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E-SERVICES IN BUSINESS MODELS OF ENTERPRISES IN THE LOGISTICS SECTOR

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Abstract. Most of the available papers on the logistics sector identify the type of the business model with the type of logistics service providers, distinguishing between three to five business models. These models most often focus, almost exclusively on the complexity of the logistical services and their scope. The more complex a logistic service is, the more benefits it brings to the company. This is a result of the increase in added value and key competences, and a decrease in the intensity of resources usage. Expanding logistics services to include e-services significantly improves the position of a company in the so-called pyramid of logistics services. The purpose of this article is to identify the use of e-services among the enterprises of the logistics sector and to examine the impact of the use of e-services on the quality of the business model. The realization of the objective was possible thanks to a study carried out among the logistics sector companies that participated in the twentieth edition of the Polish ranking of enterprises in the logistics sector. The analysis of the data from the concluded study was conducted with the use of the methods of multivariate statistical analysis: cluster analysis and correspondence analysis. The carried out study of selected companies of the logistics sector leads to the conclusion that the use of e-services in their offer has a positive effect on the quality of the business model. Offering e-services adds value for the customer, as well as the value for the company, as evidenced by the improved financial condition of enterprises that use e-logistics.

Keywords: business models, logistics sector, e-services, e-logistics, cluster analysis, correspondents analysis.

JEL Classification: M21, R410.

Introduction

Describing the activities of a company with the use of a business model is gaining wider recognition in management sciences. The vast majority of authors interpret the business model as a brief description of the company's activities, indicating its key sources of profit, the way to achieve them and, above all, value for the customer.

Many authors have increasingly been using the concept of an innovative business model. In this approach the value of the company is essential for the innovation of a model. This value is mainly co-created by its internal and external relations developed with proven business partners and employees, effective protection of intellectual property, and smooth running of processes. Specialist in business models – S. Kaplan, it expresses a very general view that the business model of the organization needs to change if its ability to create and deliver value to customers and profit from the generated value decreases (Kaplan 2012). In turn, Ch. Zook and J. Allen state that organizations are considering redesigning the business model in a situation of weakened stand out against competitors and struggle with excessive complexity of business (Zook and Allen 2001). The more specific the views expressed R. G. McGrath. The author mentions three reasons to suggest that the current business model may require changes. These reasons are: lack of ideas for new products offered by the organization, growing customer interest in alternative proposals, worse financial results and decrease performance indicators (Cliffe 2011). A good way to change the business model is the introduction of e-services in the business. The introduction of e-services

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to the business model of a company can contribute to the growth of innovativeness of the business model. The use of information and communication technologies (ICT) is essential for differentiation and diversification of services, which the company copes better in a highly competitive business (Evangelista and Sweeney 2006).

Most of the available papers on the logistics sector identify the type of the business model with the type of logistics service providers, distinguishing between three to five business models. These models most often focus, almost exclusively on the complexity of the logistical services and their scope. The more complex a logistic service is, the more benefits it brings to the company. This is a result of the increase in added value and key competences, and a decrease in the intensity of resources usage. Expanding logistics services to include e-services significantly improves the position of a company in the so-called pyramid of logistics services. The result is that competitive advantage in the logistics sector has been shifted to creating value chains whose activities are directly or indirectly assisted by e-business (Disney et al. 2004, Gunasekaran et al. 2002, Landers et al. 2000, Marchet et al. 2009).

The purpose of this article is to identify the use of e-services among the enterprises of the logistics sector and to examine the impact of the use of e-services on the quality of the business model.

The realization of the objective was possible thanks to a study carried out among the logistics sector companies that participated in the twentieth edition of the Polish ranking of enterprises in the logistics sector in 2014. The analysis of the data from the concluded study was conducted with the use of the methods of multivariate statistical analysis: cluster analysis and correspondence analysis.

