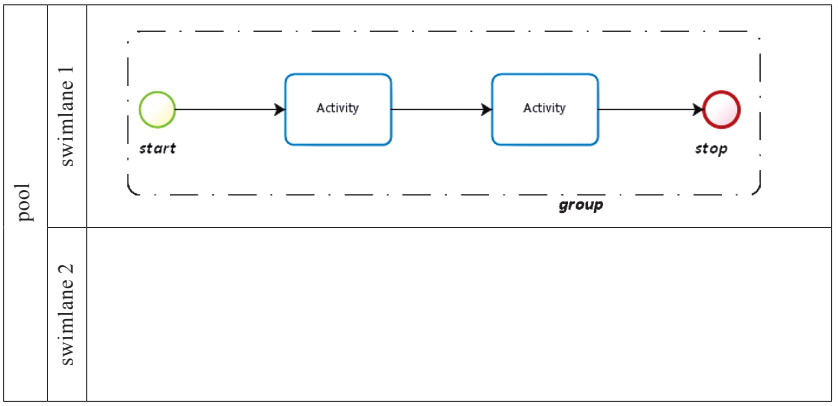
– errors,
– repeating,
– correlation.

With just a few elements from first three categories there can draw a business process diagram and begin to build and understand a process. Each of Workflow elements have several types, and all of these types can be connected in a sequence. Activities means tasks that are performed in the process by humans, by automation, or by subprocesses. Events are used to start or end process, and also to manage specific actions during a workflow. There are three type of events: start, intermediate and end events. *Intermediate events* which will affect the flow of the process, occur between a *start event* and an *end event*. They will not start or directly terminate the process. Gateways are used to separate or joint process flow. The described elements can be linked together by an arrow representing a sequence of flow (Figure 1)

Figure 1. Symbols of workflow elements: a) activities, b) events, c) gateways, d) sequence flow

Organizing elements are used to collect of the process flow elements. Pool contains a single, complete process. Workflow cannot leave a pool. A transfer action or data from one pool/process to another can be realized using events. A swimlane is used to help organize the process based on roles i.e. who does what. Workflow crosses swimlane boundaries as if they did not exist. They are purely for organizational clarity. Group is used to enclose a grouping of featured graphical elements. It does not affect sequence flow (Figure 2).

Figure 2. Using of organizing element symbols: pool, swimlanes, groups

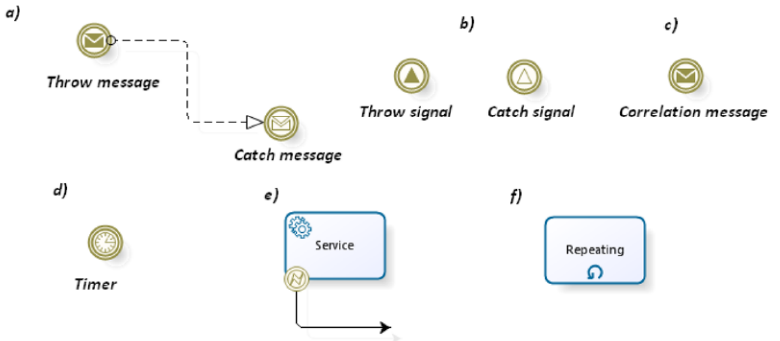


Readability elements have no effect at all on the actual process flow. Text annotation allow to paste notes all over a model with explanations for clarity. Links allow to cut a process that has become too long to read easily, and simply continue the process on another line (Figure 3).

Figure 3. Symbols of readability elements: a) text annotation, b) input and output links

Special behaviour elements allow to design executable workflow that can behave in complex ways. Messages and message flow elements are used to transfer action or data from one pool/process to another and to correlate related processes. Signals are used to send data to multiple activities simultaneously. Correlation is used to coordinate progress between to running process instances. Timers are used to launch periodic activities, or to ensure that an activity happens within a specified deadline. Errors are used to define behaviour when the system encounters error. Repeating is used to repeat behaviour, such as multiple launches of the same task, or repeating the same task multiple times (Figure 4).

Figure 4. Symbols of special behaviour elements: a) transfer action by throw and catch message; b) throw and catch signal element; c) correlation event (message); d) time symbol element; e) symbol of activity with error service; f) symbol of repeating activity

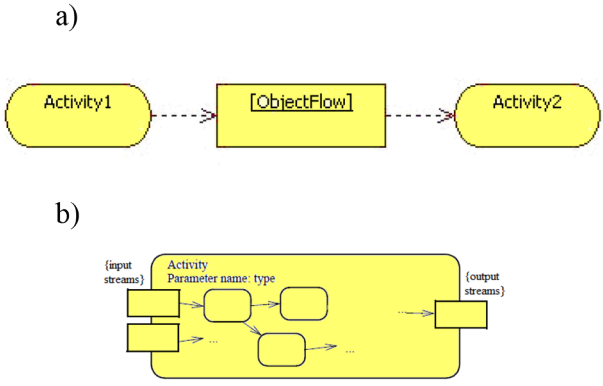


BPMN and UML are built in a hierarchical manner, starting from the general form of the system model, through successive clarification processes or activities, to the detailed model. In the final step of the modeling, processes become elementary activities or tasks. The process, which is not

divided on the simpler processes, can be explained at the next level of the hierarchy. This process (collapsed process) indicates its development by a sign "+" inside the process/activity symbol. Number of hierarchy levels depends on the complexity of the entire process, because the developed process in the next level can also contain collapsed processes.

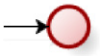
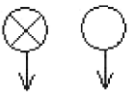
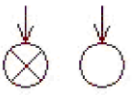
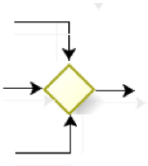
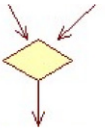
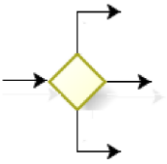
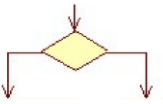
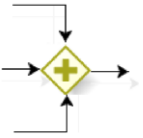
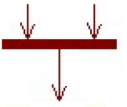
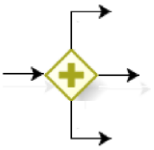
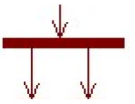
BPMN and UML activity diagrams have similar features and ease of use. Both BPMN and UML AD allow the modeling of complex sequences of tasks and activities. But UML supports primarily object-oriented approach. In addition to activity nodes and control nodes may appear nodes objects. Typically object node connects two nodes of activity (Figure 5a). This means that the object presented is the result of the activity and it is passed on to the next activity. Symbol of the activity node can contain rectangles indicate input and output parameters and streams. Thus, the UML activity diagram describes the flow of data and information processing in the modelled system.

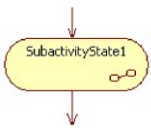
Figure 5. a) Two object flow arrows linking object nodes and actions; b) Notation of the activity with input and output streams



Although the objectives of the use of diagrams, BPMN and UML AD are different elements of the two types of diagrams are similar, they have similar meanings. Table 1 shows the comparison of major elements of the two graphical languages. The table does not include the full set of events and the types gates. They are not exact equivalents in the activity diagram for the BPMN elements. Also, do not treat the presented elements and their interpretation as a complete set of graphical symbols and their meanings. The complete description can be found in the standards of both languages BPMN and UML announced by the OMG (Object Management Group) (OMG 2011; BPML 2002).

Table 1. Comparison of BPMN and UML AD diagrams elements

BPMN	Description	UML activity diagram	Description
	Start Event indicates where a particular Process or Choreography will start		Control nodes: Beginning of Activity Flow
	End Event indicates where a Process or choreography will end		Control nodes: End of Activity Flow
	Off-Page Connector will show where a Sequence Flow		Control nodes: Activity edge connector – input
	leaves one page and then restarts on the next page.		Control nodes: Activity edge connector – output (flow final)
	Merging: exclusive combining of two or more paths into one path (OR-Join). A Merging Exclusive Gateway is used to show the merging of multiple Sequence Flows		Control nodes: Merge node
	Fork: Multiple Outgoing Sequence Flows This will be used usually in combination with any Gateway.		Decision node with control flows
	Gateway Control Type Parallel Gateway joining		Control nodes: Join node
	Gateway Control Type Parallel Gateway forking		Control nodes: Fork node with flows

	Gateway Control Type: inclusive, event- based, complex	---	
	Intermediate events: "Throwing" signal and message		Send Signal Activity Action
	Intermediate events: "Catching" signal and message		Receive Signal Activity Action
	Timer intermediate event		Action of accept time event generating
	An Activity is a generic term for work that company in a Process. An Activity can be atomic or compound.		Action from Complete Activities, Fundamental Activities, Structured Activities, Complete Structured Activities
	The types of Activities that are a part of a Process Model are: Sub- Process and Task. A Sub-Process is a compound Activity that is included within a Process. It is compound in that it can be broken down into a finer level of detail through a set of sub-Activities.		Sub-Activity

2. Exemplary logistic process model

In business, logistics may have either an internal focus (inbound logistics) or an external focus (outbound logistics), covering the flow and storage of materials from point of origin to point of consumption (supply-chain management). The main functions of a qualified logistician include inventory management, purchasing, transportation, warehousing, material handling, packaging, security, consultation, and the organizing and planning of these activities. Responsive logistics system all along the supply chain is severely dealing with workflow management system. Logisticians combine a professional knowledge of each of these functions to coordinate resources in an organization.

Examples of the use of BPMN diagrams can be found in the literature (Khabbazi et al. 2013a; Khabbazi et al. 2013b; Koniewski et al. 2006).

The article (Koniewski et al. 2006) describes a simple model of logistic chains in which additionally Petri nets were used to simulate the processes. In this section Business Process Model and Notation is used to represent the functional structure and activities of reference logistics system applicable in small and medium enterprises (SME) environment. Below are examples of modelling the two processes: Multimodal Logistics Chains and Production Logistics.

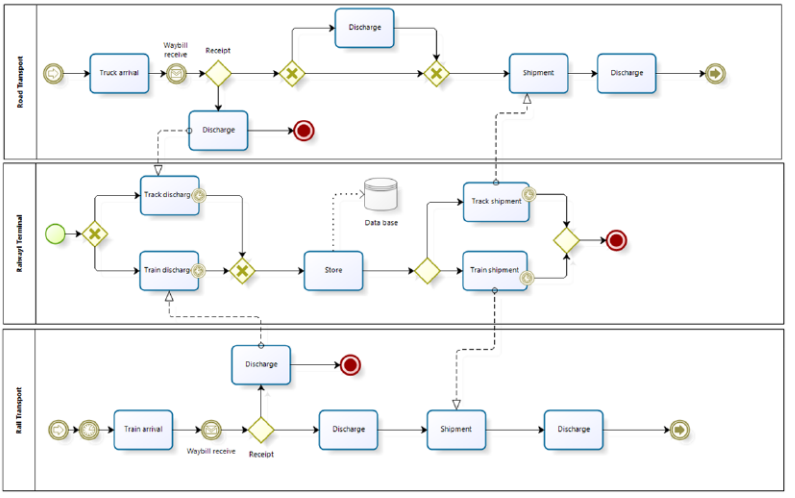
2.1. Modelling of multimodal logistics chains

Multimodal logistic chain is the interconnected set of business procedures and business partners that manage the flow of goods and information from the one point e.g. production, through intermediate nodes, to the another one e.g. to the end consumer. In this example will be presented a problem, in which the transportation unit is a single container. In such a situation we can distinguish three basic types of nodes:

- road terminal,
- train terminal,
- sea port.

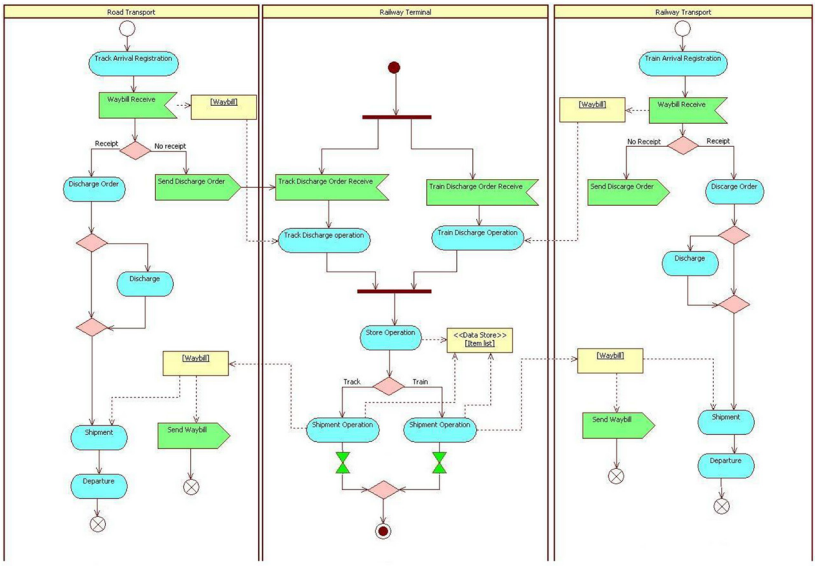
Each of three means of transport is described by business process in BPM Notation. Figure 6 presents exemplary model of the Train Terminal node modelled in BPMN. Road Transport Part, Train Terminal and Train Transport Part are identified as pools – lanes. A single connection between two terminals can be described by one or more processes, depending on number of phases of transportation stage.

Figure 6. Business process model of the terminal node using BPM Notation



The Links nodes (events) make possible to connect models of another terminals. This model focuses on the flow of business processes and relationships between them. Information processes such as the receiving and sending waybills and manage of storage containers is only signalled. Processes in the terminal node was also modelled using UML activity diagram (Figure 7). In this case the diagram is focused on processes of registration and processing.

Figure 7. Business process model of the terminal node using UML activity diagram



2.2. Example of modelling of the inbound logistic system

The architecture of inbound logistics system is organized into smaller parts as sub-systems and analytically developed. Analysis and identification of BPM requirements for logistics system is the first step in the modelling. The following example concerns the production logistics. The production logistics concerns logistic processes within a value adding system. It aims to ensure that each machine and workstation receives the required product in the required quantity and quality at the required time. The essence of the concern is to streamline and control the flow through value-adding processes and to eliminate superfluous processes. Production logistics can operate in existing as well as new manufacture.

BPMN diagram as a production model at its highest domain level represents fulfilment of the work order as responding to the received customer

order. Sales and Quality Departments are identified as separately black box lanes, Manufacturer as abstract pool with Production Department and Shop floor as lanes. In the Manufacturer pool the sequential flow of processes is mapped out through connecting them from a start event up to an end event using happy flow technique (Figure 8). The production process is triggered by Work order "Start" event message from Sales department. Collapsed sub-process of PP requirement in which a "plus" sign in the lower-centre of the shape indicates that the activity is a sub-process and has a lower level of detail (Figure 9a). Respectively the formation of sub-processes also applies to the activity as a process: Production Planning, Set-up Operating Process and Operating Process (Figure 9a, b, and c).

The PP requirement process followed by Production Planning Process leads to the Updating Production Plan System task. The production plan and the list of requirements is sent to Shop floor, Quality Department and Warehouse by Issue production plan picking task. This task is terminated with a "Message" end event. Figure 9 illustrates mentioned, collapsed sub-processes. In the next step, the model in first happy flow is supplemented by alternative paths, exceptions, activities and required artefacts.

Figure 8. The BPMN diagram model of Production System

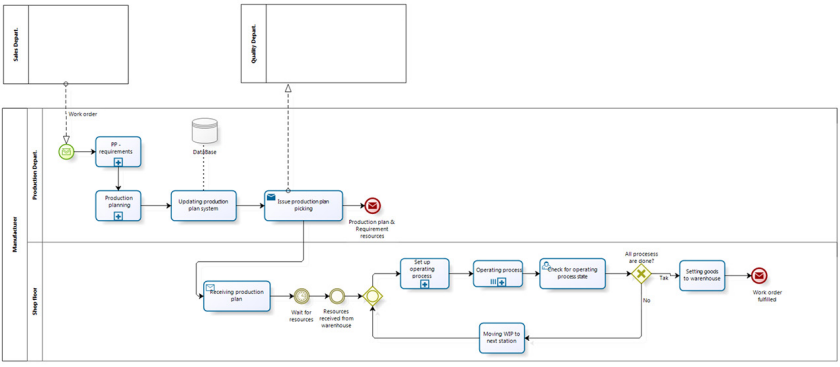
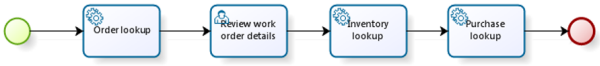
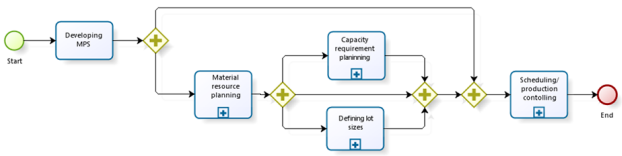


Figure 9. Expanded sub-processes: a) PP requirements; b) Production Planning; c) Set up Operating process; d) Operating Process

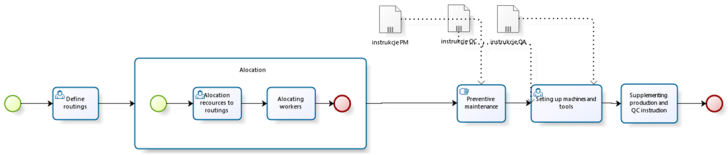
a)



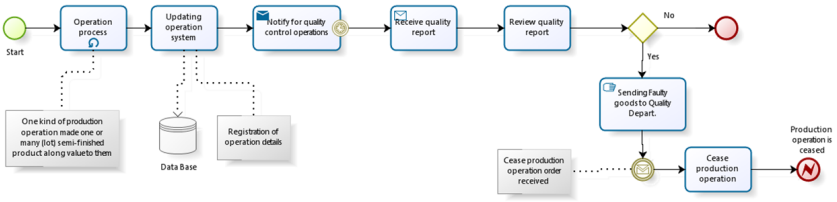
b)



c)

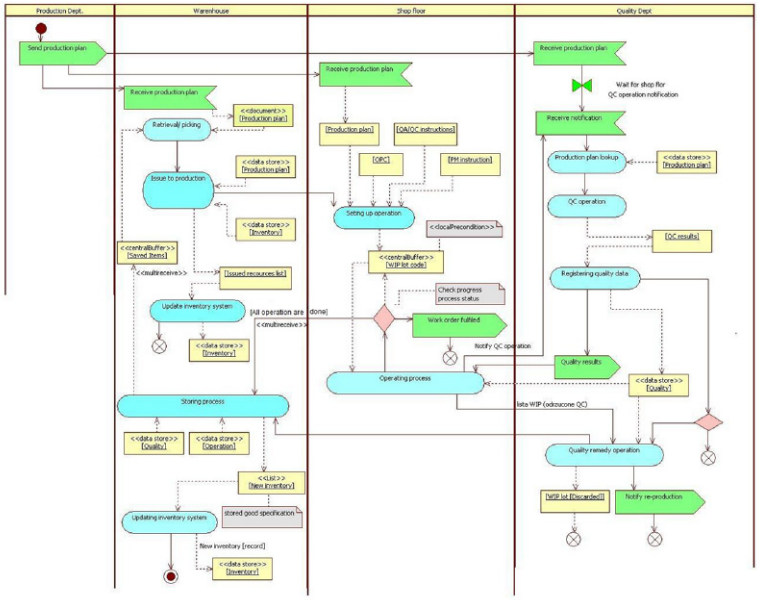


d)



The UML activity diagram make possible modelling of the complete scenario of material transmission and transformation up to the finished goods. It focuses on information and physical object flow. Data on current production are collected in the facility Saved Items <<centralBuffer>>. Details of the Production Plan and Inventory are stored in objects <<datastory>>. The UML activity diagram presents coded data used directly to control production and the OPC data used as a standard of data exchange in the industrial automation space and in other industries.

