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# SUPPLY CHAIN MANAGEMENT IN SMES: EVIDENCE FROM POLAND AND KAZAKHSTAN

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## ABSTRACT

The research aimed to assess Supply Chain Management (SCM) in small and medium enterprises in Kazakhstan and Poland, and, more specifically, identify similarities and differences in the approach to the SCM concept in selected countries. The research methodology was based on ANOVA analysis comparing samples of contemporary SMEs operating in Poland and Kazakhstan. Primary data was collected using the CAWI quantitative method and then studied using the ANOVA statistical data analysis method. The research results demonstrated similar involvement in the implementation of the concept with significant differences in some areas, such as cost reduction and focus on end customers. The concept of Supply Chain Management is a very common subject of theoretical and practical analysis. Even though research efforts in this area indicate the positive effects of the implemented concept, most of them concern large organisations. The research results showed similar involvement in the implementation of the concept, although significant differences were found in selected areas, such as cost reduction and focus on end customers.

## KEY WORDS

**ANOVA analysis, small and medium enterprises, supply chain management**

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## INTRODUCTION

Small and medium companies are key to the process of shaping economic growth at the domestic and international levels (OECD, 2009). In today's complex and competitive business environment, adoption of appropriate strategies is particularly important in the SME efforts to survive (Kozubikova et al., 2017; Kljucnikov et al., 2016; Pietrasieński et al., 2015;

Bohušová et al., 2017). In this context, the adoption of the concept of Supply Chain Management (SCM) in SME strategies seems to be crucial as supply chain operations cover all actions and activities associated with various processes required for the flow and transformation of raw materials into finished products delivered to the end customer. Naturally, the flow of goods in the supply chain is accompanied by

required information. Competition is rapidly moving from the level of enterprises to that of supply chains. Nowadays, customers not only expect companies to supply better and cheaper products using faster and more flexible shipments but also higher-level services (Kovács et al., 2016; Liberko et al., 2015). An initial analysis allowed to elaborate the research aim, namely, to assess Supply Chain Management in small and medium enterprises operating in Kazakhstan and Poland, and, more specifically, identify similarities and differences in the approach to the SCM concept in selected countries.

## 1. LITERATURE REVIEW

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A literature review in the context of Supply Chain Management indicated a significant disparity in the number of studies dedicated to small and medium enterprises. Among the existing studies in this area, no comprehensive and cross-sectional contributions were available, while research was fragmented and focused on small research samples.

A greater part of research on Supply Chain Management was dedicated to a relationship between SMEs and their performance in analysed countries. It has been shown that the lack of effective SCM implementation through the use of technology and systems results in a loss of SME competitiveness. The focus on strategic supply chain performance can improve the operational efficiency of the SME sector leading to a competitive advantage. Some authors maintain that Supply Chain Management is unsuitable for the SME sector (Arend et al., 2005) as in practice, it leads to poorer business performance and less return on investment. Foreign investments are driving the local economy through the influence of the local SME sector and the application of an appropriate policy for their development (Thompson & Zang, 2015). Improving the growth of SME innovations in the market requires simultaneously effective implementation of information and communication technologies (ICT) (Jones, 2011). The Polish SME sector generally includes family enterprises (Kołodkiewicz, 2013).

Several authors of studies connected with this subject (Thakkar et al., 2008; Thakkar et al., 2011; Tvaronavičienė, 2015) note that some SMEs see SCM benefits, such as collaboration leading to a focus on value-generating activities or a more transparent strategy development and cooperation of supply

chain members in the area of competitiveness improvement. Still, a part of the SME sector perceives SCM as a tool to achieve customer satisfaction through significant investments in information technologies.

Issues related to the SME sector are also a subject of interest among researchers in Poland. The growing number of scientific publications on SCM is indicative of the rising popularity of the topic. However, the combination of these two issues, i.e. the role of SMEs in supply chains and supply chain management from the perspective of such entities, is the area yet to be more extensively explored by Polish researchers.

Although some authors use terms “supply chain” and “small and medium businesses” in article titles, the topic fails to be appropriately reflected due to the lack of actual references to SME activities in supply chains.

The role of small and medium enterprises as supply chain links is also recognised by Zowada (2011), who emphasises that every entity can be a link in a chain. He believes that due to certain features (flexibility, ability to adapt to customer requirements, adaptability to changes in the environment, and lower plant costs) they can achieve strong positions within chains, though in most cases, it will not be the role of the chain leader.