1. Specificity of the business model

Despite the existence of numerous publications on the concept of a business model, so far that concept has not been clearly defined. The lack of conformity regarding the interpretation of the term "business model" results, among others, from a variety of contexts in which the term is used. The ambiguity of the concept of a business model in scientific publications has become a motive to be undertaken by some authors attempting to develop a synthetic definition. The authors of the book about the design of business models A. Osterwalderand Y. Pigneur state that a business model describes the rationale behind the manner in which an organization creates and delivers value and gains profit from that generated value (Osterwalder and Pigneur 2010). In turn, A. Afuah defined business model as a set of actions conducted by a company, methods and manner of their application, and the time of their execution, so as to provide benefits to customers, and ensure profit for the company (Afuah 2004). A different definition of the business model is proposed by K. Obłój, according to which the model is a combination of the strategic concept of a company and the technology of its practical implementation, understood as the construction of the value chain allowing for the effective operation and restoration of resources and skills (Obłój 2002). Despite the differences in definition, it is easy to see that some features of the business model are common for every approach. All definitions indicate that a business model describes the logic behind the actions of a company, provides organizational and financial business architecture, defines the interactions with external stakeholders and the resources held by the company, as well as its strategic orientation. A business model is what mediates between innovation and the creation of economic value (Chesbrough and Rosenbloom 2002).

To understand the specifics and principles of functioning of a business model it is important to recognize the elements making up that model. Figure 1 shows the structure of a business model proposed by M. W. Johnson, C. M. Christensen, and H. Kagermann. The authors of the presented concept of the structure of a business model

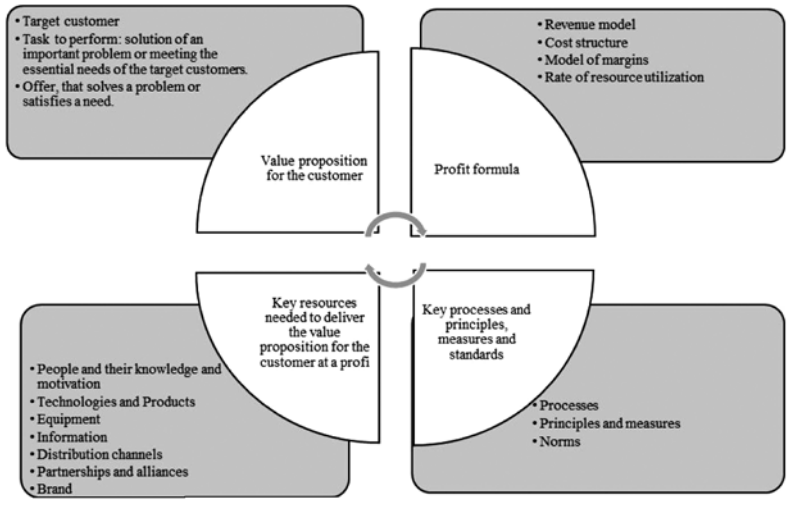

Fig. 1. Structure of business model (source: adapted from Johnson et al. 2008)

postulate that a business model should consist of four main components. These elements together form value both from the perspective of the organization itself, as well as from the perspective of its customers.

According to the authors of the concept under discussion, the biggest challenge facing the organization in the process of defining or redefining the business model is the refinement of the first of these elements – value proposition for the customer. At this stage it is particularly important to identify the target customer, which will help to create a special value for that customer. When the target customer is determined, the organization has a task to perform. This task is to solve a problem, important from the point of view of the customer, or to satisfy his essential needs. Understanding the nature of the problem and all its aspects enables the company to create an interesting offer. The more important a problem is to the customer, the lower the level of his satisfaction with currently available options to resolve the problem, and the more our solution will surpass the available alternatives, the better the offered value proposition will be (Johnson et al. 2008).

The second element of a business model is the profit formula. Through the profit formula should be understood as a plan that determines the way in which an organization creates value for itself while offering value to the target customer. The profit formula consists of such elements as the revenue model, cost structure, model of margins and the rate of resources utilization.

Having formulated a value proposition for the customer and for its own activities, the organization should take into account key resources and processes necessary to deliver this value. Key resources are tangible or intangible assets such as people with their knowledge and motivation, products, technologies, pieces of equipment, information, brand (and interactions between them) that create value for the organization and the customer. In organizations, in addition to the resources, there are also various kinds of key processes of operational and managerial nature that allow them to offer value in a reproducible manner with the possibility of scaling. Examples of such processes are: training, development, production, sales and customer service. The category of key processes also includes principles, measures and standards of an organization.

The described four elements form the basis of business activity. Value proposition for the customer and the profit formula define value – respectively – for the customer and the organization. In contrast, key resources and processes describe the manner in which that value will be provided to both parties. It should be emphasized that there are strong dependencies between the individual elements of a business model. As a result of the occurrence of these interactions, a significant change in any of the components will affect other elements and the entirety of a business model (Johnson et al. 2008).