Figure 10. The UML activity diagram as a meta-model of WIP (Work in process)



Source: Own study Khabbazi et al. 2013a.

Conclusions

The article describes the use of BPMN diagrams and UML Activity Diagrams for modelling logistics processes. UML Activity Diagrams are focused on the presentation of information flow and resources taking into account the object-oriented features of the process. In contrast, BPMN diagrams focus on the processes taking into account the events determining the runs and branching of these flows. The main objective of UML is modelling the system during its design.

Logistics processes are parallel movement of resources, whether in external or internal (eg, manufacturing) area and providing information about the movement, as well as ensuring the proper management of this movement. BPMN although not distinguish between the type of transmitted messages, it separates the content of a business process from the same information.

Coexistence of information processing with the course of business processes is the essence of modern management systems. Sometimes, however, often causes confusion in the design and modelling. The appearance of the BPMN diagrams is their significant advantage. In contrast, the UML activity diagrams are created separately for the model of the environment and to model the system.

UML activity diagram focuses only on the part of the activity of the business processes that involve the processing of information, such as the preparation of an encoded list of activities and elements of production. There introduces on the activity diagrams also detailed information about the input data and output data of each activities.

The utility of both types of diagrams confirmed by numerous publications in the field of business modelling and a variety of tools to support the creation of such diagrams. For example, a commercial system Enterprise Architect enables you to create both diagrams in UML and BPMN. There is also a free tool or tools in the free version. In many such tools for example should be mentioned: Star UML, ArgoUML, BizAgi Process Modeller. In addition to the possibility of a graphical representation of diagram elements, these tools have the most options to verify their correctness and for BPMN diagramming tools can simulate the processes. In this second case, the BPMN diagram is translated into a language of business modelling: BPML or SRML (Simulation Reference Mark-up Language). It is also possible to transform BPMN diagram to BPEL4WS script to create network service system (Badura 2012).

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SUPPLY CHAIN STRATEGIES IN EMERGING MARKETS: AN INDIAN PERSPECTIVE

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Abstract

Emerging markets offer huge growth opportunities that cannot afford to be missed out by corporate world .India has a huge potential which is yet to be exploited. The logistics/supply chain experts have not been able to meet the requirement of even urban population successfully so far. This paper focuses on igniting the mind of corporate bigwigs with a aim to address the issues of supply chain strategies holistically. The right approach to supply chain development is fundamental to successful exploitation of these opportunities.

Key words: supply chain strategies, emerging markets

Introduction

India is a developing country where shifting politics, unstable economics, lack of basic infrastructure, and limited application of enterprise management technologies are the norms. In spite of these challenges and pitfalls, it has a huge potential to address the emerging needs of the people and supply chain plays an important role.

One more issue which merits discussion is that the Indian market is to be considered as a sub-continent: serving India is similar to serving a widely diverse market where languages, cultures, habits and consumer preferences are different in every single Indian state. Each state therefore requires a customized approach.

Indian population can be divided into various segments: ultra-rich, rich, upper middle class, middle class, lower middle class, poor on the border line (aspiring to come to middle class) and poor population. Every category has different requirements and intelligent market must cater the requirements

accordingly ,which requires a thorough understanding of the local consumption patterns. In addition, prices and products need to be tailored to the taste and wallets of each category or group of categories of the consumers.

1. Challenges for India

1.1. Poor infrastructure

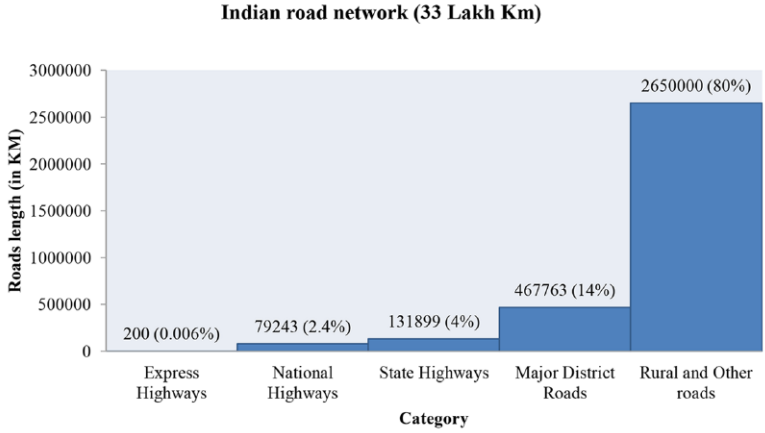
The biggest challenge for India is a poor infrastructure. Infrastructure development is the greatest challenge facing India, if it is to sustain high levels of economic growth. India's position on the world trade map has been growing steadily over the past years. However, the physical infrastructure has not been able to keep up with the country's economic expansion. Transported volumes are climbing rapidly, demand for energy has increased and the communication network is reaching its maximum capacity. Being home to over fifty national highways, the sad state of affairs is that most national highways are just two lanes or even lesser. The design of the highways is a matter of great importance since only properly designed highways can withstand the pressure created by heavy vehicles. Apart from being narrow they are also highly congested since quite a large part of India's freight is carried on these highways.

More can be accomplished if there's better infrastructure and the ability to scale up to get products to the villages. For example, the Food Security Bill that has been passed needs to be implemented. How to get rice and food grains to the villages remains an SCM challenge. There's going to be a huge opportunity once infrastructure bottlenecks are removed. India has the potential to come up as a supply chain centre of excellence for the world. The key infrastructural challenges involve the active role of roads and the Indian road freight industry, railways, ports and shipping, airports and the Indian air freight industry. These, in turn, are supported by power, energy and the ICT-infrastructure. Although the Indian government has been taking steps to improve the country's physical infrastructure; there is still much ground left to cover. Many years of under investment are now taking their toll on the country's competitiveness as India still compares unfavorably to other emerging economies. In addition, structural inefficiencies in the financial system, coupled with the global credit crunch, have left the country with a shortfall of US$ 1.9 billion in financing key infrastructure project, as a recent study by McKinsey reveals.

Roads are the lifeline of an economy. In India, road transportation accounts for 65 % of freight traffic and 85 % of passenger traffic. India has the second largest road network of the world: it is nearly twice as long as China's and it ranks second only next to the USA (Fig.1-2). However, out of

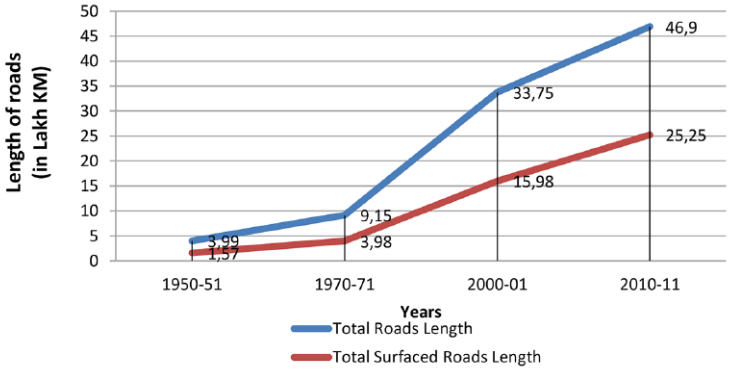
India's 3.3 million km, only 2 % are express highways and less than half the roads are paved. Off the highways, transportation links become very scarce to non-existent. Firms can only use trucks that are smaller than 6 meters (2-axle rigid trucks and smaller).

Figure 1. Status of Indian roads



Source: NHAI, 2015

Figure 2. Progress of Indian roads



Source: Basic road statistics of India, 2012

Access to the interior of the mainland is limited, 72% of the Indian population lives in villages and more than 25% are yet to be connected with roads. Reaching consumer in rural India then becomes a challenge, especially given that this is where the next market potential is expect to come from. So how does a firm get its product to the remote Indian villages?

The Indian road network is not only in very poor shape; it has also reached its designated capacity. This ultimately results in very frequent congestions. The average speed on Indian highways is 30 km per hour, which is three times lower than the average speed on highways in developed countries. The high average daily traffic volumes indicate the urgent need for improvement of the road infrastructure.

Some Indian States have tried to manage road congestions by introducing 'truck curfews', which are specific hours during which trucks are not allowed to enter the city limits. Once a vehicle misses the curfews, it is held alongside the roads until the next day when it will get the chance to enter the city limits. Such policies only lead to more delays. To meet the infrastructural need, the National Highways Authority of India (NHAI) launched the National Highways Development Project. This project has three phases, which are meant to upgrade and widen the country's highway network. The first phase incorporates the development of the Golden Quadrilateral connecting Delhi, Mumbai, Chennai and Kolkata. The second phase involves the development of the North-South and East-West links, which runs from Srinagar to Kanyakumari and from Porbunder to Silchar. The third phase consists of the upgrade of existing national highways.

1.2. Highly fragmented supplier base

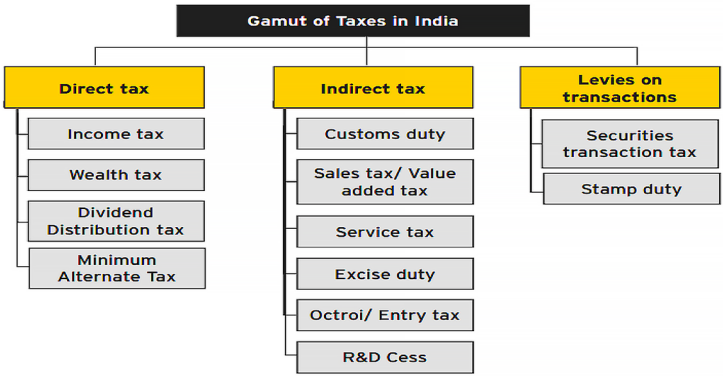
Reaching mass markets effectively will require the development and optimization of dynamic channels especially in the cultural diversification like India. In many emerging markets, outlet penetration is challenging to achieve because of fragmentation. India for example has something in the order of more than 13 million outlets (the US by comparison has fewer than 950,000). As they build a supply chain to take their brands and products into the mainstream of emerging markets, all players must keep this in mind.

1.3. Complex system of taxes and government regulations

Indian taxes and duties are known to be a labyrinth, but they are essential parameters in the optimization of supply chains. Corporate tax treatment in India varies significantly from State to State, as all levels of government have the authority to levy taxes on goods and services. The Federal government levies taxes on income, imports (*Custom duties*), the rendering of services *(Service Tax)* and goods manufactured in India *(Central Value Added Tax or cenVAT)*. The State Governments may charge taxes on professions, on property transactions *(Stamp Duty)*, the VAT on intra-state sales of goods, the Central Sales Tax (CST) on inter-state sales of goods and the *State Excise*. Local bodies tax properties, *Octroi* when goods enter the city

limits, and the supply and use of utilities. It is presented in Fig.3

Figure 3. Scope of taxes in India



Source: Indian Tax Overview, 2011: 10

1.4. Ineffective usage of information technologies and communication

Prior to 1980s the information flow between functional areas within an organization and between supply chain members organizations were 'paper' based. The 'paper' based transaction and communication is slow. During this period, information was often over looked as a critical competitive resource because its value to supply chain members was not clearly understood. IT infrastructure capabilities provide a competitive positioning of business initiatives like cycle time reduction, implementation, implementing redesigned cross-functional processes. Three factors have strongly impacted this change in the importance of information. First, satisfying in fact pleasing customer has become something of a corporate obsession. Serving the customer in the best, most efficient and effective manner has become critical. Second information is a crucial factor in the managers' abilities to reduce inventory and human resource requirement to a competitive level. Third, information flows plays a crucial role in strategic planning.

2. A concept of supply chain management

The supply chain concept is still nascent in India. However, the need for the same, at this stage, is more than ever before because of the challenges unleashed on the competitiveness of the Indian industry by deregulation and globalization. An essential first step in the process is to assess the current supply chain capability and to gauge the current state of supply chain management in the Indian industry. It is true that a beginning has been

made and large number of Indian organizations today are realizing the importance of developing and implementing a comprehensive supply chain strategy – and then linking that strategy to deliver bottom line results.

2.1. Major challenge to adapt existing strategies to the peculiarities of the Indian landscape or design new strategies from scratch, that are entirely adapted to the local conditions

India has a tremendous market potential. It also offers remarkable sourcing opportunities, strong logistics and supply chain processes are necessary in order to support objectives. Need to cope with all the challenges of managing effective supply chains. Emerging markets are hot, today more than ever. While these lower-cost countries were perceived by multinational firms as an opportunity to benefit from labour cost arbitrage in the past, the trend has changed. Next to radical cost reductions, other key forces are also driving multinational corporations towards globalization and emerging markets. These are: new markets and growth opportunities, technological capabilities, and political and macroeconomic incentives. Thus, yesterday's low-cost countries are now becoming tomorrow's new markets and strategic locations to tap into local technologies and know-how. However, emerging markets have their own challenges, ranging from poor physical infrastructure, inexistent distribution channels and a fragmented supplier base to a lack of transparent regulations. This can cause effective time-tested supply chain management practices that work in developed countries, to fail terribly when applied in emerging economies.

Figure 4. Key imperatives

Triple A-rated

It is imperative to achieve a 'triple A-rated' supply network -delivering products that are affordable, available, appealing. These are more prominently visible in the economies like India.

Skilled labour

The availability of quality skilled labour, whether in the cities or rural areas, is often in short supply. Companies must cultivate and progressively train to succeed in retaining and growing pools of skilled resources supplemented, where appropriate, by specialist external expertise and input. India need to create a well trained fully skilled manpower pool. Presently, there is huge deficiency in training institutes especially to train skilled manpower.

Supply everybody & everywhere

The rapid urbanization of emerging economies creates 'instant' markets that are geographically concentrated. But newly middle class city dwellers are very far from representing the total opportunity. Reaching the still immense rural population is critical to growth and economy.

E-Commerce

Online information sharing increases transparency, visibility, speed and accuracy in material movement across the supply chain. There is an urgent need of E-Commerce logistics for the enterprise to bring efficiency and effectiveness in material delivery to the customer.

Fragmentation

Indian market has a fragmented base wherein there are lots of small to mid size companies and where even the big players have stiff competition. It is because of diversification in culture, habits, tastes etc. It indicates that there are customers for this different type of product. Reaching mass markets effectively will require the development and optimization of dynamic channels.

India is characterized by a fragmented supplier base, with a lot of intermediaries and huge capabilities differences between suppliers. The first top tier suppliers are sophisticated and they can easily compete with their peers in developed markets. They follow world-class practices, possess leading-edge technologies and are up-to-date with the latest management techniques. India has, in fact, the most firms conferred with the Deming Award outside Japan and most of these have been awarded to top tier suppliers. Tier 2 and tier 3 suppliers are often rural and lag far on the top tier.

One size fits one

Success demands awareness that a 'one size fits all' approach is unlikely to work and at the same time, close alignment with the needs of individual markets must be based on sustainable cost to serve.

Grow your own talent

There is a need to leverage and mature management experience through 'on the ground' involvement. Managers themselves will benefit from personal development and experience gained at the emerging markets sharp end working closely with, and developing their local and regional talent.

Sourcing

Sourcing is defined as the entire set of business processes required to purchase goods and services. In doing so, companies acquire raw materials, components, services, or other resources from suppliers to execute their operations. An organization typically decides to source from an international location when it adds value to its activities in terms of cost, quality, and time or capability. Good sourcing decisions can lead to a significant competitive advantage. First, as firms have reduced vertical integration and as they are increasingly outsourcing the manufacturing of components, today's share of purchased parts within the cost of goods sold is higher than several decades ago (Chopra, Meindl, 2008: 419). Good sourcing decisions can therefore result in lower costs of goods (or services) sold. Secondly, given the current financial crisis, achieving a low cost structure has become crucial to the survival of numerous firms. Today, many multinational manufacturing firms are looking at India as a high-potential sourcing opportunity. It has a very large number of very competent, English-speaking engineers graduating each year; with labor costs that are often just a fifth of what their peers may cost in developed economies.

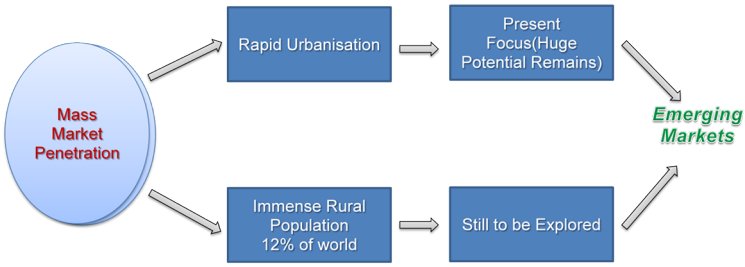
Even the most experienced sourcing professionals will be overwhelmed by the size, the complexity and the diversity of India. "In terms of laws, taxation, languages, cultures and other elements, there exist significant differences among the various states in India. There also are differences among the various business sectors. So sourcing from India actually needs to be translated into sourcing from a particular part of the country. Sourcing from India implies changes in the existing supply chain network: new relationships are built and linked to the existing network, while obsolete relationships must be abandoned. Analyzing a sourcing opportunity merely from a strategic point of view is bound to lead to unexpected outcomes, such as the hidden costs of matching and coordinating processes, and the resources needed to leverage your firm's competences in order to bring your Indian suppliers up to you expectations. In today's economy, providing a good

product with the right features is no longer sufficient. Brand image and the way the product is perceived by the end-users are increasingly influencing consumers' behavior. Nike learned this lesson the hard way. The Nike swoosh has often faced criticism for use of child labor, due to production contracts that were given to companies that operate in areas where inadequate regulations and monitoring makes it hard to ascertain that child labor is not used. When sourcing from India, it is therefore crucial to know your suppliers through and through, and to make sure that they comply with all standards and regulations.

Looking for suppliers via web-search, e-mails and phone calls can harm your business, simply because companies that are qualified may not respond; they are often too busy chasing what they consider to be real prospects. Therefore, chances are that the response you may get, comes from a company that is poorly run to get business on their own. Or it may come from some intermediary who does not own any facilities of its own, in which case you would be having no access to the actual sources.

Conclusively, sourcing from India offers many opportunities. However, the challenges are also there. They can be both external (logistics challenges, lack of quality and transparency at the supplier's end,) and internal to the firm (lack of knowledge about India at the corporate level, shortage of local sourcing. However, these obstacles can be overcome, though it often requires creative thinking and local innovations.

Figure 5. Desirable focus

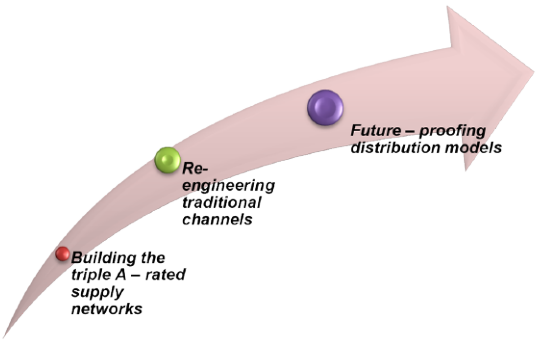


Source: Own study

Presently, the industry and supply chain management is focused on cities and satellites stations and they are yet to explore the huge market awaiting in the rural areas of India. About 72.2% of the population lives in some 638,000 villages and the rest 27.8% in about 5,480 towns and urban agglomerations. It means that approx. 12% of world population is living in rural area of India and this is yet to be tapped by effective and state if art supply chain management/experts.

3. An approach: effective supply chain

It is imperative that India need to develop the right supply chain for success in emerging markets of the future. There are three key areas which are required to be addressed.