The most comprehensive position on Supply Chain Management from the point of view of SMEs seems to be provided in the publication entitled *Functioning of small and medium manufacturing companies in a supply chain* (Kisperska-Moron et al., 2010). It provides reflections on various aspects of SMEs functioning as members of a supply chain.

Wright (2013) conducted a study on SCM strategies showing a link between a supply chain strategy and a product type and an inconclusive alignment's effect on performance. The assessment of a supply chain strategy and a product type, as well as a role in the supply chain, is challenging. Even though a systematic approach is used, it is difficult to evaluate these aspects based on secondary data. Factors determining a supply chain strategy indicate that manufacturing companies in Romania align their strategy based on the type of a product.

For Kazakhstan, as the leading economy in Central Asia, the SCM issue is significant and rather unexplored especially in connection to SMEs. Historically, Kazakh people were nomads. So, logistics and transportation issues have been urgent since the beginning of the state formation. However, the development of SCM started with Kazakhstan

becoming a part of the USSR. This economic period was characteristic of the establishment of big economic clusters, including production enterprises and developed centralised management. Several local researchers of the post-Soviet period studied and made significant contributions to the field of logistics and supply chain management, including Anikin (2010), Dybskaya (2013), Sergeyev (2001) and Sterligova (2014).

Romanko and Musabekova classify the development of logistics and supply change management into five main periods (Romanko & Musabekova, 2014). In the Period of Fragmentation (1920-1950), the key concept and principles of logistics formed. Theoretical and practical aspects of logistics developed during the Period of Formation (1950-1970). The Period of Development (1970-1980) explored new ways of cost reduction and distribution. Finally, all logistic elements were organised into one supply management chain system during the Period of Integration (1980-1990). In the 2000s, Kazakhstan experienced a big jump in the development of SCM in the context of SME development. Moreover, some contemporary Russian researches underline a clear relationship between the SCM development and the country's competitiveness (Kurganov, 2013).

Meanwhile, a more detailed consideration of SCM from the point of view of SMEs has been made since creating the Eurasian Union between Kazakhstan, the Russian Federation and Belarus. The contemporary Kazakhstani authors also support the idea and consider that an efficient system of logistics is an important factor for stable economic growth in a state, specifically focusing on the development factors under the conditions of economic instability (Zhussupova et al., 2018).

Rational use of national transport and logistics capabilities stimulates a rapid development of related industries and economic sectors. Under conditions of the globalising world and economy, and expanding integration processes, including the introduction of the Eurasian Economic Union, Kazakhstan is implementing an ambitious strategic goal of building a competitive economy. In this context, an efficient transport and logistics system has a key role in achieving the goal as it must provide high and efficient transport connectivity in the country as well as the necessary level of integration of Kazakhstan into the global transport and logistics network (Yergaliyeva & Raimbekova, 2016).

Finally, initiated by China and including more than 70 countries of Asia and Europe, the New Silk Road logistics project of the "One Belt, One Road"

(OBOR) initiative is an additional important factor that proves the urgency and significance of the detailed consideration of various SCM approaches used in different countries, including Kazakhstan, Poland and Romania.

Despite many cited studies on SCM in the SME sector, there is a clear insufficiency in the knowledge regarding the relationship between SCM and the functioning of SMEs, which seems to be an important issue for research analysts and management practitioners. Equally important is the analysis of the factors supporting and hampering the implementation of SCM in large enterprises and, above all, SMEs. So far, there has been a lack of studies demonstrating SCM implementation by SMEs on the level of success achieved by large companies.

## 2. RESEARCH METHODS

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The CAWI quantitative method was used for primary data collection required for the implementation of the designated research goal. The research was carried out in the first quarter of 2018 among randomly selected SMEs operating in Poland and Kazakhstan. Study participants were provided with a link to an online survey (CAWI), which was used for the collection of information.

The survey was divided into the part identifying the respondents and the substantive part concerning Supply Chain Management (SCM). A five-level Likert scale was used to evaluate the SCM concept, which measured the average level of the evaluation of factors in the following SCM areas. In Poland, the SME sector consists of 2 million companies. For this population, the size of the research sample was set at 211 entities. The maximum error for this sample was 6% for a confidence index of 95%. The obtained results, therefore, allowed for the dissemination of results on the entire population with an estimated error of 6%.