Most definitions of business models and the approaches to building these models have several common characteristics. The most important element is the creation of value for customers, but the creation of revenue models is no less important as well. In addition, a business model should determine the company's position in the value chain, that is the interaction of the company with external actors, as well as the company's resources and strategic objectives (target market, competitive strategy) (Nenonen and Storbacka 2010). The concept of creating value through a business model is important for all companies, regardless of the sector in which they operate. The business model should be presented in an intelligible form. A practical solution to this issue was proposed by Osterwalder and Pigneur (Osterwalder and Pigneur 2010). The tool, which they have presented, that is the business model canvas, contains nine related blocks: value proposition (value offered by an organization to its customers), key actions (actions that the organization must take to ensure proper functioning of its model), key partners (element of the model that describes the network of suppliers and collaborators, which determine the smooth functioning of the company), key resources (assets necessary for the implementation of the business model, may include physical, financial, intellectual and human resources), customer segments (element indicates the groups of customers supported by the organization), channels (value proposition reaches the consumers through the channels of communication, distribution and sales), customer relations (organization forms relations with individual customer segments), revenue streams (are the result of the implementation of value propositions; they symbolize the amount of cash generated by the company in connection with customer service), cost structure (tells the manner, in which the individual elements of the business model affect the specific cost structure).

Business models should be systematically evaluated, reviewed and updated to create new strategic alternatives. This evaluation is an important contribution to the gradual improvement of the business model and thus the development of a company on the market.

2. Business models of companies in the sector of logistics

Only few authors attempt to formulate the concept of business models for the logistics sector. There are individual solutions that are characterized by different levels of detail and scope of the industry is not always understood in the same way. Differences in the interpretation of the logistics sector and related services cause differences in interpreting what the business model of a logistics company is.

Most of the available papers on the logistics sector identify the business model with the type of logistics service providers, distinguishing between three to five business models.

These are most often models focusing almost exclusively on the complexity of the logistics services and their scope.

This method of classification means the distinction of the following types of logistics operators (see Fig. 2):

- 1 PL – internal department of a company or an equivalent external company, satisfying its internal transport and storage demand;
- 2 PL – logistics service provider performing the function of a carrier or freight forwarder or a department of the production company realizing these functions;
- 3 PL – company providing logistics services, usually in the framework of contract logistics, independent of suppliers and customers;
- 4 PL – logistics integrator providing logistics services more developed and comprehensive than 3 PL, possessing competence in the modern management of logistics processes, along with an extensive information and communication sphere, however, not bearing the high costs of capital- intensive material resources;
- 5 PL – highest level of logistics services in the hierarchy, still located in the realm of theoretical concepts, and not real economic practice.

The models contained in the Pyramid above (4 PL and 5 PL), due to the limited burden of material resources, are the least capital intensive and are characterized by the highest acquired margins of the offered services. The degree of maturity of the model according to the Pyramid should also condition the amount of achieved income. In fact, usually the benefits of using logistics services are proportional to the degree of their complexity. Simple logistics services characterizing the companies from the lowest levels of the Pyramid (1 PL, 2 PL) are burdened with high capital intensity of the material resources needed for their provision. In addition, the simplicity of these services means that the number of providers of these services is the largest. On the other hand, the need to compete with many similar entities forces the continual reduction of trade margin. This, in turn, necessitates the need to seek new sources of income and the pursuit of such improvements in the business model that will allow the company to achieve a more mature level, i.e. located higher in the Pyramid of logistics services.

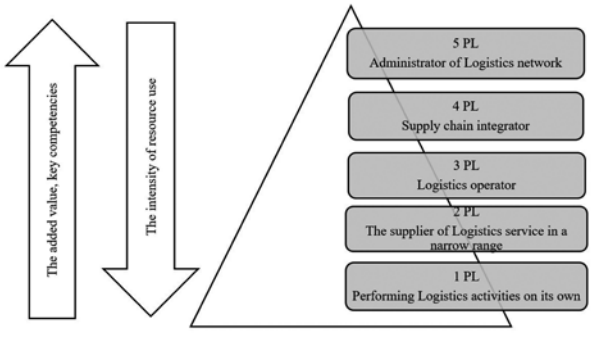

Fig. 2. Pyramid – scope of logistics services (source: own compilation)

The more complex a logistics service is, the more benefits from that service the company gains. This is a result of the increase in added value and key competences, and the decrease in the intensity of resource utilization. Expanding logistics services to include e-services significantly improves the position of a company in the so-called pyramid of logistics services.