Developing a triple A-rated supply chain

The biggest challenge for supply chain emerging markets is to ensure that their product is acceptable to the consumers and at the same time it is acceptable and available . In view of huge fragmentation nature of supply base and ability to purchase product of own choice, clients have unlimited choice from cheap to costly products. However, ultimately what will matter the appeal, affordability and availability (Geldard, 2011).

How should an effectively re-engineered channel perform?

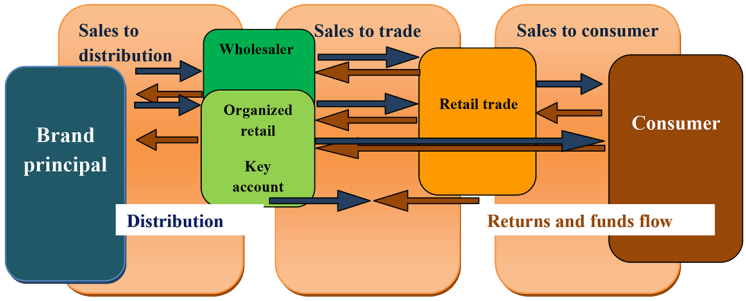
To achieve success, the approach to product portfolio will migrate, from 'blanket' to precision, through focus products and 'must stock' items supported by well executed promotions. There is no scope of complacency if supremacy is to be achieved in the market.

To achieve the mature market levels of supply chain visibility requires radical reappraisal of current system and approaches. Knowledge talent in the system must be captured, interpreted and leveraged as per the local conditions and target market.

To be effective, technology based on fast and transparent communication should be developed for analysing the sales activities and data for clear understanding of market aspects.

Future – proofing distribution model

This begins with selecting the channel options wisely, in order to minimize cost-to-serve and protect margins. It is imperative that supply chain in the emerging market should have last mile visibility. Consumers in the present scenario are in no mood to have uncertainty in delivery



Conclusions

India has a huge growth opportunities but at the same time it has its own challenges. Unlike in the developed economies, plug and play supply chain is unlikely to be successful in India. Planners need to understand the local imperatives and leverage them to their advantages. They also need to have strategy to balance the extent of localisation in order to succeed in these unpredictable and individual unique markets.

For the purpose of EMERGING MARKET strategy in India, we need to consider it being a heterogeneous nation. Each state has its own culture, rules and regulations, languages and preferences for products and services. There is a necessity to integrate the global operations with local supply chain relationship and thereby establish a combined mode of sustainable

logistics chain. Hence, spending enough time and resources into understanding the needs of your target markets is crucial to serving the Indian market successfully.

Long term business models which nurture the market for long-term growth, develop suppliers' capabilities through mutual incentives, focus on building strong relationships with key local partners and fulfil the firm's social responsibility, will be needed for a emerging market in India.

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DEVELOPMENT OF PUBLIC TRANSPORT IN THE CITY – A CHALLENGE FOR URBAN LOGISTICS IN TERMS OF SUSTAINABLE DEVELOPMENT

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Abstract

Economic progress results in a dynamic development of cities. The high tempo of urbanization is becoming one of the major challenges nowadays and calls for adequate planning solutions to the development of cities, and for new management systems which can form communities economically, socially and ecologically sustainable.

Urban logistics deals with the flow of materials, people and information within a city, and transport is one of its elements. It provides transport accessibility and organizes both freight and passenger transport. Considering the urban functions and the environmental impact of urban transport, it is important to organize it with the economic, social and environmental aspect of sustainable development in mind. The aim of this article is to point out to the problems of urban logistics connected with the organization of urban transport in terms of sustainable development, and to present a quantitative data analysis concerning Polish urban transport in 2012.

Key words: sustainable development, urban logistics, urban transport, sustainable transport.

Introduction

Transport influences the activities of all businesses as well as individual persons. The effectiveness of the system, therefore, depends on the efficiency of transport processes. Mobility of people is vital to the economic and social development of urban areas. Unfortunately, the advances of passenger transport can compromise the quality of life in those areas and have

detrimental effects on the environment. That is why it is important to devise such solutions ensuring transport availability which can support the existence of both present and future generations. In this context we talk about sustainable transport. Its premises can be realized through urban logistics. The general goal of logistics includes:

- economic goal: ensuring the development of cities through stimulating business activities in urban areas,
- social goal: ensuring the desired quality of life in urban areas,
- ecological goal: considering the ecological requirements in the realization of the economic and social goals.

In other words, the goal of logistics is to coordinate the flow of all kinds of goods between businesses and institutions so that the quality of life and economy increase at the lowest cost possible and with the smallest environmental impact. That is why urban logistics should organize urban transport whose effectiveness depends on the level of its integration. The integration of urban transport is understood as an organizational process supporting the close and effective cooperation of transport agents in order to improve the quality of their services (Dydkowski, 2009). The level of urban transport integration is determined by the availability of different means of transport. It is legitimate, therefore, to analyze the data characterizing the functioning of urban transport in the aspect of sustainable development and urban logistics.

1. Basic premises of the sustainable transport concept

Transport has become essential to the life of societies and the economy. The downside is that it is responsible for global climate change through the green-house gases emission. 95% of energy in transport is produced from liquid fuels, which means that without proper political and technological changes in transport systems, the level of air pollution emission will rise as they develop (Grant-Muller, Usher, 2014: 149). The negative effects of transport processes on people and ecosystems create the need for new organizational solutions utilizing the sustainable development principle. Paraphrasing the definition of sustainable development adopted by the Brundtland Commission, sustainable transport is defined as the system which:

1. "Allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations;
2. Is affordable, operates fairly and efficiently, offers a choice of transport mode, and supports a competitive economy, as well as balanced regional development;

3. Limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes, while minimizing the impact on the use of land and the generation of noise" (Hyard, 2013: 1376).

Most of research published in the subject literature of transport and sustainable transport, relates to the problem of the energy consumption and carbon dioxide emission (Gujba et al. 2013: 354). This only confirms the significance of the climate change issue which requires a global approach (Zawada, 2007: 78). The level of carbon dioxide emissions in passenger transport stems from seven factors: population, gross domestic product at constant prices, the number of passengers carried, the quantity and type of used fuel, income, willingness to travel, tourist activity, primary energy, carbon dioxide emission in different transport branches (Loo, Li, 2012: 467). The relationship between the overall level of carbon dioxide emitted by passenger transport and the mentioned factors can be expresses by a formula resulting from applying the multiplicative Logarithmic Mean Divisia Index (*LMDI*) decomposition technique (Loo, Li, 2012: 467):

$$G = \sum_{i,j} P \times \frac{E}{P} \times \frac{T}{E} \times \frac{T_i}{T} \times \frac{F_i}{T_i} \times \frac{F_{i,j}}{F_i} \times \frac{G_{i,j}}{F_{i,j}} = \sum_{i,j} P \times I \times TP \times TM_i \times ME_i \times FM_{i,j} \times EF_{i,j},$$

where:
i – the passenger transport mode,
j – the fuel type,
G – andamountofCO2 emission,
P – national population,
E – national GDP at constant price,
T – passenger turnover volume,
F – amount of fuel consumption,
I – income factor,
TP – travel propensity factor,
TM – travel activity mix factor,
ME – modal energy factor,
FM – fuel mix factor,
EF – emission factor.

The level of carbon dioxide is influenced by four groups of factors:

1. socio-economic – encompassing economic and demographic measures,
2. processes related – measuring the effects of carbon dioxide reduction activities,

3. fuel related - connected with the given type of fuel,
4. demand related – connected with the demand for passenger transport.

Controlling the mentioned factors by the means of legislature and different kinds of activities connected with passenger transport is reflected in lower levels of carbon dioxide emissions in this sector. The average level of carbon dioxide emitted by new cars per kilometer in the years 2007-2012 was decreasing by around 3,588% in the European Union and by 1,585% in Poland. The emission per kilometer in the years 2007 and 2008 was bigger in the European Union than in Poland which changed in 2009. Altogether, the average annual decrease of carbon dioxide emission per kilometer by new cars in the European Union in the analyzed period was two times bigger than in Poland. In 2012 Poland, ranked 7th, was among UE countries with the highest carbon dioxide emission per kilometer from passenger cars. The average level of carbon dioxide emission per kilometer from passenger cars was higher by 7,34% than the UE level. And compared to Denmark, where the carbon dioxide emission per kilometer was the lowest, the emission level in Poland was 21,28% higher. Carbon dioxide emission in passenger transport is still a problem in many countries and it calls for system solutions minimizing its impact on the environment. And urban logistics is where they can be found.

2. Urban transport as an element of urban logistics in the context of sustainable development

The level of sustainability of cities is an important element of their development. The implementation of sustainable development concept in cities is seen as a way to improve the state of the environment, and, consequently, the quality of life (Jim, 2013: 742). Sustainable development of cities is not clearly defined in the literature. It can be described as an economic, social and environmental organization of urban life, catering to the needs of present and future generations and preserving the environment and its ecosystems (Vojnovic, Darden, 2013: 90). The sustainability of a city can be understood as an effective use of resources to improve the quality of life with the consideration of limited environmental possibilities (Shen et al. 2012: 33).

It is a challenge for many cities to make their transport systems sustainable which is linked with the number of cars used by citizens (Rose 2012: 81). Because urban logistics deals with problems concerning the flow of goods, people and information within the city, its responsibility is to organize urban transport. Urban logistics brings technologies and tools for tackling the urban dilemma: increasing the access to city centres through

the development of transport and other integral functions on one hand, and decreasing traffic which compromises the quality of life on the other (Fijałkowski, 2009: 270).

The increasing number of cars seems to be the biggest challenge for cities. In order to reduce it, various activities are realized. They can be divided into hard and soft measures. Hard measures include: road tolls, congestion charges, higher fuel prices. Research shows that such measures do not bring desired effects and do not refrain people from using private cars (Friman et al.2013: 110). They are also frowned upon by the society and for these reasons the soft measures are favoured, which were presented in table 1.

Table 1. Different types of soft policy measures

Types of measures	Aim
Travel policy at workplace	Promotes car-pooling between employees
Travel policy at school	Choosing other alternatives for school runs
Personalized travel planning	Personalized travel information
Information and marketing	Increased knowledge via advertising campaigns and simplified ticket availability
Campaigns for alternative transport modes	Increasing understanding of problems with certain transport choices
Car clubs	Offering cars that are paid for upon actual use
Car cooperatives	Reducing the number of car trips through joint ownership
Tele-working	Reducing the number of trips by, e.g., offering Internet access
Tele-conferencing	Reducing the number of work trips via phone meetings
Shopping from home	Reducing the number of purchasing trips via home deliveries

Source: Friman et al. 2013: 110.

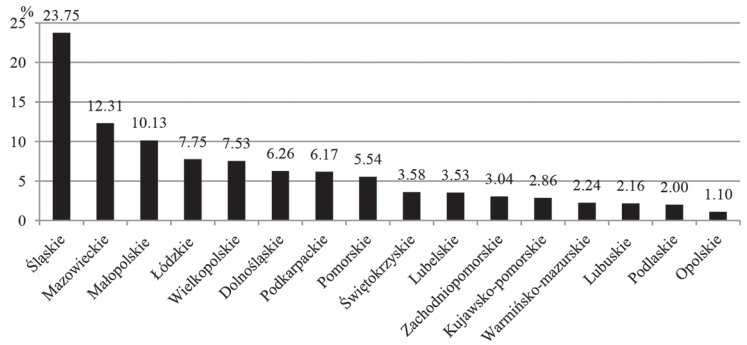
In the framework of urban logistics, the goal of the development of passenger transport infrastructure, including urban transport, is to: decrease congestion in cities, shorten journey times and reduce costs, increase the availability of transport, decrease the number of journeys, minimize the pollution emission.

3. The analysis of the structure, dynamics and use of the selected elements of urban transport in Poland

The goal of the analysis is to present the structure and dynamics of the selected elements of urban transport infrastructure in individual voivodeships in Poland. The analysis looks at the following variables: the length of transport routes and the inventory of transport vehicles. It also considers

values which are important measures of changes in the transport infrastructure connected especially with the use and exploitation of transport vehicles, vehicles capacity and the number of carried passengers, the workload of vehicles. The analysis compares two years: 2004 (base year) and the year 2012. Figure 1 presents indexes for the lengths of transport routes in Polish voivodeships in 2012.

Figure 1. Indexes for the lengths of transport routes in Polish voivodeships in 2012



The longest transport routes are found in śląskie voivodeship (Figure 3). They constitute 23,75% of total Polish transport routes length. Transport routes in mazowieckie and małopolskie voivodeships make respectively 12,31% and 10,13% of Polish transport routes. Voivodships with the shortest transport routes, which constitute not more than 5% of all routes in the country, are: świętokrzyskie, lubelskie, zachodnipomorskie, kujawsko-pomorskie, warmińsko-mazurskie, lubuskie, podlaskie and opolskie. It is clear that śląskie voivodship leads in terms of the transport routes length which is due to a conurbation there comprised of several cities, each with different functions. The conurbation thrives thanks to a well developed transport system connecting individual cities.

The analysis also concentrates on the condition, use and exploitation of urban transport vehicles, and its results were presented in tables 3 and 4.

Table 3. Measure the dynamics* of inventory, use and operating of urban buses stock in Poland and in voivodships in 2012 (%)

Voivodeships	Inventory number of stock as of 31 December		Share of vehicles in traffic in % of vehicles in the inventory		Total distance travelled by vehicles, thousand vehiclekilometres		Average distance travelled by 1 vehicle during one year (km)		Average distance travelled by 1 vehicle during one day (km)	
	Index 2004= 100%	Average rate of change	Index 2004= 100%	Average rate of change	Index 2004= 100%	Average rate of change	Index 2004= 100%	Average rate of change	Index 2004= 100%	Average rate of change

Polska	106,46	0,79	103,85	0,47	101,33	0,16	92,35	-0,99	92,20	-1,01
Dolnośląskie	90,36	-1,26	105,13	0,63	89,22	-1,42	93,02	-0,90	93,03	-0,90
Kujawsko-pomorskie	86,73	-1,76	98,77	-0,16	77,11	-3,20	91,74	-1,07	91,88	-1,05
Lubelskie	44,93	-9,52	98,67	-0,17	91,65	-1,08	78,45	-2,99	78,28	-3,01
Lubuskie	96,63	-0,43	101,20	0,15	87,07	-1,72	89,49	-1,38	89,55	-1,37
Łódzkie	96,64	-0,43	101,32	0,16	56,36	-6,92	57,67	-6,65	57,77	-6,63
Małopolskie	105,17	0,63	95,12	-0,62	95,90	-0,52	96,42	-0,46	96,30	-0,47
Mazowieckie	139,38	4,24	110,53	1,26	148,83	5,10	97,06	-0,37	97,16	-0,36
Opolskie	86,67	-1,77	96,10	-0,50	81,87	-2,47	98,24	-0,22	97,84	-0,27
Podkarpackie	89,25	-1,41	98,67	-0,17	75,99	-3,37	86,47	-1,80	86,67	-1,77
Podlaskie	84,49	-2,08	111,69	1,39	89,88	-1,32	94,45	-0,71	94,51	-0,70
Pomorskie	100,31	0,04	93,98	-0,77	89,70	-1,35	100,61	0,08	95,35	-0,59
Śląskie	112,25	1,45	105,06	0,62	121,81	2,50	104,00	0,49	103,96	0,49
Świętokrzyskie	106,39	0,78	89,02	-1,44	111,52	1,37	118,90	2,19	118,92	2,19
Warmińsko-mazurskie	97,13	-0,36	105,13	0,63	91,53	-1,10	90,06	-1,30	89,94	-1,32
Wielkopolskie	89,73	-1,34	9,57	-25,42	84,03	-2,15	86,75	-1,76	86,67	-1,77
Zachodnio-pomorskie	95,40	-0,59	17,72	-19,45	95,97	-0,51	97,33	-0,34	97,62	-0,30

* The average rate of change was calculated for period 2004-2012
Source: own calculation based on Transport… (2004 and 2012)

In most cities the inventory of buses was smaller in the year 2012 compared to 2004. The opposite was seen in just a few voivodeships: mazowieckie, śląskie, świętokrzyskie, małopolskie, pomorskie. The biggest increase of the number of buses (39,38% in comparison to the base year) took place in mazowieckie voivodeship. The analysis of the dynamics for the buses actually in use to buses in the inventory showed a decrease of the variable in the year 2012 in comparison to the base year in half of the voivodehips. The biggest decrease was observed in świętokrzyskie voivodeship where the use of bus vehicles dropped by 10,98%. The mileage total of buses in 2012 went up only in some voivodeships (mazowieckie, śląskie, pomorskie). The average mileage of a bus per day was higher in świętokrzyskie, ślaskie and pomorskie voivodeships, whereas the average mileage of a bus per year increased in świętokrzyskie and śląskie voivodeships. In Poland, in comparison to the base year, the following values went up: the inventory of buses, the number of buses in service to the number of buses in the inventory, and the total mileage of buses. However the mileage per bus per day and per

year both went down. The tendencies of the variables are confirmed by the average pace of change.

Table 4. Measure the dynamics* of inventory, use and operating of urban trams stock in Poland and in voivodships in 2012 (%)

Viovode-ships	Inventory number of stock as of 31 December		Share of vehicles in traffic in % of vehicles in the inventory		Total distance travelled by vehicles, thousand vehiclekilometres		Average distance travelled by 1 vehicle during one year (km)		Average distance travelled by 1 vehicle during one day (km)	
	Index 2004= 100%	Average rate of change	Index 2004= 100%	Average rate of change	Index 2004= 100%	Average rate of change	Index 2004= 100%	Average rate of change	Index 2004= 100%	Average rate of change
Polska	93,08	-0,89	98,67	-0,17	90,73	-1,21	97,74	-0,28	97,94	-0,26
Dolnoślą-skie	93,30	-0,86	102,53	0,31	95,72	-0,54	100,01	0,00	100,00	0,00
Kujawsko -pomorskie	103,57	0,44	100,00	0,00	93,43	-0,85	89,73	-1,35	89,69	-1,35
Lubelskie	90,14	-1,29	127,27	3,06	98,82	-0,15	43,81	-9,80	85,71	-1,91
Lubuskie	83,33	-2,25	65,38	-5,17	64,54	-5,33	118,33	2,13	118,32	2,13
Łódzkie	95,50	-0,57	93,90	-0,78	86,33	-1,82	96,40	-0,46	96,35	-0,46
Małopolskie	100,48	0,06	93,75	-0,80	96,39	-0,46	101,91	0,24	102,07	0,26
Mazowiec-kie	88,71	-1,49	107,89	0,95	86,13	-1,85	89,70	-1,35	89,80	-1,34
Opolskie	-	-	-	-	-	-	-	-	-	-
Podkarpac-kie	-	-	-	-	-	-	-	-	-	-
Podlaskie	-	-	-	-	-	-	-	-	-	-
Pomorskie	68,69	-4,59	122,78	2,60	115,55	1,82	137,53	4,06	137,31	4,04
Śląskie	90,51	-1,24	100,00	0,00	91,47	-1,11	100,88	0,11	100,93	0,12
Święto-krzyskie	-	-	-	-	-	-	-	-	-	-
Warmińsko -mazurskie	86,84	-1,75	80,00	-2,75	70,82	-4,22	100,33	0,04	100,00	0,00
Wielkopol-skie	99,69	-0,04	87,01	-1,72	77,67	-3,11	88,87	-1,46	89,00	-1,45
Zachodnio -pomorskie	103,35	0,41	98,57	-0,18	99,19	-0,10	98,52	-0,19	98,84	-0,15

*The average rate of change was calculated for period 2004-2012
Source: own calculation based on Transport… (2004 and 2012)

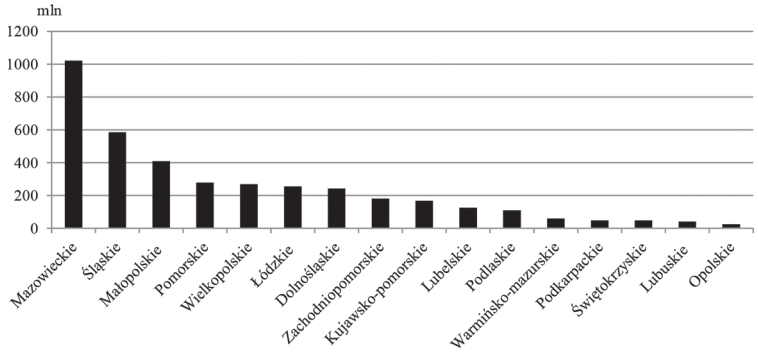
The following changes are observed in the year 2012 in comparison to 2004 in terms of the condition, use and exploitation of trams:

– decrease of the level of all variables for Poland

- slight increase of the number of trams in the following voivodeships: kujawsko-pomorskie, zachodniopomorskie and małopolskie,
- increased use of tram vehicles in the following voivodeships: lubelskie (27,27%), pomorskie (22,78%), mazowieckie (7,89%), dolnośląskie (2,53%), and no change in this respect in the voivodships: kujawsko-pomorskie and śląskie,
- increase of the total mileage of vehicles in pomorskie voivodeship (by 15,55%),
- substantial increase of the average mileage of a vehicle per one day and per one year in pomorskie voivodeship, by respectively 37,53% and 37,31%, and in lubuskie voivodship by respectively 18,33% and 18,32%,
- slight increase of the average mileage of a vehicle per one day and per one year in mołopolskie, śląskie and warmińsko-mazurskie voivodeships.

