

MODAL SPLIT IN THE SECTOR TRANSPORT – FORWARDING – LOGISTICS

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Abstract: *The article presents selected results of modal split research in the Transport – Forwarding – Logistics (TSL) sector. The conducted research was based on a deliberately chosen sample of entities providing services related to transport and logistics and forwarding, the purpose of which was to identify key factors shaping modal split in the TSL sector among entities operating in the area of the Silesia-Zagłębie metropolis. The study focuses on the problem of modal split from the perspective of qualitative conditions in the metropolis of Silesia and Zagłębie. The article consists of three parts. First of part, the article describes the modal split structure of the Silesia-Zagłębie metropolis. The author identified two perspectives on qualitative research of determinants, the structure of determinants and factors. In the second part, the previously identified factors and structure of qualitative determinants shaping the modal splits in the Silesian-Zagłębie metropolis were analyzed. The methodological result of the research is the proposition of measuring modal split in the sector transport – forwarding – logistics of the Silesia-Zagłębie metropolis. In the application part, on the example of the Silesia-Zagłębie metropolis, the results of surveys conducted among entities from the TSL sector operating in the metropolis were analyzed. The proposed research goal has been achieved. Finally, the author presented the results of the research for the Management Board of the Silesia-Zagłębie metropolis.*

Key words: *modal split, transport, forwarding, logistic*

JEL codes: *R4,O1,O2,O3*

1. Introduction

Although the problem of modal shift is not a new issue in economic theory, it is worth focusing more on contemporary aspects of this issue, and especially with regard to the structure of flows in the transport sector – forwarding – logistics in the Silesia-Zagłębie metropolis. The essence of the issue of modal shift focuses on the growth of demand and supply for one of the models of operating in the sector transport – forwarding – logistics, while falling to others, which happens when one of the branches performs services more effectively than the others. The essence of modal split can, therefore, concern various categories and be related to the effectiveness of costs, time, flexibility or reliability of service in the transport – forwarding – logistics sector. The scope and relations of the concept of modal shift can, therefore, polarize both quantitative as well as qualitative categories of the sector transport – forwarding – logistics. What is more, the determinants shaping the dynamics of modal shifts in the sector transport – forwarding – logistics can also be diverse. The essence of modal shifts is therefore a dynamic category that has a certain construction and direction of development, however its form is variable by various determinants, endogenous functioning in the sector transport – forwarding – logistics, as well as exogenous ones affecting the sector. The key category determining the development of modal split is, therefore, the structure of determinants, their dynamics and direction of development. Thus, modal split can be defined as the relation of changes in demand and supply related to the level of efficiency in the sector transport – forwarding – logistics, shaped by quantitative and qualitative determinants. While the quantitative determinants of shaping the dynamics of modal split are well presented in the subject literature and have a specific structure, most often taking the form of transport relations, storage, information and financial flows, within the sector transport – forwarding – logistics and the environment, qualitative determinants, they are a category strongly polarizing heterogeneous factors such as - value, knowledge, experience, competence, or adaptability,

etc. The sector transport – forwarding – logistics is an important issue in the functioning of the Silesia-Zagłębie metropolis, in particular the structure of qualitative determinants being a factor of modal split. On the one hand, it is worth identifying the qualitative determinants of changes in modal flows in the Silesia-Zagłębie metropolis, and, on the other hand, a closer look at their structure. The aim of the study is to answer two questions: what qualitative factors determine modal split in the sector transport – forwarding – logistics of the Silesian-Zagłębie metropolis? What is the structure of qualitative determinants shaping the structure of modal flows in the metropolis of Silesia-Zagłębie?

The Silesian-Zagłębie Metropolis is a new organizational structure functioning in the province Śląsk in Poland, since 1 July 2017 and associating 41 municipalities gathered in the upper Silesian Metropolitan Union on an area of 2,500 km², inhabited by over 2 million people (figure 1).

Fig. 1 The area of the Śląsko-Zagłębiowska metropolis



Source: www.gzm.org.pl

The Silesian-Zagłębie Metropolis is the largest area in Poland, which also concentrates the leading part of the entities of the transport sector – forwarding – logistics. In the area of the Silesian-Zagłębie metropolis, there are over 240,000 business entities producing 8% of Poland's GDP.