The purpose of the research was to assess supply chain management in small and medium enterprises operating in Kazakhstan and Poland, and, more specifically, to identify similarities and differences in the approach to the SCM concept in the named countries. The sample size was identical for each surveyed country (211 SMEs), and the sample structure was chosen randomly.

The majority of the surveyed Polish companies were small, but in the case of Kazakhstan, they were medium. As previous studies demonstrated no cor-

relation between the size of a research participant and the evaluation given to elements of the SCM concept, it was assumed that the difference between the structures of the two countries would not influence the results of further analyses. Next, a distinction was made between the duration that companies had been operating on the market.

The survey was dominated by Kazakhstani companies with 3 to 15 years of presence in the market and Polish companies with more than 15 years of operation. These groups accounted for more than 50% of the surveyed entities. Sectors of services, retail and wholesale (16% in total) were predominant in the case of Polish companies, while the Kazakhstani companies mainly operated in fields of logistics and transport, services, and construction and construction materials (60% in total).

The evaluation focused on the application of the SCM concept in SMEs operating in Poland and Kazakhstan. The main part of the research was dedicated to the assessment of the approach to supply chain management in small and medium enterprises of Poland and Romania. The research aimed to evaluate differences in individual SCM areas depending on an SME country of operation.

The main hypothesis (H0) was formulated as follows: no essential differences in evaluation levels were found depending on the country of SME operation in neither of the areas (i.e., the area of SCM determinants, factors supporting the area, barriers in the Supply Chain Management area, business elements in the Supply Chain Management area, operation of the company within the supply chain area, environmental sustainability elements in the Supply Chain Management area, social aspects of sustainability in the Supply Chain Management area).

Aiming to verify the main hypothesis, statistical testing in each SCM area with the application of single-agent ANOVA analysis was conducted, which identified important differences between averages of evaluations given by respondents.

### 3. RESEARCH RESULTS

Preceding ANOVA analysis, Cronbach's alpha was used to check the reliability of the five-point scale used for survey questions. The overall result for all questions is presented in Tab. 1.

The obtained report indicates that Cronbach's alpha is very high ( $\alpha = 0.913$ ), which means high

Tab. 1. Reliability statistics for the scale used in the survey

CRONBACH'S $\alpha$	CRONBACH'S $\alpha$ BASED ON THE STANDARDISED ITEMS	ITEMS AVERAGE	ITEMS NUMBER
0.913	0.911	3.866	60

consistency or reliability of the scale of grades proposed for each question (60 items). Therefore, it should be considered that the given scale is a reliable measurement tool.

The evaluation concerned seven SCM areas. Observations were presented in individual tables and graphs. Primarily, the analysis focused on seven elements particular to the area of SCM determinants (Tab. 2).

Based on the F test, which accepted the statistically significant value for four factors of SCM determinants with the value  $p < 0.001$  (SCM D<sub>1</sub>, SCM D<sub>2</sub>, SCM D<sub>3</sub> and SCM D<sub>7</sub>), the alternative hypothesis regarding the essential differences between averages in the evaluation of these factors had to be adopted. SMEs gave different assessment levels to SCM determinants, i.e. global competitiveness against our supply chain, end customer needs, integration of processes within the supply chain, and internal cross-functional cooperation in the country of operation. Average evaluations of crucial factors were used to check the level of these differences in every table within the ANOVA analysis for individual SCM areas.

It was observed that on the average, Polish companies gave higher scores to end customer needs (SCM D<sub>2</sub> – 2.5% more positive compared to Kazakhstani companies) and internal cross-functional cooperation (SCM D<sub>7</sub> – 8% more). On the other hand, Kazakhstani companies gave better assessments to global competitiveness against our supply chain (SCM D<sub>1</sub> – 5% more compared to Polish companies) and integration of processes within the supply chain (SCM D<sub>3</sub> – 9.3% more). End customer needs received the highest assessment on average from both Polish and Kazakhstani companies.