The results of the vehicles capacity and the carriage of passengers analysis are shown in figure 2 and in tables 5 and 6.

Figure 2. Transport of passengers of urban transport in Polish voivodeships in 2012



The biggest numbers of passengers are carried by urban transport in mazowieckie, śląskie and małopolskie voivodeships. And the number of passengers carried in mazowieckie voivodship in 2012 was higher than the number in śląskie voivodeship by 42,66%, and higher than in małopolskie voivodeship by 60%. The smallest numbers of passengers in 2012 were carried in lubuskie and opolskie voivodeships which are also characterized by the poorest condition of urban transport systems in comparison to other voivodeships in Poland.

Table 5. Dynamics* of stock capacity and transport of passengers by urban transport in 2012 (%)

Viovodeships	Seats in vehicles (thousand)**		Seats in buses (thousand)**		Seats in trams (thousand)**		Transport of passengers (million)**	
	Index 2004 =100%	Average rate of change	Index 2004= 100%	Average rate of change	Index 2004= 100%	Average rate of change	Index 2004= 100%	Average rate of change
Polska	103,29	0,00	103,69	0,00	102,67	0,00	93,19	-0,01
Dolnośląskie	91,89	-0,01	89,32	-0,01	96,25	0,00	79,08	-0,03
Kujawsko-pomorskie	91,86	-0,01	86,97	-0,02	104,07	0,00	75,88	-0,03
Lubelskie	116,41	0,02	122,02	0,03	-	-	128,67	0,03
Lubuskie	84,96	-0,02	85,92	-0,02	81,67	-0,02	73,75	-0,04
Łódzkie	90,95	-0,01	89,48	-0,01	93,31	-0,01	118,79	0,02
Małopolskie	102,95	0,00	96,47	0,00	113,98	0,02	79,61	-0,03
Mazowieckie	115,85	0,02	121,94	0,03	100,64	0,00	115,39	0,02
Opolskie	85,00	-0,02	85,00	-0,02	-	-	82,26	-0,02
Podkarpackie	81,91	-0,02	81,91	-0,02	-	-	61,79	-0,06
Podlaskie	86,68	-0,02	86,68	-0,02	-	-	84,05	-0,02
Pomorskie	99,25	0,00	104,68	0,01	85,87	-0,02	86,95	-0,02
Śląskie	112,32	0,01	117,77	0,02	93,83	-0,01	88,19	-0,02
Świętokrzyskie	99,42	0,00	99,42	0,00	-	-	87,09	-0,02
Warmińsko-mazurskie	97,82	0,00	99,04	0,00	90,74	-0,01	79,33	-0,03
Wielkopolskie	108,97	0,01	93,08	-0,01	137,55	0,04	91,64	-0,01
Zachodniopomorskie	95,83	-0,01	94,36	-0,01	98,59	0,00	87,02	-0,02

* The average rate of change was calculated for period 2004-2012

** as of 31 December

Source: own calculation based on Transport… (2004 and 2012)

Unfortunately, the dynamics of the transport vehicles capacity and the carriage of passengers in the years 2004-2012 shows a downward trend. Only some voivodeships saw an increase:

- lubuskie – increase of the total number of seats in vehicles and in buses, increase in the carriage of passengers,
- łodzkie – increase in the carriage of passengers,
- małopolskie - increase of the total number of seats in vehicles and trams, increase in the carriage of passengers,
- mazowieckie – increase in the total number of seats in vehicles, trams and buses, increase in the carriage of passengers,
- śląskie – increase of the total number of seats in vehicles and in buses,

– wielkopolskie – increase of the total number of seats in vehicles and in trams.

Table 6. Dynamics of network, rolling stock and transport of passengers by metro in 2012 (%)

Specification	Index 2004 =100%	Average rate of change*
Lines (kilometers)	146,50	4,89
Stock – cars	153,85	5,53
Seats in cars	210,76	9,77
Vehicle- kilometres (thousand)	185,09	8,00
Transport of passengers during a year (million)	163,78	6,36
Transport of passengers during a day (million)	163,64	6,35

* The average rate of change was calculated for period 2004-2012
Source: own calculation based on Transport… (2012)

Although Warsaw is the only city in Poland with an underground line, this means of transport has been developing since 2004 in terms of: the length of the line, vehicles inventory, seats in carriages, workload of vehicles, number of passengers. The biggest relative increase and the fastest average tempo of change in 2012 compared to 2004 were connected with the number of seats available in carriages - with respect to the base year, it increased by as much as 110,76%, and grew by approximately 9,77% per year during the period between 2004 and 2012. A significant increase was also observed in the workload of vehicles expressed through kilometers per carriage and its value was 85,09% higher in 2012 compared to the base year, with an average annual increase of 8% during the analyzed period. There was also an increase in a number of other criteria in 2012 in comparison to 2004:

– the length of the underground line increased by 46.50% (annual average increase of 4.89%),
– the number of carriages increased by 53,85% (annual average increase of 5,53%),
– the number of passengers carried per year and per day increased respectively by 63,78% and 63,64% (annual average tempo of change on the level of 6,36% and 6,35% respectively).

Conclusions

Urbanization is connected with the development of urban passenger transport. Urban transport processes realized in cities have negative results on the environment: air and water pollution, noise, limiting green areas.

This translates into the deterioration of citizens' leisure and work, living conditions, road safety and the global climate. That is why it is necessary to implement urban transport management systems which live up to social, ecological and economic needs. Urban logistics is a tool for the implementation of solutions compatible with the premises of sustainable development. It organizes urban transport in such a way that the quality of passenger service and effectiveness are assured with the simultaneous minimization of the environmental impact. A good method to realize this goal seems to be the reduction of the number of cars by promoting public means of transport. Unfortunately, research concerning the tempo of change of the selected elements of infrastructure and the use of urban transport in the period of 2004-2012 shows little development in this respects. Polish vovivodeships where both the transport infrastructure and the way it is managed are on the best level are: śląskie, mazowieckie and małopolskie. However, in the analyzed period we cannot see any major changes in these voivodeships as far as the development of transport is concerned. The increase in the infrastructure is mainly connected with the bus inventory, but it happened in few voivodeships and was not big. The most visible change took place in the underground transport, and was connected with the length of the route, the vehicles inventory and the number of passengers. However, this means of transport is only available in Warsaw. Urban transport, apart from providing mobility for people, contributes to the economic development of regions, and, consequently, the whole country. Moreover, using urban transport has a positive effect on the local lifestyle through the reduction of pollution, noise, congestion, and improved safety. That is why it so important to continue the search for effective solutions attracting city dwellers to urban transport.

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CHANGES IN THE SCHEDULE OF THE KOLEJE ŚLĄSKIE SP. Z O.O. AND THEIR IMPACT ON THE OPERATIONS OF THE CARRIER AND SUSTAINABLE TRANSPORT IN THE SILESIA PROVINCE

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Abstract

The aim of this article is to assess the quality railway transport (rail) in the province of Silesia (over a longer period of time) for the mobility of people, as an important element of carrier operations and the implementation of sustainable transport in the Silesia province.

The article presents an analysis of the amount of rail connections offered by one of the railway companies, whose main task is the implementation of local rail services in the Silesian agglomeration. A comparison of the current timetable for the selected route the schedule forced at the earlier period. The results allowed us to assess the current situation in the area of local rail transport as an important element of the management and implementation of public transport.

Keywords: city logistics, sustainable transport, rail transport.

Introduction

Silesian Province is the most urbanized and most densely populated area of Polish. Structure Location of cities and their mutual arrangement and geographical location of the region make the residents very often systematically move across the conurbation.

To the movement of population took place in an efficient, effective and efficient in terms of time and comfort way is necessary to ensure adequate well-developed infrastructure network, and network connections, both road

and rail. A characteristic feature of the Silesian province is the fact that these services are performed by several transport companies.

1. Communication system of Silesia province

Silesian Province is located in southern Poland in the area of the Silesian Lowland, Upland Silesian-Krakow, Oswiecim Basin, the Carpathian Plateau, and the Western Beskid. Is inhabited by 4.62 million people, representing almost 12% of the Polish (Wikipedia 2014).

A large number of residents and their congestion makes it necessary to organize an efficient and sustainable transport system. Operation urban transport system has a direct impact on the attractiveness and the economic potential of the region. Shorter commuting time and the opportunity to use this time to implement certain professional tasks (eg work on the computer, sending e-mail using WiFi network available in public transport) can be a very important factor incentives to replace individual transport public transport.

The communication system of the Silesian agglomeration consists of the following types of transport: bus, railway, tram, trolleybus (trolleybus transport is implemented in individual cities (e.g. Tychy) and transport tram is implemented in some urban cities and between them (e.g. Sosnowiec - Katowice, Katowice - Chorzow, Sosnowiec - Będzin, etc.).

Transportation from one end of the province to the other by one mode of transport is possible but only through individual or collective transport bus or rail.

Rail transport, taking into account the number of vehicles on the roads the region and the associated inconvenience and longer travel time of buses is a very attractive solution to travel long distance. An additional advantage of rail transport is also its impact on the environment (rail, in itself - not taking into consideration impurities formed during the production of electricity in power plants - is very eco-friendly), which is minimal in terms of emissions.

Such “ecological” approach is also consistent with the broad guidelines of the European Commission contained in the so-called. “White Paper”, which include requires reducing the use of means of transport with conventional combustion-powered for others (eg road transport vehicles with electric drive, means of rail transport with electric drive, etc.).

2. Rail transport collective agreement in the Silesia province

The railway network in the Silesia province is very well developed, it has the highest rate in the country's rail network density, which is 15.5 [km/km^2], with the national average of 6.5 [km/km^2]. It is also much higher than the European average of 6.2 [km/km2] (for EU countries of the so-called. "Old fifteen" ratio was 4.5 [km/km^2] - join Polish to the UE structures resulted in an increase of this indicator).

In Silesia passenger rail are realized by some transport companies, the largest of which include:

- Koleje Śląskie Sp. z o. o.
- Przewozy Regionalne Sp. z o. o.
- PKP Intercity S.A.

However, according to the adopted policy of self-governing provinces of Silesia, rail transport within the region should be implemented by the company Koleje Śląskie Sp. z o. o.

3. Koleje Śląskie Sp. z o. o. as a provincial carrier rail

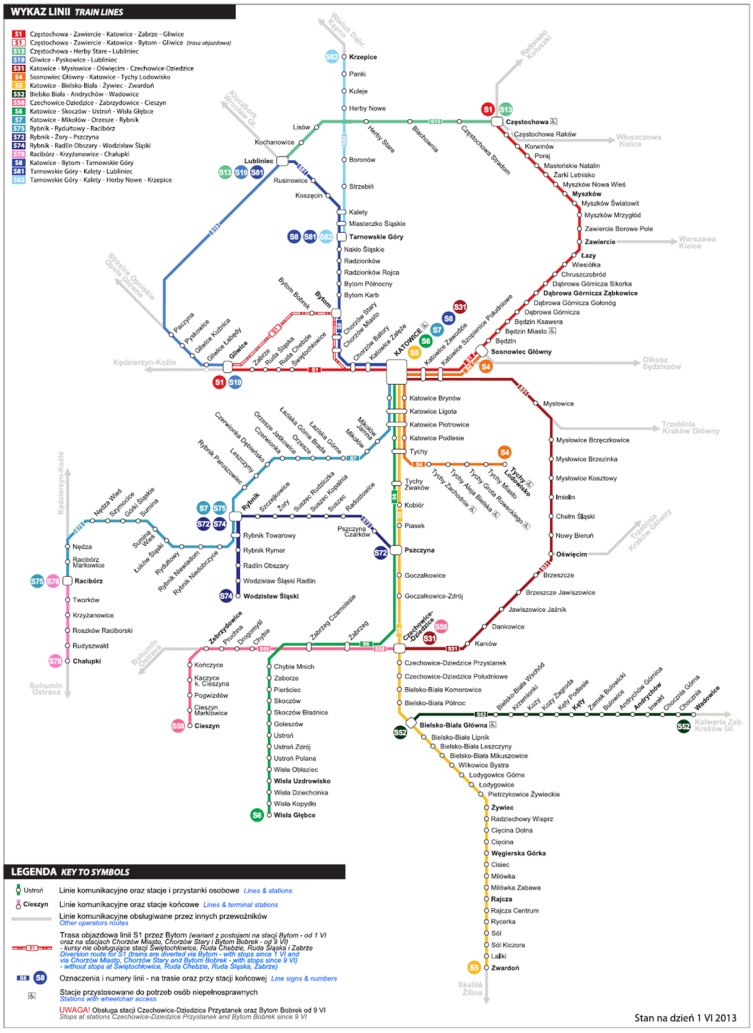
Railways Silesia Sp. z oo was established 8 April 2010, and the implementation of rail services within the company, was launched on 1 October 2010 following the provision of the Marshal's Office of the Silesian main business of the company should be primarily regional railway transport of passengers and goods and provision of services relating to the carriage. According to data provided by the company to the main objectives are:

- Providing mass transit railway in the province;
- Creating a positive image of the local suburban railway passengers and external stakeholders;
- Development of quantitative and qualitative owned rolling stock;
- Creation of a coherent and stable team of company employees (BIP 2014).

4. The railway network in Silesia

The railway network in the province of Silesia used to transport passengers by railways company Silesia was divided into 17 lines. Silesian Railway line diagram is shown in Figure 1.

Figure 1. Diagram of the company's lines of communication Koleje Śląskie Sp. z o.o.



Source: KSL 2013c.

Line which are implemented major population displacement is the line of Częstochowa - Zawiercie - Katowice - Zabrze - Gliwice, which was marked with the symbol S1.

5. Analysis of changes in timetable on the line S1

Line S1 is used to move passengers between the main centers of the Silesian province such as Częstochowa, Sosnowiec, Katowice and Gliwice.

Average time travel on the line is 2 hours 9 min, at 115 [km] distance to overcome gives average speed on the route equal to 53.5 [km/h]. Importantly, the resulting time and speed is very competitive to individual transport vehicle, whose speed is an average of 67 [km/h]. This speed transport the individual is obtainable in the absence of congestion, which, unfortunately, due to the number of vehicles moving on the roads every day are very often generating additional, unnecessary transport costs.

This situation means that rail transport is very attractive in relation to transport of individual or collective bus. This is especially true when moving in the center of the agglomeration, between the towns of Mining oak wood, Sosnowiec, Katowice. Distance between Sosnowiec and Katowice is about 10 [km] and rail transport, the current state of infrastructure overcomes it in about 14 [min], and transport individual or collective requires dedication approximately 20 to 30 minutes to travel the same road. Another advantage of using rail instead of the individual is the difficulty in finding an unpaid parking space in city centers, which also increases the total cost of private transport on the relationship.

Therefore, the speed of the train and travel time for the analyzed route is very attractive and competitive compared to private transport.

This situation causes that factor very heavily on the use of rail transport is its availability. Availability is very closely linked with the railway timetable. Schedule analyzed the carrier, which are Koleje Śląskie must therefore have a direct impact on the use of this means of transport by agglomeration, and this translates directly into obtained by the company profit and loss.

Taking into account the above factors and conditions in article compares the changes that have occurred in the number of calls and their distribution analyzed hourly on route S1 in the long term:

- from 9.12.2012 to 9.02.2013,
- from 2.08.2013 to 19.10.13,
- from 20.10.13 to 14.12.13,
- from 15.12.13 to 8.03.14,
- from 09.03.14 to 26.04.14,
- from 27.04.14 to 14.06.14,
- from 16.06.14 to 31.08.14 (timetable effective when given back the manuscript).

Themes presented in the article and the analysis is a continuation of the analysis presented in previous publications by the author (Kowalska, Sobczak, Sierpiński 2013; Sobczak 2014). Based on the data contained in (KSL 2012a, 2012b, 2013a, 2013b, 2014a,2014b,2014c) developed statement of the number of connections between stations for the following time periods: 3:31 ÷ 6:30; 6:31 ÷ 9:30; 9:31 ÷ 12:30; 12:30 ÷ 14:30; 14:31 ÷ 17:30 17:31 ÷ 20:30;

20:31 ÷ 23:30; 23:31 ÷ 3:30. Among the analyzed intervals are contained two peaks of communication occurring in the Silesian agglomeration, which are mainly due to the implementation of transport agglomeration associated with moving to and from work. They are the following timeframes: 6:31 ÷ 9:30 (the morning peak) and 14:31 ÷ 17:30 (the afternoon peak).

Table 1 summarizes the interfaces between the various stations for scheduled during the 09.02.2013 ÷ 9.12.2012.

Table 1. Summary of connections between stations for the timetable period 12/09/2012 ÷ 09/02/2013 - relation Częstochowa - Gliwice

Station	Interval								Sum
	3:30 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	
Częstochowa-Zawiercie	7	7	5	3	5	4	2	0	33
Częstochowa-Sosnowiec Gł.	7	6	5	3	5	4	2	0	32
Częstochowa-Katowice	7	7	5	3	5	4	2	0	33
Częstochowa-Zabrze	4	4	3	2	3	3	2	0	21
Częstochowa-Gliwice	5	4	3	2	3	3	2	0	22
Zawiercie - Sosnowiec Gł.	8	11	4	4	9	4	2	0	42
Zawiercie - Katowice	8	11	4	4	9	4	2	0	42
Zawiercie - Zabrze	6	8	3	3	6	3	2	0	31
Zawiercie - Gliwice	6	8	3	3	6	3	2	0	31
Sosnowiec Gł. - Katowice	5	12	7	5	9	5	3	0	46
Sosnowiec Gł. - Zabrze	4	8	6	4	6	4	3	0	35
Sosnowiec Gł. - Gliwice	4	8	6	4	6	4	3	0	35
Katowice - Zabrze	4	9	6	4	7	6	7	0	43
Katowice - Gliwice	4	9	6	4	7	6	7	0	43
Zabrze - Gliwice	3	9	6	4	7	6	7	1	43

Source: Own study based on KSL 2012a.