2. Methodology and Data

Conducted research in a purposefully selected area, standardized by a questionnaire, inspired among others by the author's experience, were to identify the types and structure of qualitative factors determining modal flows in the sector transport – forwarding – logistics of the Śląsko - Zagłębie metropolis. The research technique was a survey, a research tool, a questionnaire addressed to the flu of entities in the sector transport – forwarding – logistics operating in the metropolis of Silesia - Zagłębie. The diagnosis was carried out in September 2017 - December 2017 year. Based on 43 observations allowed for further research, separated from the group of surveyed entities of the sector transport – forwarding – logistics of the Silesia-Zagłębie metropolis, which accounted for 61.4% of correctly completed questionnaires (N = 70). The collected research material was subjected to further analysis, where the level of significance was assumed to be $\alpha = 0.05$, which allowed to organize the collected data, and thus to achieve the assumed goal. To determine the degree of acceptance of individual quality determinants in modal flows, a five-point Likert scale was used. In addition to identifying qualitative factors affecting the modal flows in the Silesian – Zagłębie metropolis, the study also determined their structure. As the subject matter, the determinants of quality determining modal flows in the transport sector – forwarding – logistics of the Silesian-Zagłębie metropolis were recognized. The substantive scope of the study focused, therefore, on the identification of quality determinants and then on the definition of their structure in the sector transport – forwarding – logistics of the Silesian-Zagłębiowska metropolis. The quality determinants were:

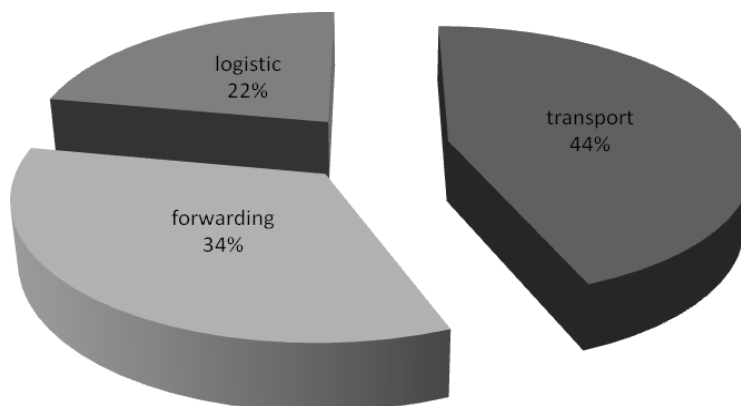
- customer value in the TSL sector,

- knowledge-based economy in the TFL sector,
- experience in the TSL sector,
- professional competence in TSL,
- adaptability to changes taking place in the TSL sector.

3. Results and Discussion

Structural relations of sector transport – forwarding – logistics are presented in figure 2.

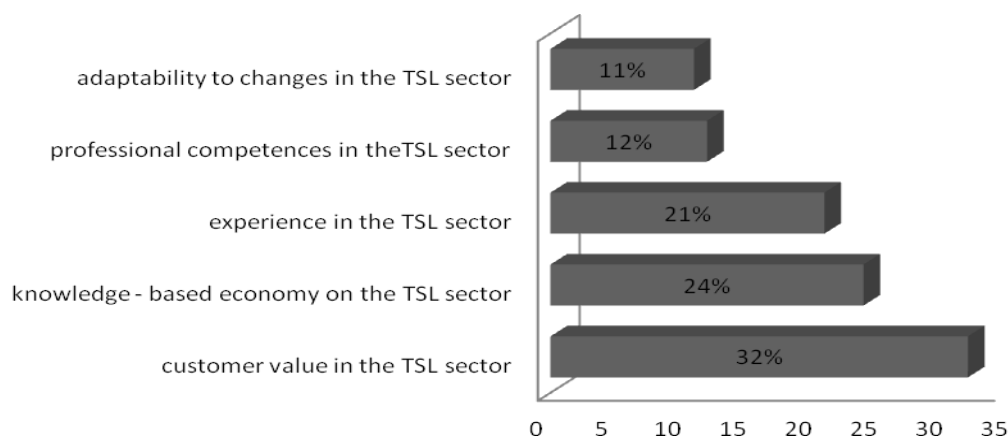
Fig. 2 Structure of the surveyed entities of the sector transport – forwarding – logistics of the Silesia-Zagłębie metropolis



Source: Own study

The results of empirical research on the identification of qualitative shaping determinants, modal split in the Silesia-Zagłębie metropolis indicate that the surveyed entities of the sector transport – forwarding – logistics – the client's values in the TSL sector are the most important 32 %, then knowledge - based economy on the TSL sector 24%, experience in the TSL sector 21% and professional competences In the TSL sector 12% and adaptability to changes in the TSL sector 11% (figure 3).