3. E-services in logistics

An e-service is the execution of the provided service without the simultaneous presence of the parties (at a distance), through the transmission of data on individual request of a recipient, transmitted and received with the use of electronic processing devices, including digital compression, and the storage of data, which is entirely sent, received or transmitted via a telecommunication network.

The difference between e-services and traditional services is the absence of human intervention on the other side and providing services at a distance. The literature presents a wider concept of the term e-service, as a new form of performing services with the use of the Internet, beginning with the company's contact with the client in order to present the offer, through the ordering of a service, execution of that service and contact with the customer after the completion of the service (Dąbrowska et al. 2009).

In summary e-service is a service that fulfils the following conditions (Śliwiński 2008):

- it is provided through a partially or fully automated process, with the use of information technology,
- it is provided on the Internet and via the Internet,
- it is individualized in relation to the customer's needs or decisions (personalized),
- service providers and users are in different locations (distant service).

E-logistics was created as a result of the development of the logistics services market, which are related to the widely understood distribution and transport. The increasing demands of the market and the increasing competition forced the use of innovative solutions supporting logistics processes. E-logistics often affects the whole organization of the entirety of these processes, starting from making an order, and ending with its implementation.

E-logistics means a broad application of the latest information technologies to support the logistics management of a company (e.g. manufacturing, warehouse management, support of order fulfilment cycles) and to support the board of with its business environment, especially the supply chains (e.g. supplies, distribution) (Wieczerzycki 2013). Providers of e-logistics services can organize the

whole process of order processing (from the moment of its filing to the confirmation of execution of the delivery), therefore they are the integrators of logistics services (4PL level in the TSL pyramid). They can also act as e-markets that associate the available services to address the needs of suppliers and recipients in the supply chains of market goods. 4PL integrators service the B2B market and B2C contacts. In the case of e-markets it is essential to be able to match demand and supply of logistics services in real time on a platform of public online tools.

Next to the advanced solutions based on electronic data interchange (EDI) a number of applications appeared, communicating with the business environment through a standard web browser as well as Internet portals and websites. Portals offer functionalities, which apply the principles specific to exchanges (e.g.: exchange of free freight, vehicles, a wide range of logistics services), price comparison engines (e.g. comparison of fuel prices) or information services (e.g.: service for drivers). The search service of transport connections, supporting the movement in large cities and urban areas is also very useful.

The role of e-logistics in the modern economy is beyond doubt. To meet the challenges, it is necessary first and foremost to deal with logistical problems, the number of which is increasing. In is necessary to individualize the offer of products and services, and thus diversify them, provide customers with quick and small supplies, ensure increasing reliability and flexibility in action to business partners, and move goods quickly and efficiently almost all over the world. All this cannot be achieved with traditional methods of logistics management, and therefore, proper selection and implementation of potential benefits offered by the e-logistics in the functioning of enterprises is necessary, especially for the construction of the increasingly popular e-supply chains.

4. Methodology

In order to identify e-services in the logistics sector and the impact of e-services on the business model of companies, 51 enterprises of the logistics sector were analysed. The selection of companies was not accidental, because these are the companies that have applied to participate and qualified for the twentieth edition of the Ranking of companies of the logistics sector.

The ranking prepared by experts from the Warsaw School of Economics, Blue Media and TNS Poland. Ranking's criteria relate to the financial situation of companies, the number of services provided, scope of activities, contacts with customers. One of the criteria is the implementation of e-logistics by the companies – it is very important from the perspective of my research.

Information from the ranking concerned 74 companies and included data for the year 2014. The own research was based on the data of 51 companies because not all data was available for 74 companies. As a result, a database was created, covering 51 companies analysed according to the following variables:

- X1–Revenue from sales,
- X2–Dynamics of revenue from sales,
- X3–Gross profit,
- X4–Dynamics of gross profit,
- X5–Current assets,
- X6–Dynamics of current assets,
- X7–Number of services offered,
- X8–Conducting customer satisfaction research,
- X9–Offering e-services (e-logistics).

Due to the numerous variables taken into account in the study, the methods of multivariate statistical analysis have been chosen: cluster analysis and correspondence analysis.