Table 2 shows the analogous statement of connections between stations for the timetable period 08/02/2013 ÷ 10/19/2013 - relation Częstochowa - Gliwice.

Table 2. Summary of connections between stations for the timetable period 08/02/2013 ÷ 10/19/2013 – relation Częstochowa - Gliwice

Station	Interval								Sum
	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	
Częstochowa-Zawiercie	9	5	3	1	6	4	5	0	33

Częstochowa-Sosnowiec Gł.	8	4	3	1	5	4	2	0	27
Częstochowa-Katowice	10	5	3	1	5	4	2	0	30
Częstochowa-Zabrze	3	3	3	1	3	3	2	0	18
Częstochowa-Gliwice	7	3	3	1	3	3	2	0	22
Zawiercie - Sosnowiec Gł.	4	6	2	1	5	3	2	0	23
Zawiercie - Katowice	6	7	2	2	6	3	2	0	28
Zawiercie - Zabrze	2	4	2	1	4	3	2	0	18
Zawiercie - Gliwice	4	6	2	1	4	3	2	0	22
Sosnowiec Gł. - Katowice	3	8	2	2	4	4	3	0	26
Sosnowiec Gł. - Zabrze	2	3	2	2	4	3	3	0	19
Sosnowiec Gł. - Gliwice	2	7	2	2	3	3	3	0	22
Katowice - Zabrze	2	3	2	2	2	4	2	1	18
Katowice - Gliwice	2	9	2	2	3	6	4	1	29
Zabrze - Gliwice	1	3	3	1	3	3	3	1	18

Source: Own study based on KSL 2012b.

Table 3 shows the analogous statement of connections between stations for scheduled during ÷ 20.10.2013 14.12.2013 – relation Częstochowa – Gliwice.

Table 3. Summary of connections between stations for scheduled during 20/10/2013 ÷ 12/14/2013 - relation Częstochowa - Gliwice

	Interval								
Station	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	Sum
Częstochowa-Zawiercie	8	4	2	2	7	3	3	0	29
Częstochowa-Sosnowiec Gł.	7	4	2	2	6	3	2	0	26
Częstochowa-Katowice	7	4	2	2	6	3	2	0	26
Częstochowa-Zabrze	3	3	2	2	2	3	2	0	17
Częstochowa-Gliwice	6	3	2	2	3	3	2	0	21
Zawiercie - Sosnowiec Gł.	5	6	2	2	6	3	2	0	26
Zawiercie - Katowice	5	6	2	2	6	3	2	0	26
Zawiercie - Zabrze	3	3	2	2	2	3	2	0	17
Zawiercie - Gliwice	4	5	2	2	3	3	2	0	21
Sosnowiec Gł. - Katowice	3	8	2	2	6	3	3	0	27
Sosnowiec Gł. - Zabrze	2	2	2	2	3	2	3	0	16
Sosnowiec Gł. - Gliwice	2	6	2	2	3	3	3	0	21
Katowice - Zabrze	2	3	2	2	3	2	3	0	17
Katowice - Gliwice	2	8	2	2	5	5	5	0	29
Zabrze - Gliwice	1	3	3	1	3	2	3	1	17

Source: Own study based on KSL 2013a.

Table 4 shows the analogous statement of connections between stations for scheduled during 15/12/2013 ÷ 08/03/2014 - relation Częstochowa - Gliwice.

Table 4. Summary of connections between stations for scheduled during 15/12/2013 ÷ 03/08/2014 - relation Częstochowa – Gliwice.

	Interval								
Station	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	Sum
Częstochowa-Zawiercie	4	4	2	3	3	3	4	0	23
Częstochowa-Sosnowiec Gł.	4	4	2	3	3	3	2	0	21
Częstochowa-Katowice	4	4	2	3	3	3	2	0	21
Częstochowa-Zabrze	3	4	2	2	3	3	2	0	19
Częstochowa-Gliwice	3	4	2	2	3	3	2	0	19
Zawiercie - Sosnowiec Gł.	5	4	3	3	4	4	2	0	25
Zawiercie - Katowice	5	4	3	3	4	4	2	0	25
Zawiercie - Zabrze	3	3	3	2	3	3	2	0	19
Zawiercie - Gliwice	3	4	3	2	3	4	2	0	21
Sosnowiec Gł. - Katowice	4	4	3	2	5	4	3	0	25
Sosnowiec Gł. - Zabrze	2	3	3	2	3	3	3	0	19
Sosnowiec Gł. - Gliwice	2	4	3	2	3	4	3	0	21
Katowice - Zabrze	3	6	4	4	4	6	6	2	35
Katowice - Gliwice	3	7	4	4	4	7	6	2	37
Zabrze - Gliwice	2	6	4	4	4	6	6	3	35

Source: Own study based on KSL 2013b.

Table 5 presents the next set of connections between stations, this time for the scheduled period 03/09/2014 ÷ 04/26/2014 - relation Częstochowa - Gliwice.

Table 5. Summary of connections between stations for the timetable period 03/09/2014 ÷ 04/26/2014 - relation Częstochowa - Gliwice

	Interval								
Station	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	Sum
Częstochowa-Zawiercie	4	5	3	2	3	3	6	0	26
Częstochowa-Sosnowiec Gł.	4	5	3	3	3	3	2	0	23
Częstochowa-Katowice	4	5	2	3	3	3	2	0	22
Częstochowa-Zabrze	3	4	2	2	3	3	2	0	19
Częstochowa-Gliwice	3	4	2	2	3	3	2	0	19

Zawiercie - Sosnowiec Gł.	5	5	2	3	3	4	2	0	24
Zawiercie - Katowice	5	5	2	4	3	4	2	0	25
Zawiercie - Zabrze	3	4	2	2	3	3	2	0	19
Zawiercie - Gliwice	3	4	2	2	3	3	2	0	19
Sosnowiec Gł. - Katowice	4	6	3	3	4	4	3	0	27
Sosnowiec Gł. - Zabrze	2	4	3	2	3	3	3	0	20
Sosnowiec Gł. - Gliwice	2	3	3	2	3	4	3	0	20
Katowice - Zabrze	3	7	6	3	3	6	6	2	36
Katowice - Gliwice	3	7	6	3	3	6	6	2	36
Zabrze - Gliwice	2	7	6	3	4	5	6	3	36

Source: Own study based on KSL 2014a.

Table 6 shows the next set of connections between stations, this time for the scheduled period 04/27/2014 ÷ 06/14/2014 - relation Częstochowa - Gliwice.

Table 6. Summary of connections between stations for the timetable period 04/27/2014 ÷ 14/06/2014 - relation Częstochowa - Gliwice

	Interval								
Station	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	Sum
Częstochowa-Zawiercie	4	4	2	3	3	3	5	0	24
Częstochowa-Sosnowiec Gł.	4	4	2	3	3	3	2	0	21
Częstochowa-Katowice	4	4	2	3	3	3	2	0	21
Częstochowa-Zabrze	3	3	2	2	3	3	2	0	18
Częstochowa-Gliwice	3	3	2	2	3	3	2	0	18
Zawiercie - Sosnowiec Gł.	5	4	3	2	4	4	2	0	24
Zawiercie - Katowice	5	4	3	2	4	4	2	0	24
Zawiercie - Zabrze	3	3	3	1	4	3	2	0	19
Zawiercie - Gliwice	3	3	3	1	4	4	2	0	20
Sosnowiec Gł. - Katowice	4	5	3	3	5	4	3	0	27
Sosnowiec Gł. - Zabrze	2	3	3	2	3	3	3	0	19
Sosnowiec Gł. - Gliwice	2	3	3	2	3	4	3	0	20
Katowice - Zabrze	3	5	5	3	4	7	6	2	35
Katowice - Gliwice	3	6	5	4	4	8	6	2	38
Zabrze - Gliwice	2	5	5	3	4	7	6	3	35

Source: Own study based on KSL 2014b.

However, in Table 7 summarizes the connections between the individual stations, this time for the last of the analyzed timetables in force during the period of 15/06/2014 ÷ 31/08/2014 - relation Częstochowa - Gliwice.

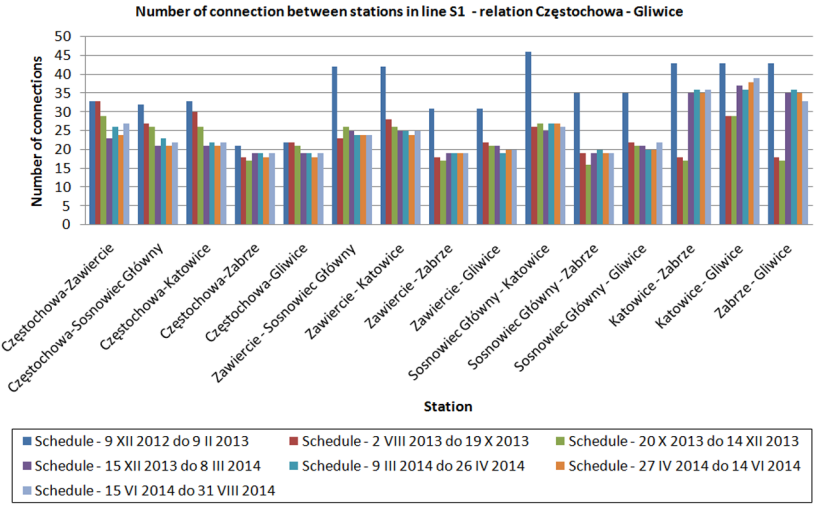
Table 7. Summary of connections between stations for the timetable period 06/15/2014 ÷ 31/08/2014 - relation Częstochowa - Gliwice

Station	Interval								Sum
	3:31 ÷ 6:30	6:31 ÷ 9:30	9:31 ÷ 12:30	12:31 ÷ 14:30	14:31 ÷ 17:30	17:31 ÷ 20:30	20:31 ÷ 23:30	23:31 ÷ 3:30	
Częstochowa-Zawiercie	4	4	3	3	3	3	6	1	27
Częstochowa-Sosnowiec Gł.	4	4	3	3	3	3	2	0	22
Częstochowa-Katowice	4	4	3	3	3	3	2	0	22
Częstochowa-Zabrze	3	3	3	2	3	3	2	0	19
Częstochowa-Gliwice	3	3	3	2	3	3	2	0	19
Zawiercie - Sosnowiec Gł.	5	4	3	3	3	4	2	0	24
Zawiercie - Katowice	5	4	3	4	3	4	2	0	25
Zawiercie - Zabrze	3	3	3	2	3	3	2	0	19
Zawiercie - Gliwice	3	3	3	2	3	4	2	0	20
Sosnowiec Gł. - Katowice	3	6	3	2	5	4	3	0	26
Sosnowiec Gł. - Zabrze	2	3	3	2	3	3	3	0	19
Sosnowiec Gł. - Gliwice	2	3	3	3	3	5	3	0	22
Katowice - Zabrze	3	4	5	4	6	4	8	2	36
Katowice - Gliwice	3	4	5	4	6	6	9	2	39
Zabrze - Gliwice	2	4	5	4	4	4	7	3	33

Source: Own study based on KSL 2014c.

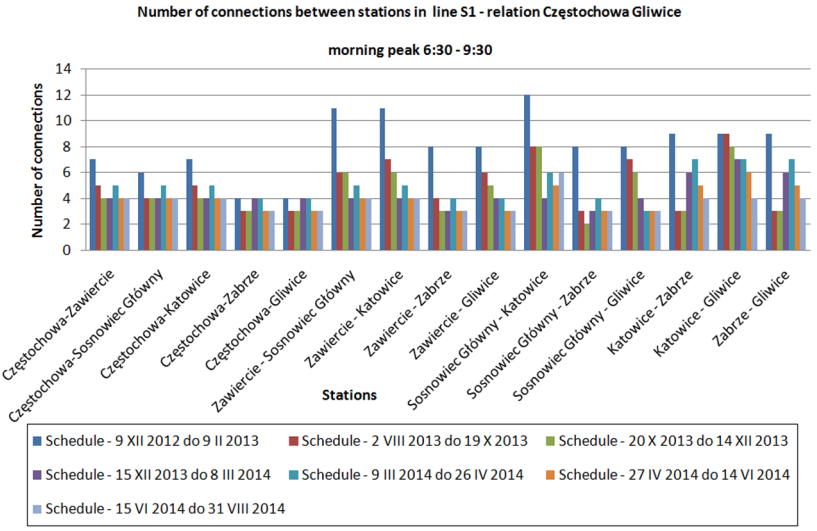
Summary of the number of connections in order to better observe changes in the number of available connections are also shown in graphical form. Summary of the total number of connections is shown in Figure 2, while the number of connections for morning peak is shown in Figure 3 and the afternoon peak in Figure 4.

Figure 2. Comparison of the total number of connections between stations on the line S1 Częstochowa - Gliwice for the analyzed timetables



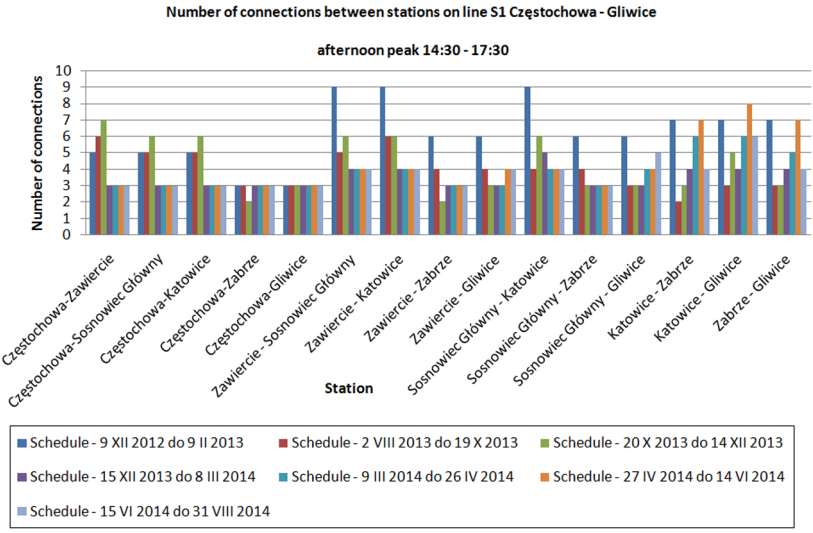
Source: Own study based on tables 1 ÷ 7.

Figure 3. Comparison of the total number of connections in the morning peak between stations on the line S1 Częstochowa - Gliwice for the analyzed timetables



Source: Own study based on tables 1 ÷ 7.

Figure 4. Comparison of the total number of connections in the afternoon peak between the stations on the line S1 Częstochowa - Gliwice for the analyzed timetables



Source: Own study based on tables 1 ÷ 7.

Based on the data in the tables 1 through 7 and Figures 2 to 4 it is seen that, unfortunately, in the period of over 1.5 years followed mainly fall in the number of railway connections implemented by Koleje Śląskie Sp. z o.o. between the cities of the Silesian agglomeration.

Conclusions

One of the key activities of a transport company that provides its services in such an area which is the Silesian agglomeration should be measures aimed at broadening the services offered, particularly on major routes pass. One such line is the line S1. The company should increase the number of available connections that they were attractive to others - competing in this case - the modes of transport. As shown in the article Koleje Śląskie company unfortunately does not implement such a policy operations. Still visible is observed in the earlier period, a very small number of connections and the number of cities is seen continuous progressive reduction of the number.

This allows to conclude that the Railways Silesia Sp. with o.o. still does not pursue actions, which it had hoped for. It also has a direct impact on projects, or rather the lack of implementation of the policy of sustainable transport in the agglomeration through the availability of passengers to a comprehensive range of transport and a wide number of connections.

The total number of connections in relation to the number of calls within a period of 9 February 2013 remains at a very low level (372 in relation to the connection 532 in February 2013). At the morning and afternoon peak is still observed a very small number of connections. For example, at the morning peak the number of connections between Sosnowiec and Katowice increased to 5, which is not sufficient to encourage more passengers to use this mode of transport instead of eg bus or individual.

In order to enhance sustainable mobility in the Silesian agglomeration and improve the effectiveness of the company's business Koleje Śląskie Sp. z o.o. it is necessary to increase the number of available connections and undertake long-term, systemic and more decisive action related to popularize rail transport as a mode of transport used not only as a means for moving within a larger distance, but also a very good means of transport between the local and in Urban.

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PUBLIC LOGISTICS IN MANAGEMENT OF MEDICAL ENTITIES (HOSPITALS)

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Abstract

The problem of public/social logistics application opportunities has been discussed in this paper. The public/social logistics is understood as the application of public objectives by the external entities within medical entities. There has been undertaken an attempt of showing that the greatest potential of costs reduction and processes diminishing in a hospital occurs in the logistics sphere. It has been indicated that the development of public logistics resulting, first of all, from the budget constraints is a kind of a panacea for the processes diminishing and the medical services effectiveness increase.

Key words: logistics, public logistics, public objectives, outsourcing of hospitals' logistic objectives**.**

Introduction

The public sector permanent withdrawal from the public objectives implementation as well as the increased interest in these objectives realization by private entities have caused that the new research area defined as the public logistics has been emerged (Kauf, 2014). This term consists of two elements: "logistics" and "public". Without taking into consideration the semantic context of these two elements, it can be stated that the public logistics, in narrow terms, means the time and space transformation connected with the public objectives implementation[7] (Eßig, 2005: 93) and the coordination of links among the involved institutions (public and private). The multiplicity of participating entities creates the necessity of considering the public logistics in the context of the supply chain. Then, the public logistics

[7] The concept of public objectives is understood as providing or ensuring the provision of services for citizens or other entities.

stands for the flow oriented management of the value creation public chains/networks[8].The public logistics, in broader terms, can be defined as all activities connected with the time and space goods transformation, independently of the goods ownership titles as well as the nature of an organization implementing those actions (Eßig et al. 2009: 8).

The emergence of the public logistics is consistent with the trend of The New Public Management, whose the main objective is the more effective and efficient management of the public units (Szołtysek, Twaróg, 2013: 27)[9]. One of the areas where the public logistics has been implemented is the area of medical entities, especially hospitals. However, in this case we deal with the public objectives, the implementation of which is connected with meeting the crucial social needs in the more effective method rather than the economic one. This fact authorizes us to use the notion of "the social logistics", which is defined as "shaping the socially crucial material and information flows, in order to obtain the defined time and space values (and supplementary attributes) resulting from the social needs and ensuring the society's appropriate functioning" (Kołodziejczyk, Szołtysek, 2009: 23).

The aim of this paper is presenting the public/social logistics optimization possibilities in hospitals.

1. Logistics in the health service objectives implementation

Economic, social and political tendencies cause that the public units are often forced to change their past methods of functioning: costs reduction, generating revenues, increase of effectiveness and coping with the increasing competition. The financial problems that the health care institutions grapple with are also added to this problem. Hospitals do not manage their financial resources dedicated to the renewal and modernization of physical resources that are necessary to implement the supportive objectives. The National Health Fund constantly decreases the expenses for the health care. Although, the amount of nominal expenditures in a current year is maintained at the unchanged level of 63,3 billion zł., which is about 6,7% of the Gross Domestic Product value (www.nfz.gov.pl), this amount has to be intended for the bigger number of patients. In consequence, the hospitals and health centers revenues will decrease. In Poland the health care

[8] Public chain of supply constitutes the network of organizations, government and local government agencies, institutions, private companies whose objective is the provision of the added value for the public sector and beneficiaries.