Fig. 3 The structure of factors determining the shaping of modal split of the surveyed entities of the sector transport – forwarding – logistics of the Silesia-Zagłębie metropolis



Source: Own study

The value of the client is an issue which he paid particular attention to and introduced into the literature of the subject Drucker (1954). The customer value issue was also taken by Miller and Lewis (1991), who notes that the value-sharing model should cover the values of all kinds (economic, social, psychological, etc.), rather than focusing only on the economic aspect. The polarization of the customer value issue is reflected in the various aspects of this issue. Some authors of Calciu and Salerno (2002) define the value of the client as a customer's

preferences and perceptions about the attributes of the product, its functioning and the consequences resulting from its use, which enable or prevent achieving goals in the process of use. This is a broad definition as it places the customer's values both before and after the product is used. The values for the client may be emotional and cognitive in nature, and may also refer to the attributes of the product, which is the sector transport – forwarding – logistics and resulting consequences. Gives a fairly abstract definition of value for the client, which is interactive and relativistic preferences and experiences. As Smith and Colgate (2007), this definition reflects the most important feature of value for the client. These values are perceived in a unique way by the client, they have a contextual character, because they depend on the situation, the product, the consumer, and dynamic, because they are variable over time. Szymura-Tyc (2006). adds that the value for the customer is a perceived quantity, because only the values he noticed, and not those he actually obtained, count for the client According to Samuelson and Nordhaus (2004), the concept of customer value is similar to the microeconomic concept of usability. It means the ability to meet needs and determines the subjective pleasure, benefit or satisfaction of possessing goods. However, the concept of utility does not include the costs of purchasing the product and concerns the benefits occurring after its purchase. Dobiegała-Korona (2006) reminds that the crown has also been drawn to the value of the customer or the value for the client. In the transport – forwarding – logistics sector, the customer's value has not been specified so far. For the needs of the presented study, it is assumed that the value of the client is a set of benefits achieved in the exchange process with the provider of transport services – forwarding – logistics.

Another issue analyzed in the course of research is the question of a knowledge-based economy. This issue in the presented studies reached the level of 24% and ranked second, among the examined determinants. The knowledge economy is basically based on three pillars – human capital, ICT – informatics and telecommunications, and innovation systems based on R + D. Knowledge-based economy is a relatively new issue that appeared in economic considerations in the 1970s, and referred to the theory of technological waves of Alvin Toffler, for which a key element of development is technology, referring to groundbreaking inventions implemented by man throughout history. The essence of the concept of a knowledge-based economy in the sector transport – forwarding – logistics refers to a gradual transition from material-intensive relations based on economies of scale to relationships related to intellectual potential, where innovation is a key aspect. According to this concept, in the transport – forwarding – logistics sector, it is possible to talk about cargo and information flows in the agrarian, industrial and post-industrial wave (Brand et al., 2009). For the agrarian wave, skills related to the popularization of agriculture, and thus those aspects which concerned the transport of agricultural products and their storage and storage became characteristic. The industrial wave based on a steam engine, as the most important invention shaping the development of relations in the transport sector – forwarding – logistics, is characterized in particular by the emergence of new means of transport, organizing transport and the development of logistics networks based on standardization and unification of processes (Cidell, 2011). The post-industrial wave is characterized by mass application of modern technologies, especially information technologies, which give almost unlimited possibilities of data transfers. Based on the knowledge base in the organization, Darroch and Naughton (2003) defined the category of the company's orientation to knowledge management. The influence of orientation on knowledge management on innovation, the enterprise and its economic results was determined. It is worth emphasizing that the authors distinguish between the orientation on knowledge management and knowledge orientation. It was pointed out that knowledge management is the management of procedures, systems, people, and tools that are revealed in the form of specific organizational practices.