The F test accepted the statistically significant value for four factors supporting the area (SCM) for  $p < 0.001$  (FS<sub>2</sub> and FS<sub>3</sub>) and  $p < 0.05$  (FS<sub>4</sub> and FS<sub>6</sub>). Therefore, an alternative hypothesis had to be adopted regarding important differences between evaluation averages of factors supporting the SCM area. In conclusion, SMEs from different countries gave different assessments to the integration of processes amongst members of the supply chain, an organisational structure designed to promote the cooperation and the coordination of activities, understanding of

Tab. 2. ANOVA analysis results for the area of SCM determinants

SCM DETERMINANTS	SYMBOL	RESULTS FOR GROUPS	DF	MEAN SQUARE	F	SIGNIFICANCE
Global competitiveness against our supply chain	SCM D <sub>1</sub>	Among	1	13.322	15.03	0.000
		Within	398	0.886		
End customer needs	SCM D <sub>2</sub>	Among	1	15.210	41.91	0.000
		Within	398	0.363		
Integration of processes within the supply chain	SCM D <sub>3</sub>	Among	1	8.702	16.57	0.000
		Within	398	0.525		
Members of the supply chain cooperation	SCM D <sub>4</sub>	Among	1	0.902	1.88	0.171
		Within	398	0.479		
Costs reduction	SCM D <sub>5</sub>	Among	1	0.090	0.19	0.661
		Within	398	0.468		
Improving processes and productivity	SCM D <sub>6</sub>	Among	1	1.563	3.43	0.064
		Within	398	0.454		
Internal cross-functional cooperation	SCM D <sub>7</sub>	Among	1	9.302	14.83	0.000
		Within	398	0.627		

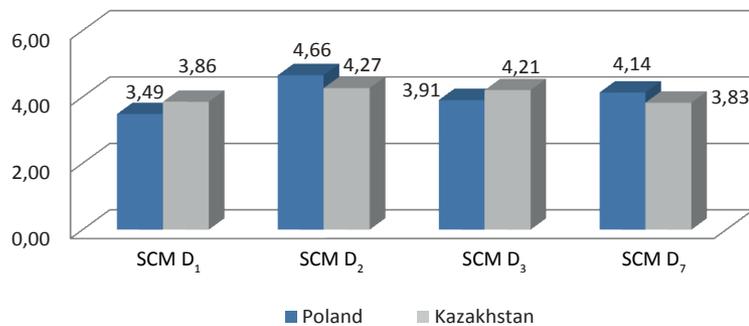


Fig. 1. Average assessment level given to significant factors in the area of SCM determinants in the studied groups

the SCM concept and support from the managers, and trust and openness amongst members of the supply chain.

It is apparent that on the average, Polish companies gave higher scores to an organisational structure designed to promote the cooperation and the coordination of activities (FS<sub>5</sub> – 12.3% more positive compared to Kazakhstani companies), and trust and openness amongst members of the supply chain (FS<sub>6</sub> – 3% more). On the other hand, Kazakhstani companies gave higher scores to the integration of processes amongst members of the supply chain (FS<sub>2</sub> – 6% more positive compared to Polish companies) and the understanding of the SCM concept and support from the managers (FS<sub>4</sub> – 5% more). On the average, Kazakhstani companies gave the highest assessments to the understanding of the SCM concept and support from the managers. In the case of Polish companies, the highest scores were given to trust and openness amongst members of the supply chain.

The F test accepted the statistically significant value for six factors of barriers to Supply Chain Management for  $p < 0.001$  (B<sub>3</sub>, B<sub>6</sub> and B<sub>7</sub>) and  $p < 0.05$  (B<sub>1</sub>,

B<sub>4</sub> and B<sub>5</sub>). Therefore, an alternative hypothesis had to be adopted regarding important differences between evaluation averages received for factors relating to barriers in Supply Chain Management. This means that SMEs from different countries gave different assessments to organisational structure hampering the information exchange, laws and provisions hampering relations in SCM, some members of the supply chain not supporting the SCM concept, the lack of understanding of SCM goals and ideas amongst employees, problems with the quality of activities caused by members of the supply chain, communication problems and confidential data.