[9] The public logistics is recognized similarly by T. Tanimoto, who observes the effectiveness increase opportunities in the implementation of public objectives in the framework of the public logistics.

expenditures are at the lowest level in Europe and the Polish society is becoming older so the health care costs increase. All of these exert pressure on medical entities, which have to cope with the increasing number of patients and, first of all, with the decreasing budget.

Therefore, the following statement is not a incorrect: the financial problems are the main cause of implementing the restructuring actions. The planned financing according to the number of contracted medical services causes that the hospital managers concentrate on the component costs of procedures connected with the medical services implementation (Szołtysek, Twaróg, 2011: 315). Managers search for an answer: Where can costs be reduced? Costs for patients – no, but how about the structures or modified processes – yes. The greatest potential of the rationalization is cumulated in the material flows and in hospitals' human resources. It results from the fact that ensuring the undisturbed implementation of the key objectives connected with the health care services, requires the support of some auxiliary processes such as: logistic services – material management, transport of patients, management of medical waste and medicaments. Although, the aim of these objectives is ensuring the constant availability of resources (staff, hospital beds, drugs) necessary to conduct medical services, they do not have to be realized by the hospital staff but they are commissioned (in the framework of the outsourcing) to the specialized external entities (logistics operators). Such a solution suggests the medical institutions managers' new opportunities. In the hospital management practice, the outsourcing, in the scope of such functions as: catering, transport, surveillance of property, laundry, technical and IT support, cleaning, is often adapted. As it results from the conducted research by Marcinkowska (2012), hospitals do not delegate the following functions as: staff management, finance, marketing or accounting, to the external entities.

Outsourcing or public sector services privatization, including the hospitals' logistic objectives, are run on the basis of different principles, in comparison to the companies' practice. Public medical entities can obtain the logistics operators to implement objectives on the basis of competition regulated in accordance with the public procurement law. In this context, a hospital is obliged to publish the tender notices. They should specify the objective in details, precisely and clearly, in order to make the tender notices be standardized and comparable (Boesen, 2008: 315). The location and the method of the tender notices publication depend on the public objective value. Tenders notices can be published:

- on the bulletin board in an applying institution headquarters,
- on the webpage of the announcing a tender institution,
- on the webpage of the Public Procurement Bulletin,

– in the Official Journal of the European Union (in the case when the value of the public procurement exceeds "the European Union tax thresholds").

The appropriate procedure of selecting an ordering party consists of two steps. Admission to the second stage requires from the potential contractors (logistics operators) the fulfillment of the formal requirements and possessing the defined features that let them fulfill the objectives: among others, the features[10] are as follows: knowledge, experience, technical and human potential as well as the appropriate financial terms. In the second stage, the selection of the most favorable tender, i.e. the cheapest or the shortest one, is made. These criteria should not be the only criteria because they can lead to the short-term benefits (Kauf, 2008: 265). In the case of selecting a contractor who delivers complex services, as it happens with the contract logistics, the multi-criteria[11] evaluation that allows assessing the real project value is reasonable. Then every criterion should be assigned the appropriate importance i.e. a price constitutes 25% of all items, an objective performance quality and functionality – 50% and the rest criteria correspondingly less.

One of the limitations of the external operators' selection is the negotiation modes concern. The percentage of proceedings is the evidence: 1,09% – in the case of procurements representing the lower than the European Union tax thresholds value and 2,09% – in the case of procurements representing the higher than the European Union tax thresholds value. (Report 2010: 24). The fact that negotiations are not run is the obvious disadvantage of the logistics operator selection procedures. Therefore, new procedures eliminating the current concerns and allowing conducting a constructive dialogue should be created. Such a postulate seems to be crucial, because even the companies, which are currently cooperating with suppliers and which are not limited by legal acts or regulations in the framework of the contract logistics, grapple with the problem of an accurate specification and a description of services that would correspond to the requirements of the public procurement (Amirkhanyan et al. 2007: 714). It results from the fact that the public logistics is a new form of the public objectives implementation and the logistics operators have not been providing the complex services so far for the public sector. They have not been acquainted with the appropriate knowledge which lets really assess the needs and prepare the optimal solutions.

[10] Conditions that the employer should fulfill are defined in the art.22 of the law on the public procurement.

[11] It is necessary to define clearly the criteria in the announcement on the public procurement.

Because of those and also other problems, the ideal model of delegating the logistic objectives to specialized logistics operators by hospitals has not been elaborated. Preparing the universal procedures is impeded by the big variety of hospitals and these hospitals' medical services complexity. Although, it is true that the following rule exists: the bigger the medical entity is, the better economic results it can obtain. However, the hospital management still lacks the sufficient strategic oriented option and the readiness to make difficult and nonconventional decisions. These factors determine the processes and structures. However, it can be assumed that the majority of processes implemented in hospitals, especially processes connected with the supply, can be standardized. It also can be stated that processes in hospitals are conducted on the similar basis as it is run in the car industry. This provides i.e. the introduction of the *just in time* type deliveries, even within the operating suite or the appropriate hospital wards.

The pressures exerted on the medical entities (hospitals) in order to make the procedures shorter, is getting stronger. Those entities, which will not share the experiences of the business practice and will not implement the principles of the public logistics, will not be able to exist on the market. Markets systems fluctuate, new logistics operators, who are specialists in the medical entities services, emerge. Their offer should be taken advantage of and the processes or the hospital supply chain management should be improved.

2. Possibilities in implementing the public/social logistics in the sphere of hospitals supply

The crucial area of the public logistics is the sphere of the hospitals supply. Both, the distribution understood as the external logistics objectives and all areas of the internal material logistics (i.e. transport logistics, storing, material supply and waste management) belong to the group of this sphere basic elements (Pieper, et al. 2002: 267; Drees, 2003: 20). In this sense, the public logistics includes the whole hospital supply chain (medical chain) defined as the entire materials and services flows that are targeted at meeting the needs of a hospital as well as all other organizations providing services to patients (Schneller, Smelter, 2006: 5). The huge potential of the hospitals' reorganization works as well as the actions optimization in the framework of the supply chain are observed in the moment of the superficial analysis of employment, which is necessary to implement all logistic actions connected with, among others, patients' transport to hospitals, catering, supply of materials used in the hospital treatment processes or hazardous waste management.

In production companies the potential of costs reduction in the sphere of the supply has been appreciated for a long time. Similar advantages can be obtained in the hospitals supply sphere. It results from the great standardization of both supply processes and medical products. It results from the research conducted by the A.T. Kearney Institute and the German Institute of Therapeutics (DKI), that in hospitals the material costs reduction potential is shaped at the level of 20-25%, what constitutes the value of 3,6 to 4,5 billion Euros (DKI, 2010: 3). Moreover, thanks to the supplying processes optimization, it is possible to obtain the additional savings at the level of 20% of the processes general costs (DKI 2010). If these costs refer to the general costs of a hospital maintenance, the value of savings will be shaped at the level of 6,6 to 8,3% (DKI 2010). The medical materials (46%) determine the greatest element of the material costs.

The suppliers' structures of medical materials delivery are not monopolized but they cause that hospitals make selections among these suppliers on the basis of the market conditions (usually choosing the cheapest bidder). Hence, due to a big number of bidders, the hospital supplying processes are relatively complicated.

One of the opportunities of supplying logistics optimization is establishing the cooperation that let consolidate purchases. On the advanced medical markets (Western Europe, USA) this process is initiated by forming the Hospital Purchases Groups (Kaszyński, Federwoski, 2011)[12], whose aim is aggregating the demand of many entities. This demand gives the greater tender sales force to suppliers. In consequence, it is possible to achieve results in the form of, among others, lower purchase prices, better customer service and standardization as well as the unification of the assortment used by various hospital facilities (Bartkowiak, Domański, 2013: 12). Striving for the effectiveness increase in the framework of a group requires conducting the number of administrative and negotiation works, which usually are transferred to an external logistics operator (i.e. in the form of a public and private partnership) (Grüb, 2009: 83).

The cooperation with a logistics operator does not have to be limited to the purchases, but it can include also (Bartkowiak, Domański, 2013: 13):

legal support for a group members,

- coordination of clinical research conducted in medical institutions,
- financial and managerial consulting.

The bases for the cooperation with a logistics operator are as follows:

[12] The purchase group is a voluntary institution of buyers who link their demands in order to achieve better position in negotiations and obtain better terms.

counseling and shaping the positive relations with customers. However, the selection of a good operator is the main problem. Before signing a contract with a private logistics operator, the medical care facility should not only confirm the operator's experience in the scope of delivering the services to the health care institution, but also analyze his infrastructure and personnel resources.

Positive examples of employing good logistics operators serving the medical institutions in Europe and can be multiplied. For instance, the St. Francis Polyclinal Hospital in Munster in Germany is handled by the specialized in medical services logistics operator *Fige*[13]. Thanks to the logistic services outsourcing, a hospital achieves savings in the scope of logistics at the level of 20-25% (http://logistyka.infor.pl).

Another example is the coordination in the scope of the public logistics - *NetLog*Hanover -established among clinics of this region, Medical College and the *Rhenuseonova* Company. The first contract between a logistics operator and the Health Care Service was signed in 2005. The project value amounted for 5 billion Euros. Implementing the new health care supply system, which improved the quality and effectiveness of the hospital logistics, was the aim of the partnership.

Although the benefits of implementing the public logistics in hospitals are undeniable, however, this method of hospitals' functioning in Poland has not been adopted yet. Although, the first attempts of transferring the logistic tasks and sharing the experiences of the specialized external companies are visible[14]. There is still the lack of delegating all tasks to the specialized logistic operators. Hospitals still have the skeptic attitude towards this kind of solutions and they manage the supplies themselves, what does not bring positive results, especially when taking into account a big number of hospitals. Such a situation seems to be a consequence of: the weak awareness of benefits that hospitals would obtain thanks to the cooperation with a logistics operator, the lack of confidence and the interdisciplinary education of the managerial staff. In Poland there exists the conviction that the medical entities should be managed by the medical profession representatives. The experience shows that the logistic competences and the support of the advanced information technology are required (Szołtysek, Twaróg, 2011: 316). Observing the subsequent proprietary transformations and re-

[13] The Hospital Group consists of 14 catholic hospitals, 7 facilities taking care of the elderly and disable people; it possesses shares in many rehabilitation facilities, nursing homes and hospices.

[8]The Fige company delivers services for hospitals also in the Benelux countries, Italy, it is going to enter the Polish market.

[14] i.e. The University Hospital in Bydgoszcz, which in 2011 entered into cooperation with the external company in the scope of cleaning and hiring the hospital linen.

structuring processes, in the framework of which the first attempts of co-operation with the external suppliers are undertaken, it can be stated that in the near future the hospitals management will only concentrate on the key competences and will delegate the majority of the logistic tasks to the appropriate operators.

Conclusions

The problem of applying the public logistics in the implementation of objectives and processes connected with delivering the medical services has been discussed in this paper. The benefits resulting from the hospitals' concentration on the key competences and the transfer of the supportive actions (logistic services) to the specialized logistics operators have been presented. The presented hospitals' good practices explain the legitimacy of implementing the public logistics and they also visualize the logistics' potential in the cost reduction. Although, the benefits are undeniable, the Polish hospitals management's attitude towards this form of the supportive processes implementation is still skeptical. But hopefully, the pressure to reduce costs resulting from the smaller number of contracts with the National Health Fund will force the hospitals management to implement the public logistics and to share the experiences of the business practice.

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EXAMPLE OF RATIONAL MODAL SPLIT IN THE TRANSPORT NETWORK – TECHNICAL AND ECONOMIC ISSUES

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Abstract

In recent decades, almost all over the world, the issue of sustainable development has been strongly promoted in the transport policy. Initially, it applied chiefly to creating specific documents defining basic terms, for instance Brundtland Report (UN Documents 1987). In further years, documents containing more specific guidelines started to be developed focusing on directions for developing transport systems and activities to be implemented to achieve the goal of sustainable transport. At the moment, there are a number of official guiding or mandatory documents in the field, for example White Papers (COM(2001)370; COM(2006)314; COM(2011)144) and communications (including COM(2013); SEC(2009)). The idea of sustainable development of transport expressed in those documents is gradually realized in the form of EU supported projects. The article focuses on modal split in the transport network while using basic decision-making process facilitation methods; an activity which aims at making transport development sustainable. The proposed method provides a holistic approach to the transport network, as a structure comprising specific coherent space regimes undergoing continuous interaction. Modal split is optimized in all those space regimes, whereas the splitting procedure itself is presented using an example.

Key words: transport network, modal split, basic decision-making process facilitation methods

Introduction

The definitions of sustainable development of transport can be found in a number of publicized documents (including those mentioned above). Simply, we may assume that for the purpose of the article sustainability is present (achievable) when the share of particular modes of transport aims at a pre-defined proportion. Those proportions can be referred to as the status of 'green' balance (e.g. present EU supported project of Green Travelling) (Celiński, 2013). The balance between modes of transport, in line with sustainable development, can be expressed:

$$MT_1 : MT_2 : MT_3 : ... : MT_l :: ... : MT_k : ...MT_n = const = \{const_{lk}\} \qquad (1)$$

where:

MT_k-k-th means of transportation [-], passenger car, bus, tramway [vehicle], etc.

In the context of the equation (1) it is important to explain certain basic issues. The number of means of transport having various operational features has been growing in transport systems (n>>0) They include means of public transport on request, without a fixed route, and without a fixed timetable (e.g. mini-bus lines in Ankara, Istanbul, Bilbao and other, or Telebus in Cracow). The diversity in functionalities of means of public transport is expected to grow in the years to come. It means that the development of modal split ceases to be a simple bipolar issue of differentiating between individual vs. public transport. It necessitates simple and at the same time effective methods for analyzing the issue. Another question is to adjust modal split to technical parameters of the transport network. The split cannot be imposed in an arbitrary manner, and it should take into consideration a number issues pertaining to the operation of transport networks, both technical and economic ones. Of course, it should also (or perhaps first of all) consider needs of people travelling. Shaping their transportation behavior extends beyond the scope of this article (literature list includes several items referring to those issues more extensively, e.g. Nosal, 2011; Okraszewska, 2013; Sierpiński, 2011).

The transport network is an organism which should be approached holistically. Its immanent properties result from various, frequently distant sub-areas. Nevertheless, for calculation and organizational purposes it is easier to manage sections of the network (space regimes and subareas) rather than its entire area. Such an approach is justified while managing all sub-areas simultaneously in a larger part of the transport network. Space regimes can be described in the form of a matrix $[r_i]$ or $[r_{ij}]$, depending on

delimitation. In the first case the division into regimes is random and in the second, it is based on symmetrical shapes (squares, rectangles, triangles, hexagons, etc.). This enables describing the network through convenient square matrixes, taking into consideration mutual incidences of space regimes. For simplicity reason, it was assumed that the network will be divided into i, non-homogenous space regimes (in terms of their area). Each of the space regimes can be quantified as regards its technical parameters, such as transport volume and capacity, while using methods for estimating those parameters (e.g. Goras, Waltz, 2000; CTRE 2014; Cambridge Systematic 1996; TRB 2014; Ned Levine & Associates 2010; Mathew, Krishna Rao, 2014). The regime may include an area of a single transport node. Therefore, it is possible to assign capacity value C_i to each regime, if it covers a larger number of nodes, as an aggregated value of infrastructure elements within an i-th regime area. Consequently, it is possible to determine capacity CAP_i for each i-th space regime. The value can be estimated using contemporary traffic detection systems within interval for capacity i in time Δt in the case of capacity itself.

Technical parameters of the transport network (capacity, volume and others) can usually be determined. Theoretically, using a relevant detection system, we can determine real proportions of particular means of transport in all m space regimes:

$$\left\{cMT_{1..n}^{1} : cMT_{1..n}^{2} : ... : cMT_{1..n}^{i} : ....cMT_{1..n}^{m}\right\} = \left\{const^{i}\right\} \qquad (2)$$

where:
i – number of space regime [-].
n – number of means [-]

Calculating those values is usually a question of using relevant calculation methods for determining particulars of the transport network and using an appropriate detection system as regards the number and type of means of transport. A separate issue is matching an economic dimension which depends on e.g. $\{const^{i}\}$ with the value of modal split in its i-th space regime. Each way of shaping modal split involves certain cost related to operation of vehicles, environmental cost, other social cost, etc. There are LCA methods for calculating cost related to a specific development of the transport network (Góralczyk, Konieczny, 2001). Several companies on the transport service market provide such calculations, e.g. Factor CO_2, 39 Therefore, we may allocate the cost related to the existing modal split V_i to each space regime. General cost in regime V_i is the aggregate of indirect cost which results from spreading the cost on particular modes of transport:

$$V_i = \sum v_k \qquad (3)$$

where:
$v_k = v_E + v_C + v_{ENV} + ... + v_o$
v_E - operating cost [PLN],
v_c - community cost [PLN],
v_{ENV} -environmental cost [PLN].

Attention should be drawn to the fact that modal split influences the distribution of general cost in the transport network. We may expect that a relevant modal split enables reducing total operation cost of a transport network. The question which remains is to find a relevant optimization method.

1. Sustainable development

The transport system is an integral part of the city structure. A natural consequence of this is a strict relationship between city development and its public transport system. Changing social and economic conditions determine directions for the development of a city. A frequent trend, related to dense urban development, is creating new housing estates, companies and other public utility facilities beyond boundaries of a core city center, and investing in green areas or developing neighboring rural areas situated within one hour drive from the city. Urban sprawl (also known as suburbanization (Pawlak, Pawlak, 2014)) has been particularly vivid since the second half of the 20th c. Growing distance between sources and destinations results in longer travelling routes and significant changes in distributing traffic flows in the existing transport network. This contributes to increased number of travels, especially using individual means of transport (passenger cars) which leads to congestions on roads, increased noise levels and emission of noxious substances from transport, etc.

While defining sustainable development, the UN report (commonly known as Brundtland report) is quoted most often. It reads (UN Documents 1987): 'sustainable development is a development which meets current generation needs while preserving opportunities for future generations, in terms of meeting current and future needs. It is based on two fundamental assumptions: Firstly, we need to focus on the concept of needs, in particular basic needs of the poor. Secondly, while meeting current and future needs, we should take into consideration limited possibilities, and do not ignore boundaries set by the natural environment for technological advancement and social order'.

According to the definition, every action should be taken in response to a need. Such an approach to investing should be reflected in every field of life, including planning the development of transport systems. At the same time, we should remember not to limit business activity of companies and individuals while trying to reduce transport intensity in the economy. This should result in rationalizing mobility among citizens, improving spatial structure in cities and reducing the impact of transport on the environment (Tundys, 2008). As regards the concept of needs, it is necessary to provide thorough analysis of traffic and defining sources and destinations, motivations, as well as frequency. Only full knowledge about the subject, including not only a situation in the current transport system, but also real expectations of people travelling, enables arranging appropriate solutions and properly used new technologies (Celiński et al. 2012; Kowalska, Markusik, 2011; Celiński, Sierpiński, 2012). The issue of optimization of transport development towards more environmentally friendly ways of travelling can be analyzed from different angles. Some of the main approaches include technical, organizational and economic perspectives. The latter refer to the cost incurred by the transport system (holistic approach) and the environment (Pawłowska, 2000; Bąk, 2009; Pawłowska, 2013).

2. Calculation method

The solution to the problem has two aspects. The first one is purely technical and applies to 'packing' of vehicles in a given space regime, at a specific modal split supported by technical parameters of the transport network. While solving the problem, a knapsack algorithm (Kleinberg, Tardo, 2006; Martello, Toth, 1990) might be useful. The algorithm is known in the field of decision-making facilitation systems. The second issue refers to optimization of modal split at known costs, correlated with different types of means of transport (Kleinberg, Tardo, 2006; Martello, Toth, 1990).