Another of the identified determinants of quality during the study of modal split in the Silesian-Zagłębie metropolis was experience in the transport – forwarding sector – logistics. Experience in the transport sector - logistics forwarding achieved the level of 21% in the study, which should be considered a high level in relation to other shaping parameters, quality of modal flows. Experience is a desirable total of knowledge and skills that allow accurate assessment of events and prediction of their effects during the implementation of services related to the transport sector – forwarding – logistics. The experience may refer to both mentally unhealthy and directly experienced events, as well as to the wisdom acquired as a result of further reflection on these events or their professional interpretations of events gained during the provision of services in the transport sector – forwarding – logistics. There are many entities in the Silesian-Zagłębie metropolis, whose employees represent the highest level of professional experience shaped by successive generations. Professional experience in the transport – forwarding sector – logistics, which builds personal ties between participants of business relationships, and further shapes the level of trust in the brand, building the level of competence of a specific entity in the TSL sector.

Adaptability to changes in the transport sector – forwarding – logistics is another category of modal split research, which achieved the level of 11%. Adaptability to change is a complex need to adapt the implementation of services in the transport sector – forwarding – logistics to new, changing conditions on the market. Adaptability to changes in the transport sector – forwarding – logistics can also be perceived as a

planned and controlled modification of a given entity's functioning as a reaction to the changes made or expected to improve its effectiveness (Bordoloi et al., 1999).

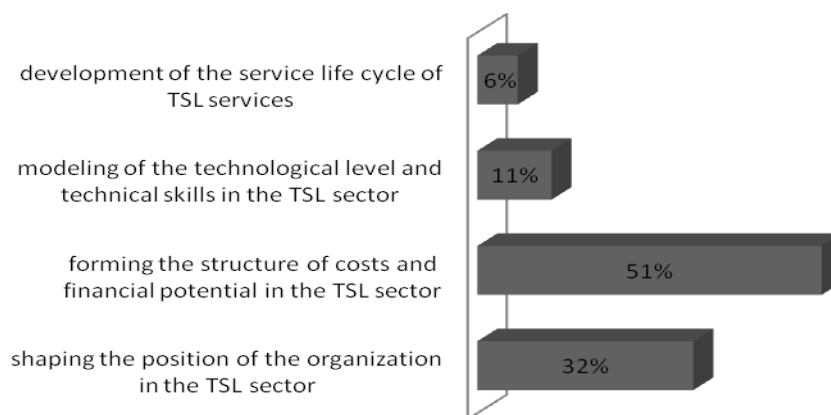
Analyzing individual identified in the research quality determinants shaping modal shifts, among the surveyed entities of the transport sector – forwarding – logistics of the Silesia-Zagłębie metropolis, it should be stated that so far any research describing the presented issues, therefore, presented research results should be treated as a base, being starting point for further more in-depth analyzes and confrontations in the future. The results of the presented research should therefore be treated only in cognitive categories and can be used in situations where the researcher is interested in deepened knowledge about a subject and getting to the heart of the problem when the representativeness of the results is not needed, but rather getting to know the essence of the phenomenon. Due to costs and time, qualitative research is carried out on a smaller number of cases than quantitative ones. Qualitative research aims to look at the "outside world" (reality studied in its natural environment), as well as to describe, interpret and explain various phenomena from an internal perspective in many different ways (Flick, 2010).

Another issue that is being considered is the structure of qualitative determinants shaping the structure of modal split in the Silesian-Zagłębie metropolis. The structure of qualitative determinants shaping modal split in the sector transport – forwarding – logistics, has been captured from two perspectives. The first of these perspectives is related to the development of the strategic potential of the sector transport – forwarding – logistics, operating within the Silesian-Zagłębie metropolis, where the following factors were examined:

- shaping the position of the organization in the TSL sector,
- forming the structure of costs and financial potential in the TSL sector,
- modeling of the technological level and technical skills in the TSL sector,
- development of the service life cycle of TSL services.

Figure 4 presents the results of diagnoses of the strategic potential development of the surveyed entities of the sector transport – forwarding – logistics of the Silesian-Zagłębie metropolis.

Fig. 4 Structure of the strategic potential development of the surveyed entities of the sector transport – forwarding – logistics of the Silesian-Zagłębie metropolis