Cluster analysis as a method of grouping allows the identification of groups containing similar objects (Tryon 1939). Clustering techniques are used in many different research fields. A perfect summary of many published studies informing about the results of the analysis of clusters is provided by Hartigan (1975). This method is representative of the so-called methods of analysis of interdependence, which means that all variables in the analysis are treated as interdependent without distinguishing between dependent (effects) and independent variables (causes). The purpose of the analysis in such a case is usually the identification of the structure of the examined set of variables or objects. Cluster analysis as a method of grouping allows for the identification of internally consistent groups of objects. The research is carried out in four main phases: selection of variables and adoption of a method for determining similarities between objects (I), choice of the manner of allocation of data objects into homogeneous groups (II), selection of the number of identified clusters (III) and the interpretation and profiling of the obtained clusters (IV).

There are two basic approaches to the problem of clustering: hierarchical and non-hierarchical. In the hierarchical approach, we obtain a hierarchical structure of similarities between objects in the form of a tree called a dendrogram. A variety of ways to obtain the hierarchical trees, reflecting the relations of similarities between objects were developed. They can be divided into three basic groups of methods: links, centroidal and Ward's (Ward 1963).

Among the non-hierarchical methods, the method of k-means should be distinguished, allowing for faster and more efficient grouping of cases. This is an iterative method that allows for the grouping of sets of objects consisting of even a few or several thousand observations. In this method, however, the researcher must specify in advance the number of clusters. Therefore, the two-stage approach is very widely used in research. During the first stage the hierarchical analysis is used to determine the initial number of

groups, and in the second step, the correct classification of objects is performed with the use of the k-means method.

The k-means method divides the entire set of cases into k different, possibly distinct clusters. The algorithm of this method is to transfer objects between the indicated number of clusters in order to minimize variation within clusters and maximize the variation between clusters (Grabiański et al. 1998). Analysing the results of the clustering, the averages for each cluster are examined in every dimension, in order to assess the extent, to which the distinguished k clusters are different from each other. The k-means method relies on the estimation of the distance between clusters and objects.

The article uses the Ward's method and the method of k-means to group the surveyed enterprises of the logistics sector due to their financial condition.

Correspondence analysis is a descriptive, exploratory technique of multivariate statistical analysis, allowing to define the nature and structure of the relationship between qualitative variables, measured in nominal and ordinal scales (Stanisz 2007). Correspondence analysis belongs to the group of incomplete taxonomic methods. This technique, as well as multidimensional scaling, principal component analysis of factor analysis, on the cost of losing some of the information leads to an increase in the transparency of data and simplifies their interpretation. The use of statistics and charts specific for that method provides the researcher with easy, intuitive reasoning on the relationships between the analysed categories of variables (Panek 2009). In general, the correspondence analysis could be considered as a method to decompose the overall chi-square statistics by defining a system with a small number of dimensions, in which the deviations from the expected values are presented. Correspondence analysis is a multi-step procedure, that starts from the arrangement of the data in the contingency table. Correspondence analysis technique includes the following steps (Gatnar and Walesiak 2004):

- Determination of the correspondence matrix, row and column profiles and masses;
- Calculation of the distances between the rows (columns) using the chi-squared metric;
- Presentation of row (column) profiles in the space generated by the columns (rows) correspondence matrix;
- Determination of the average row and column profiles;
- Reducing the dimension of space;
- Plotting the correspondence map, as a common row and column profiles chart (biplot).

The main aim of plotting the correspondence map is to reduce the number of analysed space dimensions by choosing such a low-dimensional subspace in which the chi-square distances between points are shown with the best accuracy (Greencare and Hastie 1987). In this process, the SVD (singular value decomposition) algorithm of the matrix decomposition with respect to specific values is used (Press et al. 2007). Interpretation of the correspondence map allows the researcher to find the diversity within the analysed variables profiles, as well as the co-occurrence of different categories.

Correspondence analysis was used in the article to present the relationship between the use of e-services by the companies of the logistics sector and the maturity of the business model functioning in the company.