Once we determine a permissible modal split for a single i-th space regime, the issue of modal split can be expressed in the form of the following equation:

$$b_1 MT_1^i + b_2 MT_2^i + ... + b_k MT_k^i + ... + b_n MT_n^i \leq C^i \qquad (4)$$

where:

b_1 – decision variable [-], discrete value [vehicle], $b_i \in N$

C' – capacity or volume (CAP) of space regime,

MT_1^i – number of specific means of transport in given space regime.

We should remember that values of C' heavily depend on intensity, directional structure and kinds, as well as other parameters of road traffic. On the other hand, they are time related parameters. Once we know the cost related to a specific modal split in i-th space regime V_i and cost of particular means of transport v_i, the issue of optimization of cost related to a specific modal split can be expressed as follows:

$$V_i = \min \sum_{k=1}^{n} v_k b_k \qquad (5)$$

with limitation:

$$B_i = \sum_{k=1}^{n} b_k MT_k \leq (C' \text{ lub } CAP) \qquad (6)$$

Therefore, from the point of view of sustainable development, the optimization of modal split in the transport network boils down to determining of time t', or interval Δt, set of values: $\{V_i\}$ and $\{B_i\}$ in particular i-th space regimes. The first set of values defines minimum cost related to a specific modal split, the second one technical parameters of a space regime (packing and cost reduction).

It should be noted that there are several technical solutions that enable supporting the development of modal split in selected areas of transport networks. In relation to the city public transport, it is possible to apply the following:

- separate lanes for buses,
- specific arrangement of platforms and bays,
- priority at cross roads,
- other transport telematics solutions,
- optimizing of routes,
- clear tariff policy and common tickets (e.g. ŚKUP in Silesia).

Yet another environmentally friendly means of transport is bicycle (in cities). In this particular case we may distinguish as follows:

- coherent and safe bike routes,
- safe parking for bicycles,
- city bike concept (public),
- bike rental.

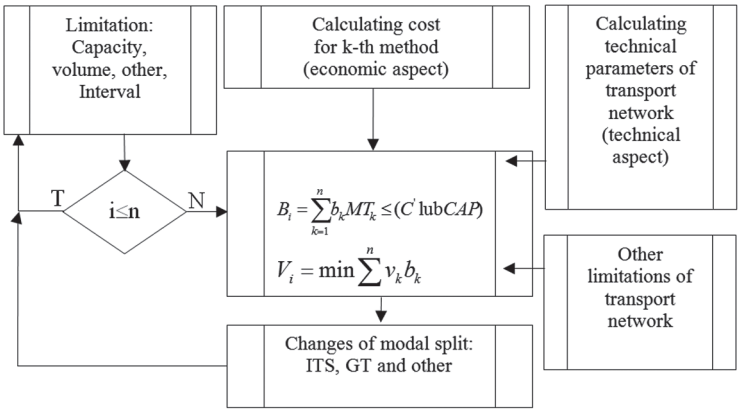
The last solution worth mentioning is a system of co-using a car by several people, including joint commuting to work, school, etc. In Poland, the system is still little popular (so called carpooling) and may also include certain incentives:

- separate lanes,

– reduced parking fees, separate car parks,
– reduced fees for entry into paid zones.
– discounts at petrol stations.

Figure 1 shows a flow chart of the method of selecting an optimized modal split in a transport network as regards reduction of the transport network operating cost (sustainable transport).

Figure 1. Modal split selection method



Source: Own study.

It is obvious that certain reserves of 'green' modal split could be observed between space regimes in the transport network. And in specific regime sit will not be possible to set/develop modal split which reduces cost. The method of distributing reserves within the transport network should be added to the above mentioned modal split selection method.

3. Example of calculation

Below presented are example calculations as regards selecting modal split in an individual space regime (example data). Discrete decision variables were assumed (this may also apply to calculating parameters of network in relation to people and not vehicles) (Celiński, Sierpiński, 2014). The volume of the transport network in a space regime was selected as a limitation expressed in the maximum length of the network [in meters]. The parameter is fairly easy to calculate for every transport network (Mathew, Krishna Rao, 2014). The volume was then used to calculate the maximum number of vehicles of a given means of transport that can fit into the space regime concerned. While calculating lengths of vehicles, a buffer of 1 m was adopted on each side of a vehicle. Data and calculation are included in figure 2.

Figure 2. Calculation example, modal split selection to the volume of space regime of a transport network (SO – passenger cars, SD – delivery vans, Mb – mini-buses, SC – trucks, SCP – trucks with trailers and semi-trailers, A – buses, AP – articulated buses, other – e.g. horse drawn carts, special vehicles, tractors, harvester (agricultural vehicles), etc., M/R – motorcycles/bicycles)

		limit		25650	[m]		
	l [m]+2*D	bi	xi	b*x		%	R %
1	2	3	4	5	6	7	8
SO		6	1282	7692	7695	30	29,99
SD		7	366	2562	2565	10	9,99
Mb		9	285	2565	2565	10	10,00
SC		12	106	1272	1282,5	5	4,96
SCP		20	25	500	513	2	1,95
A		13	493	6409	6412,5	25	24,99
AP		18	114	2052	2052	8	8,00
Inne		14	91	1274	1282,5	5	4,97
M/R		3,5	366	1281	1282,5	5	4,99
	suma	102,5	3128	25607	25650	100	99,83
	średnio	11,39					

Source: Own study.

Figure 2 presents a table based on calculations performer in an Excel sheet. The calculation used application Solver. The top of the table presents the limitation of the regime, which is the total available volume expressed in meters: 25650 [m]. Column 1 shows types of vehicles (any reasonable division of vehicles into groups can be used). Column 3 includes lengths of the selected types of vehicles including buffer in the front and rear (1 m each side). Column 4 presents decision variables x (in equation 5 and 6 it is b, number of vehicles of specific type 'let into' regime). Column 5 is the product of the decision variable b_k multiplied by the length of a given vehicle. Column 6 and 7 show limitations for a regime as regards servicing vehicles of specific type. Column 6 expresses a limitation in space (meters) whereas column 7 defines percentage of the total available volume 26,650 [m] to be used for traffic of a specific type of vehicles in the space regime concerned (desired percentage figure defined for each type). In the example, according to the principle of sustainable development, about 30% of transport volume was assigned for passenger cars in the regime, 43% for public transport, and about 5% for motorcycles and bicycles. The method enables shaping (any) modal split. The Solver application based on PCL determines

numbers of vehicles in specific groups that can be serviced in a given space regime in line with the sustainable development principle. The operation of the system should be based on ITS functionalities. Inbound traffic to a given space regime should be directed in such a way to have the same number of vehicles of a given type in each interval as set according to the proposed methodology. Consequently, such analyses can be linked to predetermined economic measures for servicing vehicles of a given type.

We may assume that the cost of servicing in a space regime in interval 5' is as provided in table 1 (example data).

Table 1. Cost of servicing vehicles of given type in regime in interval 5'

	Type of vehicle	Cost[PLN]	Cost per person [PLN]	Comments
1	SO	0,05	0,038	Mean value of number of person in vehicle 1,3
2	SD	0,07	0,053	1,3
3	Mb	0,06	0,012	5
4	SC	0,09	0,09	1
5	SCP	0,1	0,1	1
6	A	0,08	0,0026	30
7	AP	0,1	0,002	50
8	Inne	0,09	0,09	1
9	M/R	0,001	0,001	1

Source: Own study.

Similarly to the previous example, we can optimized modal split in the regime concerned in line with the principle of sustainable development of transport. Further calculations are presented in figure 3.

Figure 3. Calculation example, selecting optimized modal split reducing cost in transport network regime

		limit		25650	[m]							Personal cost		Conditions
	l [m]+2*D	bi	xi	b*x		%	R %	x'i	c	c*x	b*x	0,05	0,038462	
1	2	3	4	5	6	7	8	9	10	11	12	0,07	0,053846	
SO		6	1282	7692	7695	30	29,99	428	0,038462	16,46154	2568	0,06	0,012	>=10%
SD		7	366	2562	2565	10	9,99	0	0,053846	0	0	0,09	0,09	
Mb		9	285	2565	2565	10	10	0	0,012	0	0	0,1	0,1	
SC		12	106	1272	1282,5	5	4,96	0	0,09	0	0	0,08	0,002667	
SCP		20	25	500	513	2	1,95	0	0,1	0	0	0,1	0,002	
A		13	493	6409	6412,5	25	24,99	198	0,002667	0,528	2574	0,09	0,09	>=10%
AP		18	114	2052	2052	8	8	1104	0,002	2,208	19872	0,001	0,001	
Inne		14	91	1274	1282,5	5	4,97	0	0,09	0	0			

M/R		3,5	366	1281	1282,5	5	4,99	0	0,001	0	0
	sum	102,5	3128	25607	25650	100	99,83	0		19,19754	25014
	mean	11,39									

Source: Own study.

Figure 3 presents an example of optimized modal split in the space regime. A criterion for the PLC algorithm is the average cost generated per one person travelling in a regime in interval 5'. Additionally, it was assumed that individual traffic can be less than 10% of the total transport volume in the space regime. Moreover, it was assumed that buses (articulated bus) cannot account for less than 10% of the transport volume in a given space regime. Percentages in other groups of vehicles were not limited in any way. Results of the cost efficient modal split are presented in figure 3. Other criteria can be used alike. Therefore, one can focus on various means of transport. In principle, to realize modal split in a transport network, the following should be determined:

- network volume (or capacity) in relations to particular delimitation units,
- physical parameters of vehicles (mean values),
- average cost of vehicle maintenance in a given space regime (optional),
- desired split criteria (percentage shares for particular vehicles or priorities in traffic management).

Thus, it is possible to estimate quantitative and qualitative measures for the traffic management system, it is capable of controlling isolated areas in the city transport network. Control here is understood as at least capability of the system to perform two operations: segregation of vehicles into separate lanes and if possible controlling each vehicles separately. The proposed method combines technical and economic dimensioning of traffic in the transport network.

Is it possible to determine arbitrarily proportions of particular means of transport in the modal split? In recent years, a number of papers were developed on traffic modelling in transport networks (e.g. Celiński et al. 2012). For example, in the Upper Silesia-Zagłębie Agglomeration, modal split determined in 2009-2011 between individual cars and public transport was roughly balanced (50/50) (Karoń et al. 2009). However, small differences in those proportions matter. On the one hand, it seems that a good criterion can be examining occupancy rates in means of public transport. This enables determining possible changes in modal split in particular space regimes of the transport network (occupancy between stops). One the other hand, occupancy in individual cars should be controlled by using such techniques as: car-sharing, carpooling and HOV (Sierpiński, 2011).

Conclusions

Due to steady increase in mobility of societies, the development of transport systems is undoubtedly a challenge for coming years. Establishing proper directions for the development, and then implementing measures that enable achieving goals are not easy. May be in the nearest future it will be possible to apply the method presented in the article.

The procedure enables shaping modal split in line with the sustainable development policy and available volume or capacity of the transport network. The precision of the method should be adjusted to traffic management equipment available in a given transport network. The method is based on a possibility of road traffic management ensuring saturation with vehicles of various types in space regimes. However, proportions between various vehicles are strictly defined (certain vehicles enjoy priority in access to space regime). The method necessitates segregating of vehicles between various lanes assuming that several different lanes are available. It also requires changes of traffic management algorithms (changes of effective green signals in line with predefined 'green' proportions of traffic involving different types of vehicles). In order to implement the method, it is necessary to promote further development of services available in domestic ITS architectures.

Further research by the authors will add a number of procedures to make it possible to use the method in traffic management algorithms.

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DIAGNOSIS OF COMPATIBILITY OF A NETWORK-BASED ORGANIZATION'S VALUES WITH EMPLOYEES' PERSONAL VALUES

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Abstract

Compatibility of values in network-based organisation is diagnosed in this article. It was theoretically grounded that compatibility of values between values declared and cherished by network-based organisation and employees' personal values is very important for ensuring successful existence of network-based organization. Such compatibility of values in network-based organisation in Klaipėda city (in Lithuania) development strategy shall ensure fair employment of urban residents, competitive ability of employees in the market as well as other social problems are being solved. Quantitative research comprised interviews with 221 respondents in Klaipėda network-based trade organisation "IKI". Based on the research results, it was determined what common values an organisation and employees do share in the level of organisational behaviour. Spiritual and moral values, which are allied to cherishing of social responsibility, are mostly cherished in network-based organization "IKI". Meanwhile, social and economic values shall dominate mostly among employees' personal values. No occupational values were mentioned among 10 of the most important values. Such analysis of values' compatibility shall form main values, on which organisation's strategy, education plans and practise are based. Application of purposeful policy of employees' value-based orientation in education companies, solving problems of leadership and more increasing level of congruence between values of network-based organisation and employees' personal values were offered to improve the situation.

Key words: network-based organisation; compatibility of organisation's and employees' values

Introduction

In modern world affected by globalisation process, networks are named as incorporation of effective content and measures into organisations and consolidation of their correlation. Therefore a fact, that universal tendencies of globalisation did not affect human value-based position, could not be negated. Laws of formation of network-based organisations shall vary future technologies and society, so it likely that more and more individuals and organisations will be involved in mutually useful networks in the future.

Values shall provide singleness for goals of activity, policy and strategies for network-based organisation. Clearly formed values in network-based organisation shall become main guidelines, assisting to decide how to seek for tasks. Positive attitude towards values of network-based organisation is a particular index, how an employee interanalyse them and how these values participate in its life. Employees must realise and accept values of network-based organisation otherwise it's not a value. Values shall help employee orient in the environment, to cull from the environment such aspects of economic, social and cultural life which shall become important to it during period of improvement. An employee, identified himself with values of network-based organisation, shall accept them as a part of himself/herself and his/her success shall become a success of organisation. Therefore employees are attracted to network-based organisation, which, according to their understanding, have similar values with theirs. From the other side, network-based organisations shall also try to select such candidates, who are apt to cherish the same values. Consequently processes of compatibility of values between network-based organisation and employees became a very important aspect of working of network-based organisation.

Elfenbein and O'Reilly (2007) present compatibility between personal and organisational values as common system of values, typical both for an individual and organisation, defining what is important for both sides as well as norms, defining desirable behaviour and provisions of organisation's members. On the grounds of combined values, it is possible to unify endeavours of organisation's members while implementing strategies (Sorensen, 2002), thus ensuring survival of organisation itself in competitive environment (Šimanskienė, 2008). Therefore, uniformity of organisation's and employees' values may lead to interpretation of same events and same reaction to them, and it would have negative effect on the results of activity under particular conditions, especially when innovation and adaption to changes is needed (Giedraitis, 2011). It is very complicated to determine when values in organisation are really combined. Existence of compatibility of values could be decided from employees' behaviour: a demand felt by

employees to act and seek for a goal in the organisation or not. In case personal values shall not coincide with organisation's values, then the first ones shall be combined to the latter, or an employee must leave the organisation as common values of organisation are more important than personal values. Thus an employee is forced to "assemble" his/her value-based attitude selecting between own and organisational values.

What is the level, on which network-based organisation and employee share common values? How to reach that network-based organisation values and employees' personal values in working environment would coincide as much as possible? It is very burning practical problem.

Problem of the research: Employers are familiar with compatibility of values in network-based organisation as a motivating force in order to reach high results. Therefore, network-based organisation shall confront with problems of compatibility of values and supporting.

Subject of the work: Compatibility of values in retail chain "Iki".

Purpose of the work: To diagnose compatibility of values in retail chain "Iki".

Tasks of the work: to ground significance of compatibility of values in network-based trade organisation in theoretical aspect and to diagnose compatibility of values between network-based organisation and employee's personal values in retail chain "Iki".

Methods of the work: comparative analysis of scientific literature; methods of quantitative research and data processing applied in the research; received data of quantitative research were processed according to SPSS 15. Survey was performed in April of 2014.

1. An importance of compatibility of values and theoretical reasoning in network-based organisation

Network-based organisation is a modern organisation, for which resilient relations between all members and subdivisions of an organisation are typical. It shall require radically arrangement of information infrastructure. Values shall form an essence of culture of network-based organisation. Šimanskienė (2001) claims that values are the main concepts of organisation, forming cultural background, which majority of organisation members must approve. Values are "long-term" goals, presented as main principles of human life (Berson et al. 2005). Values are those criteria which definin what is good or bad, correct or incorrect. They shall develop from culture of an individual and shall determine its behaviour as well as shall assert in the behaviour of an individual or their groups (Čiburienė, Guščinskienė, 2007). Freedom, selection of goals, creativity, desire to recognise and indepen-

dence shall depend on particular values (Peterson, Park, 2006). In psychological literature values are understood as "a thing, process or phenomenon, for which a person shall have largest significance, a ratio, with which person's ego is important and which determines singleness of person's activity" (Suslavičius, 2006). In Lithuanian legal laws, the concept values if being replaced by "principles", which is allied to its essence and may be treated as convictions, creeds and laws of activity.

Value-based orientation shall reflect ideology and culture of network-based organisation, to which an employee shall belong to. One of the main tasks of system of values is to present a concept of its identity to the members of organisation (Monkevičienė, 2009). Values must be integrated into processes, policy of business organisation and principles of business activity. Consequently selection, combination and cherishing of suitable values have great significance on indexes of companies' profit and even on survival of companies themselves (Goman, 2007). System of organisation's values shall provide singleness for goals, policy and strategies of activity. Most values of organisations are universal and characteristics typical to a person and organisation are similar (Sezgin, 2006; Edwards, Cable, 2009). Values of organisation are time-tested, stable and flows from inside, and an organisation shall consider it as standard of behaviour (Monkevičienė, Liugailaitė-Radzvickienė, 2009). Values in organisation must be fairly precisely named, understood and accepted. If person's values are allied to ideas of organisation, assertion and common agreements are being standardised as well as honesty, quality and integrity shall increase (Lusthaus et al. 2002). One of the main tasks of system of values is to provide members of organisation with concept of its identity attitude (Monkevičienė, 2009). In such a way attitude of transference of abilities, knowledge and skills, occupational duties and responsibility is being educated.

Scientific resources contain assessment of various values. It should be stated, that one authors analysing values shall define that employee's value-based relation is determined by its needs, and the others state, that employee's behaviour shall depend on goals, one wishes to implemented, and the others state, that this relation is determined by interests. Usually values shall determine boundaries of vital activity of individuals, groups and systems. The more poor scale of value, the more allowable and less restriction. It is important, that distinguished values would not contradict with each other, would be acceptable and agreed in various levels of network-based organisation: personal, team, subdivision, company etc. In other case it will arouse internal conflicts in network-based organisation. Rao (2007) indicated that wrong assessment of values in organisation may lead to catastrophes or prevent from adequate reaction into their consequences.

Values are being formed considering to opinions, provided by various authors (Table 1).