Source: Own study

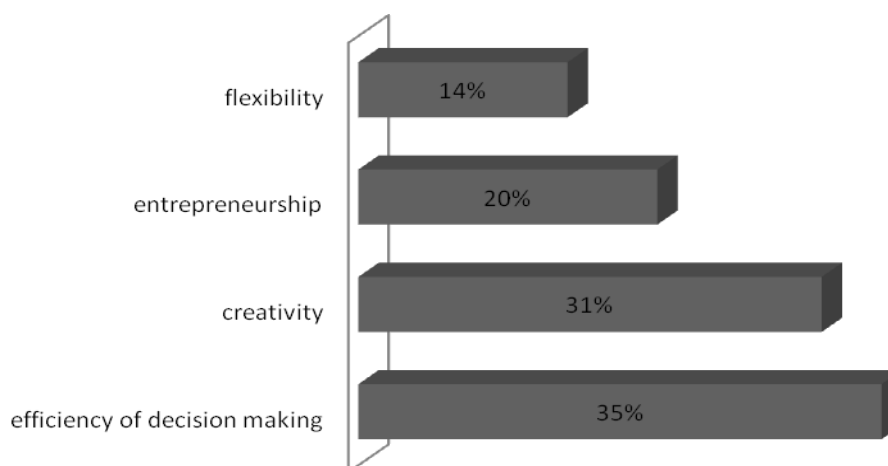
The results of research on the relationship between the development of strategic potential shaping modal shifts seen through the prism of sector transport – forwarding – logistics of the Silesian-Zagłębie metropolis (figure 4), indicate a clear dominance of the cost structure and financial potential of 51%, which is quite interesting, especially in the results of items achieved in the sector transport – forwarding – logistics of 32%. The relation of the obtained results may indicate very strong cost competition and the necessity of shaping the financial potential, irrespective of the position of the given entity in the sector transport – forwarding – logistics. It can also be assumed that among the subjects of the transport sector – forwarding – logistics, there is a competition for survival. However, the proposed hypotheses should be checked in the context of further more in-depth studies. Quite surprising are also low results regarding the level of technology and technical skills 11%, and the life cycle of services in the sector transport – forwarding – logistics of 6%. Such a combination of the obtained results may confirm the hypothesis of survival. Generally, it can be stated that the development of the strategic potential of the surveyed entities of the sector transport – forwarding – logistics is concentrated within the Silesian-Zagłębie metropolis, around financial issues that today define the directions for the development of

strategic potential. The second examined perspective was the quality of management within the framework of qualitative determinants shaping the modal shift in the Silesian-Zagłębie metropolis was defined by the prism:

- efficiency of decision making,
- creativity,
- entrepreneurship,
- flexibility.

The results of research on the quality of management of the surveyed entities of the sector transport – forwarding – logistics in the metropolis of Silesia-Zagłębie is presented in figure 5.

Fig. 5 Structure of the quality of management of the surveyed entities of the transport sector – forwarding – logistics of the Silesia-Zagłębie metropolis



Source: Own study.

The results of research on the second perspective, i.e. the quality of management among entities of the transport sector – forwarding – logistics in the Silesia-Zagłębie metropolis, slightly change (figure 5). The results of the diagnoses indicate two determinants - 33% decision efficiency and 31% creativity, against the other determinants, and 20% entrepreneurship and 14% flexibility. High level, especially efficiency in decision making and creativity are determinants that are required for the management of entities operating in a dynamic environment - the transport sector – forwarding – logistics. Conditions of the rapidly changing environment - the sector transport – forwarding – logistics impose premises, quality of management. Therefore, it would be necessary to examine, within the framework of more in-depth studies, modal shifting what is the impact of external factors affecting the sector transport – forwarding – logistics shaping the quality management conditions on entities involved in the TSL sector services, thereby verifying the hypothesis about the dynamics of the environment variability. Meanwhile, it can be said that the management quality relations of the surveyed entities of the sector transport – forwarding – logistics are concentrated within the Silesia-Zagłębie metropolis, around the issues of decision-making efficiency and creativity, which currently determine the directions of development of management quality, as confirmed by research.

4. Conclusions

The results of research on modal shifts in the transport – forwarding sector – logistics of the Silesian-Zagłębie metropolis brought quite an interesting picture which, viewed from the perspective of factors shaping modal split and the structure of quality determinants, allowed the issue to be significantly examined. First of all, it should be stated that the presented research results and their results are character of pioneer diagnoses, no qualifications have been made so far in the transport sector – forwarding – logistics in the Silesia-Zagłębie metropolis. The image of modal shift in the transport sector – forwarding – logistics of the Silesia-Zagłębie metropolis, outlined in the research, illustrates the following problem – dynamically changing relations shaped around the preferences of decision efficiency and creativity as part of the quality of managing one side and shaping cost relationships and financial preferences on the other hand, with essentially two-three leading factors determining the quality of the relationship, customer value, knowledge-based economy and experience in the TSL sector.

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