5. Findings and discussion

During the first stage of the study the surveyed companies were grouped due to their financial condition. For

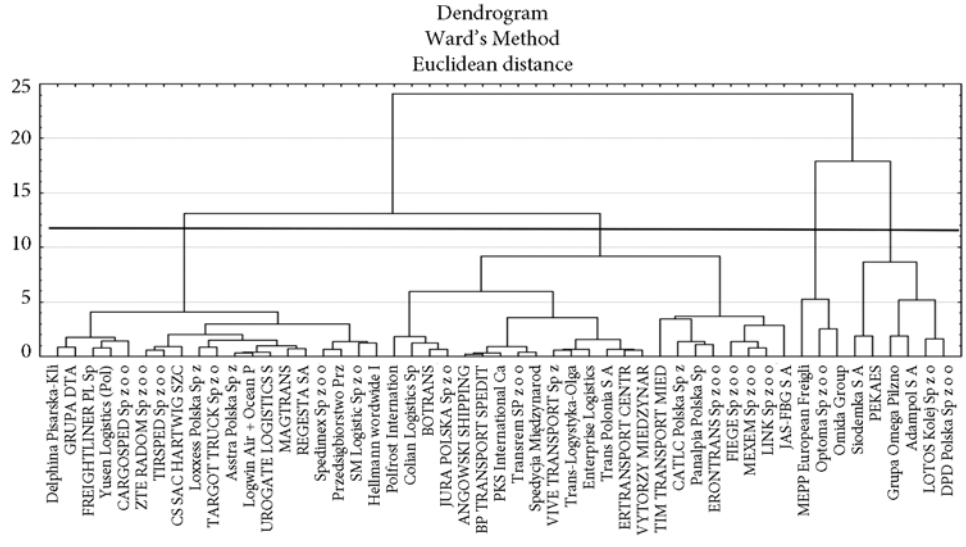

Fig. 3. Clusters of enterprises of the logistics sector grouped based on the financial condition (source: own calculation using STATISTICA PL)

this purpose, the Ward's method of cluster analysis was used, and the variables that were used for the grouping of enterprises into similar, due to the financial condition, groups concerned sales revenue, gross profit, fixed assets and the dynamics of those figures in 2014 compared to 2013 X 1, X2, X3, X4, X5, X6). As a result, four groups of companies in a similar financial condition were obtained (see. Fig. 3).

The resulting four clusters of companies were analysed according to the different financial variables. With the use of the K-mean method an average value of each variable in each of the clusters was determined (see. Fig. 4), and an attempt was made to interpret the results.

By far the highest levels of revenues, profits and assets were recorded in group 4. In this group, however, the dynamics indicators are not too high. This situation is typical for companies active on the market for a long time, which are characterized by a stable financial situation.

A different situation applies to the companies of group 3, where the levels of revenues, profits and assets are the lowest, but a very large increase in sales revenue and fixed assets was recorded in 2014 compared to 2013.

Companies from group 1 achieve average profits, but are characterized by high dynamics because of the profit.

Companies from group 2 are the companies with quite average values of revenues, profits and assets, and also in this group a decline in profit was recorded in 2014 compared to 2013.

The conducted analysis with the use of the k-means method leads to the conclusion that group 4 contains companies with the best and stable financial situation.

Later in the study an attempt was made to examine the relationship between the use of e-logistics and the business model in the logistics sector enterprises. On the side of variables describing the company's business model the following factors were adopted:

- The financial situation of companies, presented with the help of the groups emerged out of cluster analysis with variants: Group 1, Group 2, Group 3, Group 4;
- X7 – The number of services offered, presented in the form of classes illustrating that number: 4 and less, between 5 and 9, between 10 and 14, 15 or more;
- X8 – Customer satisfaction survey with variants yes or no.

On the side of usage of e-services in business, the variable showing the existence of services in the form of e-logistics in a given enterprise (X9) was adopted with variants: yes, or no.

Implementation of the research on the dependencies between the business model and the use of e-logistics was possible due to the method of correspondence analysis, which allows to study relationships between immeasurable variables, which means variables the variations of which are not expressed on a numerical scale.

The use of correspondence analysis allowed the identification of two groups of companies (Fig. 5).

The first contains companies using e-logistics. It should be stressed that these companies mainly belong to group 4, which is the group with the best financial situation. Besides, these companies offer a large number of services and carry out customer satisfaction surveys. In the second group there are companies not using e-logistics. They are of businesses with a weaker financial situation, offering a small number of services and not carrying out customer satisfaction surveys.