Table 1. Groups of values in network-based organisation

Group No.	Groups of values	Significance of values	Authors
1.	Occupational values	Identify how well organised work is important for employee and organisation	Palidauskaitė, 2004, 2004b, 2007a; Glomseth, Gottschalk, Hole, (2010).
2.	Spiritual values	Identify how important higher (spiritual) needs and goals are for employee and organisation.	Kuzmickas, 2003; Aramavičiūtė, 2005; Mureika, 2006; Williams, 2006; Nekrašas, 2008
3.	Moral values	Identify how much humanistic values are important for employee and organisation.	Hartman, 2001; Baranova, 2004; Kanišauskas, 2009; Šarlauskienė, 2011
4.	Physical – aesthetic values	Identify how convenient and comfortable working environment is for employee and organisation.	Šimanskienė, 2002; Ginevičius, Sūdžius, 2007; Vveinhardt, Nikaitė, 2008; Borisova, 2009; Vveinhardt, Gulbovaitė, 2012a, 2012b
5.	Social values	Identify how personal and organisational success is important for employee and organisation.	Edvardsson et al. 2006; Ginevičius, Sūdžius, 2007; Martinaitytė, Matutis, 2012
6.	Economical values	Identify how encouragement and social guarantees as well as orientation to work results are important for employee and organisation.	Edvardsson et al. 2006; Ginevičius, Sūdžius, 2007; Monkevičienė, Ligugailaitė-Radzvickienė, 2009; Pruskus, 2010, 2012

Source: own elaboration

It shall be supposed that the values presented in Table 1 shall define personal actions and expectations of network-based organisation and employees. Here physical-aesthetic values are joined together into one block as their meaning is almost the same.

It shall be stated that values shall not create welfare of itself in network-based organisation. It shall be accented, that values must be constantly supported and cherished. Variation of values may take place as creative, innovative continuity, when their initial meaning shall unfold with new concepts and roles, corresponding to dynamic human relation with reality and their changed needs. Individuals and organisations shall follow values typical to socio-culture, on the grounds of which construe relations between separate systems (Verplanken, 2004; Kvedaravičius, 2006).

Various authors (Hyde, Williamson 2000; Sagnak 2005; Knoppen et al. 2006; Šimanskienė 2007; Natarajan, Nagar 2011; Vveinhardt, Gulbovaitė 2012a) describe frequently a relation between employees' and organisation's

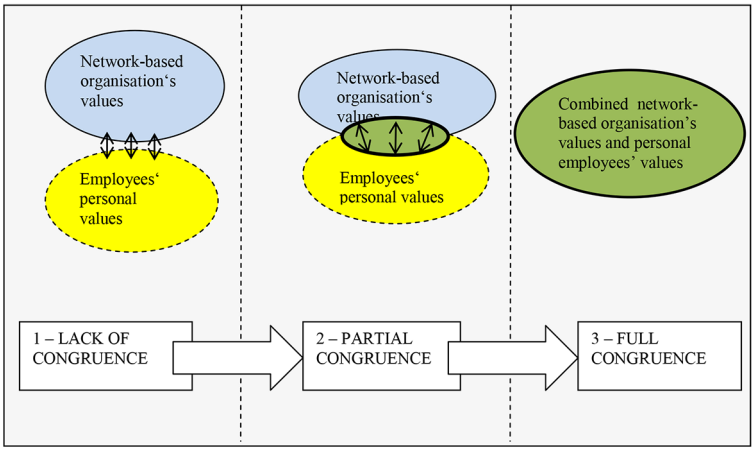
values with performance of work in general sense and performance of particular tasks and works. In such a way, close contact of valuable attitude and organisational identity, as an essential valuable position, is accented. Results of the research received by other authors (Kristof-Brown et al. 2005) show that contact of compatibility between organisation's and employees' personal values with performance of common work was high. Other authors notice that there is very great significance regarding takeover of organisation's values for employees (Ledgerwood, White, 2006). It shall be stated that compatibility of elements of values' system shall increase effectiveness of organisation's activity. Congruence of organisational and personal values is natural and artificial process, which, as a component of culture, must be supported and developed by organisation representing management (Vveinhardt, Gulbinaitė, 2012). Disagreements are being eliminated using value-based background, highlighted by separated attitudes (compatibility of values). Very small change of employees shows a level of values combined in the organisation (Giedraitis, 2011).

A task to create an environment, where values of organisation and employees would coincide as much possible, was raised for network-based organisation. In such environment an employee shall identify himself/herself with values of prosperous network-based organisation, accept them as a part of himself/herself and his/her personal success shall become inseparable from success of organisation. In this way provision of transfer of abilities, knowledge and skills is being developed as well as occupational duty and responsibility.

Diagnostic model of value congruence (Fig. 1) is offered as one of the methods to ensure compatibility of values in network-based organisation. Therefore, first of all, network-based organisation requires knowledge on what stage congruence of personal values of network-based organisation and employees is. Three typical levels of compatibility are presented in this model:

1 – lack of congruence;
2 – partial congruence;
3 – full congruence.

Figure 1. Diagnostic model of value congruence



In the first level, in which there is a lack of congruence, rapid analysis of values is required. In the second level (a partial congruence), it is necessary to review values, assess and accept a decision on refusal of some values or improve them. The greatest influence on perfect compatibility has the fact, when values of network-based organisation and employees' values are close to full congruence. In turn, in the third level, when full congruence exists, full compatibility of values is received or contamination of values is reached.

Values would be left unrealised and forgotten if one would not try to consolidate them in any possible way, i.e. institutionalise. The greatest responsibility in assessment of values and spread process falls to managers of organisation. Vision of managers, understanding significance of values, is employees' provisions oriented to network-based organisation values and goals. Compatibility of these strategies is impossible without wish and understanding of the management that values may contribute to preparation and implementation of business strategy. Consequently managers must attempt, that employees' personal values would not only coincide as much as possible with network-based organisation's values but also would contribute to aim of full value congruence. The larger compatibility of values between employees and organisation, i.e. congruence, the better quality of work performed by employees is. Variable business environment undoubtedly shall also require flexible decisions in respect of values. But it is likely to reach contamination of values by performing unplanned change of employees, and especially managers of all levels, and rapidly seeking for compatibility of personal values of new employees with values of network-based organisation.

When seeking compatibility of values in network-based organisation between network-based organisation and employees' personal values, one should remember that the result shall depend on:

- what are main value-based orientations of managers;
- how clearly values of network-based organisation are formed;
- in what level human resource management system is;
- what is the level of economic and trade system;
- how do main processes are being performed.

Consequently, value compatibility in network-based organisation shall require spread of information and its accessibility as well as inspirational examples of good practises. And probably the most important aspect is that in order to ensure successful existence of network-based organisation, compatibility between values declared and cherished by network-based organisation and values of employees is very important.

2. Organisation of research and methodology

The goal of the research is to determine compatibility of values in retail chain "Iki": between values declared and cherished by network-based organisation and values of employees.

Retail chain "IKI" is the second network according to turnover in Lithuania and one of 10 largest organisations in the Baltic States, executing its trade activity for 22 years. Retail chain "IKI" is one of the largest employers in the Baltic States. Total number of shops owned by the network reached 239. Almost 7500 network employees work in Lithuania. The research was performed in 18 trade companies of "Iki" network in Klaipėda city.

Type of the research is quantitative, descriptive with the application of a questionnaire. During direct assessment, the respondents were asked if their values shall correspond to values, assessed by network-based organisation (Tepecy, 2002). Anonymous interview was applied for evaluation of compatibility of values between network-based organisation and personal values of employees, providing close questions. A questionnaire consists of demographic part and six blocks of questions, where respondents were asked to assess values in retail chain "IKI". Questions were evaluated in the scale of 5 levels (from 1 – totally unimportant, up to 5 – very important).

In order to assess the questionnaire's reliability, SPSS 17.0 version of statistic analysis and data processing program was used for processing of data received during research. Reliability of questionnaire was determined by calculating Cronbach's alpha coefficient. Comparing exploratory groups, scale is sufficiently reliable, when Cronbach's alpha > 0,7; very reliable – when Cronbach's alpha > 0,8 (Vaitkevičius, Saudargienė, 2006). It is presented in Table 2.

Table 2. Meaning of Cronbach's alpha

Cronbach's α value	Spearman–Brown's coefficient of increased reliability
0,983	0,984

As Cronbach's alpha value is larger than 0,8, then a questionnaire may be considered as very reliable.

Considering the purpose of the research and tasks raised, *non-probability* selection method of exploratory groups, purposive formation of groups, is provided (Kardelis, 2007). Here researcher involves persons into group under formation, who, according to him, are typical from the point of view of exploratory feature, who are easy to find and who are near (Tydikis (2003). Exploratory groups in small researches often are formed by not fully following contingency principle. Undoubtedly, so formed groups do not totally reflect the whole population. But the results of such researches may be enough reliable, only if the researcher shall not intend to extrapolate them for all population, that is to transform outside limits of exploratory group. Most often groups are selected using such method, by performing exploratory (preliminary) research (Kardelis, 2007).

221 employees (respondents) of retail chain "Iki" from Klaipėda city participated in this questionnaire. There represented different levels of management:

- middle level managers – 7.2 per cent. The group includes managers of the shop – managers, being in the middle of organisation's hierarchy. They are responsible for shift's principals. They shall report to the manager of highest level for their activity and results;
- lowest level managers - 15.4 per cent, i.e. principals of shifts: managers, who directly manage to employees: cashiers – sellers, production employees shall report for their activity and results to the direct manager;
- principals – 77.4, i.e. employees, actions of which are regulated by managers of the lowest level: 4.1 per cent, - chief cashiers; 70 per cent – cashiers – sellers; 1.4 per cent – employees of meat shop; 3.6 per cent – bakery employees; 1.7 per cent - loaders.

3. Analysis of the research results

Analysing averages and distribution of total assessments (Fig. 2), it could be noticed that greatest personal preferences of respondents are rendered to economical, physical-aesthetic and moral values. Social, spiritual and occupational values are of less importance (sequence). According to subjective understanding of values cherished in the companies, it could be noticed

that the situation is rather different from block of preferences of personal values. Respondents indicated values belonging to the block of moral values and physical – aesthetic values as mostly consistent in everyday activity of the company. Meanwhile economical and social values are especially relevant for employees and such values were evaluated with lowest grades in subjective assessment of values, cherished by the company. Occupational and spiritual values are not so important for an employee, working in network-based organisation.

One can also see that there is a great enough incongruity between values cherished in network-based organisation and subjectively understandable personal values of employees. However, distribution of blocks of organisational and personal values shall not reflect strength of congruence of values. In order to assess compatibility, it is necessary to calculate averages of total assessments of values' blocks of both scales and to compare them. Table 3 contains assessment results of compatibility of values between network-based organisation and employees.

Figure. 2. Congruence of values of network-based organisation and employees' personal values

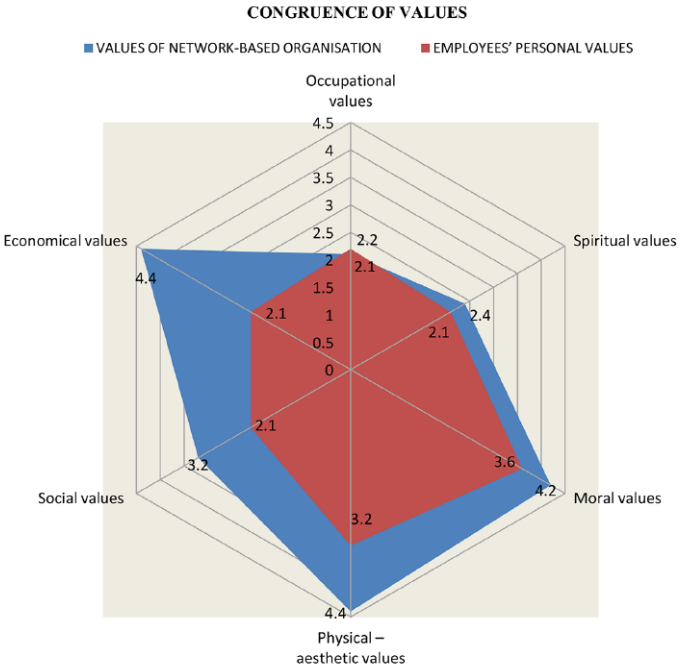


Table 3. Differences of averages of total values of compatibility between values of network-based organisation and employees' personal values

Subscale	Difference of averages	Compatibility (%)
1. Occupational values	0,01	0,8
2. Spiritual values	0,11	9,1
3. Moral values	0,15	12,5
4. Physical – aesthetic values	0,22	18,3
5. Social values	0,22	18,3
6. Economical values	0,49	41,0

Comparing a block of occupational values with the weakest block of economical values, one can see that a difference is high: compatibility of *occupational* values shall only reach 0.8 percent, and it shall allow state that in this area compatibility of values is almost ideal. But incompatibility (incongruence) of block of *economical* values shall reach even 41 percent. It means that incompatibility of employees' economical values with network-based organisation's values shall force back employees' satisfaction with work and orientation to goals of network-based organisation.

Assessments of averages are especially significant for compatibility of values, but averages that were calculated specially for blocks, may partly distort the results. Therefore it is very important to analyse separate statements and their conformity. After all, values shall be dissociated from block of values, assessments of averages shall be analysed both in the scale important for a person and in subjectively understandable scale of values cherished by the company. Therefore it is necessary to determine the most important values of network-based organisation and employees' personal values, that collected most of assessments (total averages) (Table 4).

Table 4. Values of network-based organisation and employees' personal values that collected most of total assessments

Serial No.	Values of network-based organisation		Employees' personal values	
1.	Responsibility	4,394231	Remuneration for performed work	4,709091
2.	Dutifulness	4,389423	Encouragements for good work	4,637615
3.	Quality	4,418269	Physical health	4,605634
4.	Honesty, honest behaviour	4,309179	Social guarantees	4,596330
5.	Reputation of the company	4,361905	Industrial safety	4,576744
6.	Image of the company	4,342857	Support of work supervisor	4,566210
7.	Well organised work	4,277512	Tolerance	4,454976
8.	Transparency, transparent activity	4,275362	Friendly relations at work	4,548387
9.	Social guarantees	4,271429	Responsibility	4,535545
10.	Reliability	4,270531	Dutifulness	4,523585

As one can see from Table 4, according to the assessment of respondents, such values as responsibility, dutifulness, quality, honesty, reputation of the company, image of the company are mostly cherished in network-based organisation. Largest part of them shall depend to spiritual and moral blocks of values. Only one value that is social guarantees, from block of social values fell into 10 of mostly felt values. Whereas, five social and economical values important for employees fell into 10 according to total assessments. It's remuneration for performed work, encouragement for executable work, social guarantees, support of work manager and friendly relationship at work. A very important value for employees was also determined. It's physical health which depends on physical factors. But, no occupational values were mentioned among 10 of the most important values. It shall enforce managers of network-based organisation to think about importance of these professions in social working environment, as changes in the market shall dictate new attitude: employees are being treated as investments; significance of continuous learning is being accented; team work is being evaluated more and more.

Such values were selected according to total averages of values' assessments which shall distinguish by strong congruence (Table 5), and such, which shall distinguish by weakest congruence (Table 6).

Table 5. Strongest compatibility assessments of values between network-based organisation and employees' personal values

No.	Values			Difference of averages	Incongruence
	Title	Organisation's	Personal		
1	Keeping of secrets	4,285024	4,288462	0,003437	0,040075
2	Dissociation from politics	3,517073	3,500000	0,017073	0,199050
3	Procedure rules	4,267943	4,247619	0,020324	0,236944
4	Loyalty to organisation	3,947368	3,921569	0,025800	0,300790
5	Creativity	3,932367	3,904762	0,027605	0,321839
6	Possibility to seek for career	3,855072	3,813397	0,041675	0,485877
7	Importance of values	4,144231	4,095238	0,048993	0,571187
8	Various new challenges	3,845411	3,796209	0,049202	0,573629
9	New ideas	3,956731	4,009524	0,052793	0,615494
10	Image of the company	4,342857	4,267606	0,075252	0,877329

Table 6. Weakest compatibility assessments of values between network-based organisation and employees' personal values

No.	Values			Difference of averages	Incongruence
	Title	Organisation's	Personal		
1.	Remuneration for performed work	4,042453	4,709091	0,666638	7,77208
2.	Encouragements for good work	3,985782	4,637615	0,651833	7,599469

3.	Friendly relations at work	4,076555	4,548387	0,471832	5,500911
4.	Convenient working environment	4,071429	4,516432	0,445003	5,188125
5.	Support of work supervisor	4,174757	4,56621	0,391453	4,563799
6.	Physical health	4,244019	4,605634	0,361615	4,215928
7.	Comfortable working environment	4,142857	4,495327	0,35247	4,109313
8.	Respect for colleagues	4,109524	4,43662	0,327096	3,813487
9.	Social guarantees	4,271429	4,59633	0,324902	3,787905
10.	Awards for loyalty	3,817308	4,134259	0,316952	3,695218

According to data of received researches (Tables 5 and 6), one can see that mostly combined are those values, for which respondents imposed smallest preferences in personal life and by evaluating values, cherished by network-based organisation. Whereas the greatest incompatibility occurs between such values, for which respondents gave greatest preferences in personal life. As in case of analysis of blocks of values, we can see that the greatest incompatibility is between economical and social values. Therefore managers of network-based organisation should pay attention to these values. Especially it is necessary to use immaterial measures for encouragement of employees and apply measures for strengthening loyalty.

When analysing the research results, it was determined that great enough compatibility of values is observed in formal level, which couldn't be said when analysing compatibility of values in accordance with methods defined by scientists. Therefore it should be stated that network-based organisation may survive latent incompatibility of values, as an incongruity between that, what is formally declared and that, what are real personal expectations of employees and how much managers of network-based organisation shall consider to these expectations will occur. Managers shall reach compatibility of values in network-based organisation through self-reflexion of employees.

In summarising empirical research, we shall distinguish the following aspects as the most important:

- first of all, great enough incompatibility between values cherished by network-based organisation and employees' personal values shall exist (large incongruence exists);
- secondly, spiritual and moral values are mostly cherished in network-based organisation. Such values are close to cherishing of social responsibility, whereas social and economical values shall dominate among employees' values;
- thirdly, the following values are considered as congruent in the system of values of network-based organisation: social responsi-

bility, compliance with legislation, dissociation from politics, love for buyers, respect for colleagues, honesty (honest behaviour), transparency (transparent activity), keeping of secrets, positive attitude. However, no occupational values were mentioned as the most important.

Managers of network-based organisation are required to seek that organisation's values and employees' personal values would be as much combined as possible, in such way forming guides of network-based organisations, philosophy and politics, helping employees to understand value of team work and contributing to seeking of company's goals. Therefore practical actions of employees of network-based organisation will be purposeful and give required results, and a profit received in network-based organisation is inevitable result of such activity.

Conclusions

A necessity in network-based organisations is understandable and possibilities for occurrence and development of new attitude towards increase of organisations' success shall form. Since values shall determine activity of employees and direction of their behaviour, so as much as possible employees should be involved in the process of compatibility of values, whom the managers consider as necessary in this process, as later this would more "inspire", motivate such employees to realise management effects selected at later stages, would remove or reduce a resistance to changes in new direction, since it would correspond to their values. Personalities (leaders), who are able to release and manage artificial processes, which would form new thinking and would combine values in network-based organisation, are necessary. Managers should create situations, that such employees could satisfy their needs of self-expression and relate it with implementation of company's goal.

The research performed in network-based organisation showed that quite great incompatibility between values cherished by organisation and employees' personal values shall exist (great incongruence shall exist). Spiritual and moral values, which are close to cherishing of social responsibility, are mostly cherished in network-based organisation. No occupational values were mentioned in 10 of the most important. Meanwhile, mostly social and economical values shall dominate between employees' personal values. The following values are combined in the system of values of network-based organisation: social responsibility, compliance with legislation, dissociation from politics, love for buyers, respect for colleagues, honesty (honest behaviour), transparency (transparent activity), keeping of secrets, positive at-

titude. For improvement of situation it was offered to apply purposeful politics of education of employees' value-based orientation in network-based organisation, to solve leadership problems and to more increase level of compatibility of values between organisation and employees.

Diagnosis of compatibility of values in network-based organisation is not only a measure, creating regular management system, but also an ideological motive power of all employees, with the help of which network-based organisation shall implement its goals.

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