As observed, Polish companies gave higher average scores to one factor only, which is an organisational structure hampering the information exchange (B<sub>3</sub> – 10.2% more positive compared to Kazakhstani companies). On the other hand, Kazakhstani companies gave higher average scores to the majority of factors concerning SCM barriers, including the lack of understanding of SCM goals and ideas amongst employees (B<sub>1</sub> – 6% more positive compared to Polish companies), quality problems caused by members of

Tab. 3. ANOVA analysis results for factors supporting the area (SCM)

FACTORS SUPPORTING THE AREA (SCM)	SYMBOL	RESULTS FOR GROUPS	DF	MEAN SQUARE	F	SIGNIFICANCE
Information technology	FS <sub>1</sub>	Among	1	0.090	0.20	0.652
		Within	398	0.443		
Integration of processes amongst members of the supply chain	FS <sub>2</sub>	Among	1	6.760	14.64	0.000
		Within	398	0.462		
Concentration on end customers	FS <sub>3</sub>	Among	1	0.022	0.05	0.809
		Within	398	0.383		
Understanding the SCM concept and support from the managers	FS <sub>4</sub>	Among	1	3.240	5.73	0.017
		Within	398	0.565		
An organisational structure designed to promote the cooperation and the coordination of activities	FS <sub>5</sub>	Among	1	16.000	27.36	0.000
		Within	398	0.585		
Trust and openness amongst members of the supply chain	FS <sub>6</sub>	Among	1	2.890	5.87	0.016
		Within	398	0.492		
Readiness to share the knowledge	FS <sub>7</sub>	Among	1	1.440	2.44	0.119
		Within	398	0.590		

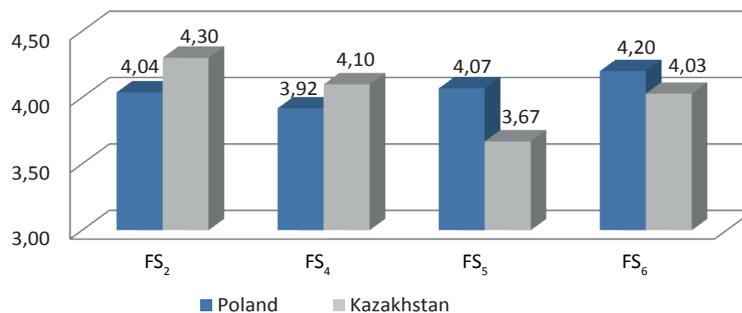


Fig. 2. Average evaluation level given to crucial factors of the factors supporting the area (SCM) in the examined groups

the supply chain (B<sub>4</sub> – 5% more), communication problems and confidential data (B<sub>5</sub> – 5% more), laws and provisions hampering relations in SCM (B<sub>6</sub> – 12.2% more), and some members of the supply chain not supporting the SCM concept (B<sub>7</sub> – 15% more). On the average, Kazakhstani companies gave the highest score to laws and provisions hampering relations in SCM, while Polish companies underlined quality problems caused by members of the supply chain.

The F test accepted the statistically significant value for eight factors relating to the SME area of business elements for p < 0.001 (BE<sub>1</sub>, BE<sub>10</sub>) and p < 0.05 (BE<sub>2</sub>, BE<sub>4</sub>, BE<sub>6</sub>, BE<sub>9</sub>, BE<sub>12</sub> and BE<sub>13</sub>). Therefore, an alternative hypothesis had to be adopted regarding important differences between average evaluations of these elements. This means that SMEs from different countries gave different assessments to cooperation in inventory and logistics management, use of information technologies to increase the efficiency of communication, common clear vision of Supply

Chain Management, exchange of production information on a regular basis, alignment of product strategies, supply, and distribution, and making a supply chain strategy, sharing information regarding customer requirements and design plans, common procedures to provide feedback from a customer involved in product development, and members of the supply chain using sustainability concepts in the supply chain strategy.

As observed, Polish companies gave higher average scores to the majority of crucial factors, including cooperation in inventory and logistics management (BE<sub>1</sub> – 20% more positive compared to Kazakhstani companies), use of information technologies to increase the efficiency of communication (BE<sub>2</sub> – 4.5% more), common clear vision of Supply Chain Management (BE<sub>4</sub> – 9.3% more), exchange of production information on a regular basis (BE<sub>6</sub> – 9.5% more), alignment of product strategies, supply, and distribution, and making a supply chain strategy (BE<sub>9</sub> – 10% more), sharing information about customer require-