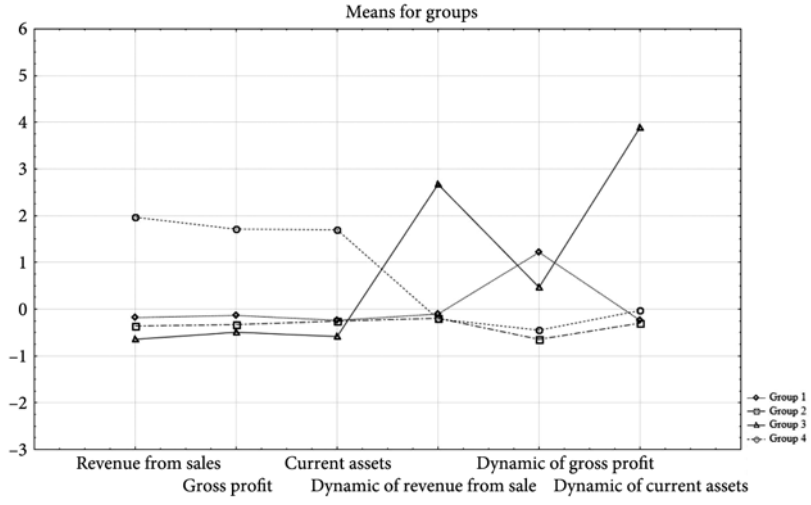

Fig. 4. Average values of standardized variables relating to the financial condition of enterprises of the logistics sector in the selected clusters (source: own calculation using STATISTICA PL)

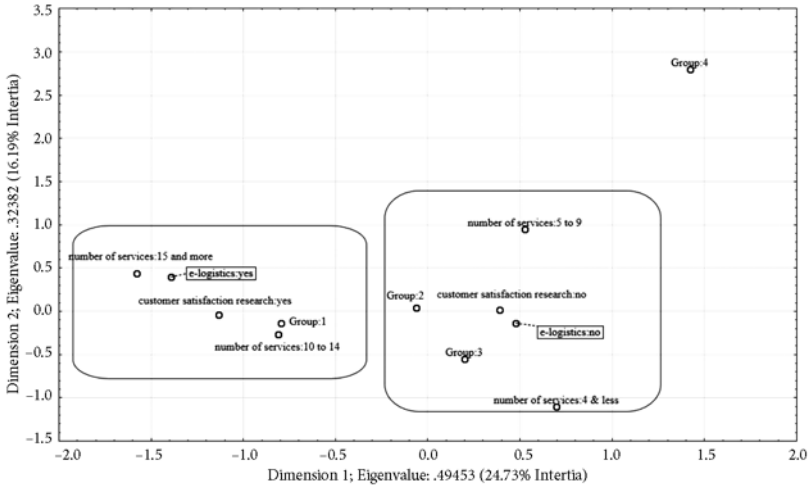

Fig. 5. Chart of the analysis of correspondence between the business model used and the use of e-logistics services in enterprises of the logistics sector (source: own calculation using STATISTICA PL)

Conclusions

The carried out study of selected companies of the logistics sector leads to the conclusion that the use of e-services in their offer has a positive effect on the quality of the business model. Offering e-services adds value for the customer, as well as the value for the company, as evidenced by the improved financial condition of enterprises that use e-logistics. Besides, such companies offer more differentiated services, which indicates that they occupy higher levels in the pyramid of logistics services. These companies conduct customer satisfaction research, which indicates their concern for customers and customization the provided services to customers' needs.

The conducted research has the nature of pilot studies and does not apply to all companies of the logistics sector. However, it should be noted that the data used in the study concerned companies voluntarily participating in the ranking. Therefore, these are companies of recognized standing in the market, the best in their sector.

The conducted research should be continued in a more detailed manner. The author is aware that the variables adopted to describe the business model are not sufficient. To evaluate the business model of the company, information on the individual parts of the model is necessary, such as customer segments, value proposition, distribution channels, relationships with customers, revenue streams, costs, key resources, key partners and key activities. Unfortunately, data availability did not allow to analyse all the elements of the model. However, the adopted variables concerning the financial condition, the number of the provided services, and customer satisfaction surveys describe (at least in part) the business model used by the company. On the other hand, the use of e-services by the company was only possible through the identification of tendering or not offering e-logistics. It Information on specific e-logistics services was not available, so it was not possible to determine which e-logistics services were used in the surveyed enterprises.

Conducting a more detailed study in the form of a survey would allow the assessment of the used business models by examining the individual elements of the model and the identification of the specific e-services used by enterprises of the logistics sector. Nevertheless, the study showed that the companies using e-logistics have a better financial condition, occupy higher levels in the pyramid of logistics services and care for relationships with customers, which indicates that the business model used by them can be assessed positively.

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