Tab. 4. ANOVA analysis results for barriers in the SCM area

BARRIERS TO SUPPLY CHAIN MANAGEMENT	SYMBOL	RESULTS FOR GROUPS	DF	MEAN SQUARE	F	SIGNIFICANCE
Lack of understanding of SCM goals and ideas amongst employees	B <sub>1</sub>	Among	1	5.063	9.02	0.003
		Within	398	0.561		
Resistance of employees before implementing changes connected with SCM	B <sub>2</sub>	Among	1	0.250	0.30	0.582
		Within	398	0.823		
Organisational structure hampering the information exchange	B <sub>3</sub>	Among	1	10.562	17.58	0.000
		Within	398	0.601		
Quality problems caused by members of the supply chain	B <sub>4</sub>	Among	1	3.610	7.09	0.008
		Within	398	0.508		
Communication problems and confidential data	B <sub>5</sub>	Among	1	3.423	6.25	0.013
		Within	398	0.547		
Laws and provisions hampering relations in SCM	B <sub>6</sub>	Among	1	25.000	38.36	0.000
		Within	398	0.652		
Some members of the supply chain do not support the SCM concept	B <sub>7</sub>	Among	1	42.903	65.16	0.000
		Within	398	0.658		

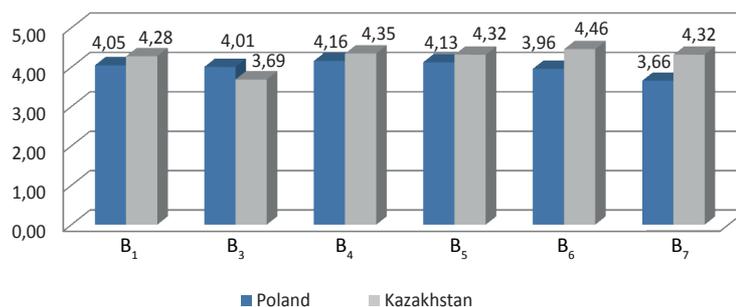


Fig. 3. Average level of the evaluation given to crucial factors related to carriers in the SCM area in the examined groups

ments and design plans (BE<sub>10</sub> – 17.7% more), and members of the supply chain using sustainability concepts in the supply chain strategy (BE<sub>13</sub> – 6.2% more). On the other hand, Kazakhstani companies gave higher average scores to common procedures to provide feedback from a customer involved in product development (BE<sub>12</sub> – 6% more). On the average, the highest assessment by Polish companies was given to the use of information technologies to increase the efficiency of communication, while in the case of Kazakhstani companies, the emphasis was on common procedures to provide feedback from a customer involved in product development.

The value of the F test accepted the statistically significant value for five factors related to the operation of the company within the supply chain for  $p < 0.001$  (OC<sub>4</sub>) and  $p < 0.05$  (OC<sub>1</sub>, OC<sub>3</sub>, OC<sub>5</sub> and OC<sub>7</sub>). Therefore, an alternative hypothesis had to be adopted regarding important differences between evaluation averages given to factors in the SCM area in relation to the operation of the company within the supply chain. This means that SMEs from differ-

ent countries gave different assessments to lower logistics costs: the ability to receive lower total logistics costs through effective collaboration in the supply chain and increased efficiency of activities; shortened lead time: the ability to reduce lead time from receipt of an order to delivery to a customer; shorter delivery time: the ability to adjust the delivery time to customer requirements; appropriate quantity on time: the ability to meet specified or scheduled delivery times and ordered quantities of products; and greater customer satisfaction: the extent to which the perceived performance of the business corresponds with customer expectations.

As observed, Polish companies gave higher average assessments to all crucial factors, including lower logistics costs: the ability to receive lower total logistics costs through effective collaboration in the supply chain and increased efficiency of activities (OC<sub>1</sub> – 2% more positive compared to Kazakhstani companies); shortened lead time: the ability to reduce lead time from receipt of an order to delivery to a customer (OC<sub>3</sub> – 3% more); shorter delivery time: the ability to

Tab. 5. ANOVA analysis results for business elements in the SCM area

BUSINESS ELEMENTS IN SUPPLY CHAIN MANAGEMENT	SYMBOL	RESULTS FOR GROUPS	DF	MEAN SQUARE	F	SIGNIFICANCE
Cooperation in inventory and logistics management	BE <sub>1</sub>	Among	1	52.563	60.06	0.000
		Within	398	0.875		
Use of information technologies to increase the efficiency of communication	BE <sub>2</sub>	Among	1	7.290	10.13	0.002
		Within	398	0.719		
Building long-term relationships based on established guidelines	BE <sub>3</sub>	Among	1	0.250	0.39	0.531
		Within	398	0.637		
Common clear vision of Supply Chain Management	BE <sub>4</sub>	Among	1	6.503	8.77	0.003
		Within	398	0.741		
Use of Just-in-Time concept as a tool for enhancing competitiveness	BE <sub>5</sub>	Among	1	1.823	1.90	0.168
		Within	398	0.955		
Exchange of production information on a regular basis, e.g. through sales and operational planning meetings	BE <sub>6</sub>	Among	1	10.240	10.98	0.001
		Within	398	0.932		
Common introduction of benchmarking and performance metrics	BE <sub>7</sub>	Among	1	0.422	0.38	0.535
		Within	398	1.095		
Standardisation of quality policy for both products and processes with established guidelines	BE <sub>8</sub>	Among	1	2.103	2.43	0.120
		Within	398	0.865		
Alignment of product strategies, supply and distribution, and making a supply chain strategy	BE <sub>9</sub>	Among	1	9.610	11.86	0.001
		Within	398	0.810		
Sharing information regarding customer requirements and design plans	BE <sub>10</sub>	Among	1	46.923	59.25	0.000
		Within	398	0.792		
Use of the supply chain concept to design products, processes and packaging	BE <sub>11</sub>	Among	1	0.002	0.01	0.960
		Within	398	1.018		
Common procedures to provide feedback from a customer involved in product development	BE <sub>12</sub>	Among	1	5.760	7.77	0.006
		Within	398	0.741		
Members of our supply chain use sustainability concepts in the supply chain strategy	BE <sub>13</sub>	Among	1	3.240	3.95	0.048
		Within	398	0.820		

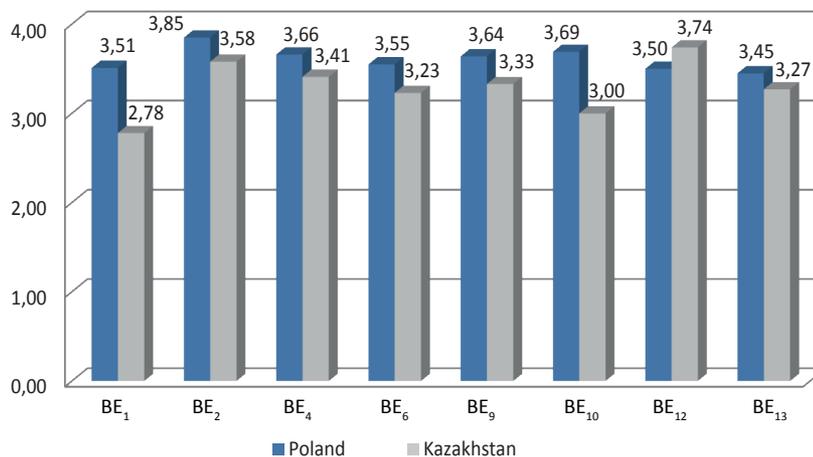


Fig. 4. Average evaluation level given to crucial factors related to business elements in the SCM area in the examined groups

Tab. 6. ANOVA analysis results for the operation of the company within the supply chain area

OPERATION OF THE COMPANY WITHIN THE SUPPLY CHAIN	SYMBOL	RESULTS FOR GROUPS	DF	MEAN SQUARE	F	SIGNIFICANCE
Lower logistics costs: the ability to receive lower total logistics costs through effective collaboration in the supply chain and increased efficiency of activities	OC <sub>1</sub>	Among	1	3.240	6.90	0.009
		Within	398	0.469		
Lower total costs of products: product competitiveness due to a lower total cost of a unit	OC <sub>2</sub>	Among	1	0.563	0.80	0.371
		Within	398	0.702		
Shortened lead time: the ability to reduce lead time from receipt of an order to delivery to a customer	OC <sub>3</sub>	Among	1	4.623	6.84	0.009
		Within	398	0.676		
Shorter delivery time: the ability to adjust the delivery time to customer requirements	OC <sub>4</sub>	Among	1	14.063	19.45	0.000
		Within	398	0.723		
Appropriate quantity on time: the ability to meet specified or scheduled delivery times and ordered quantities of products	OC <sub>5</sub>	Among	1	7.840	11.05	0.001
		Within	398	0.709		
Higher inventory turnover ratio: value ratio of sold goods to the average value of inventory over a given period	OC <sub>6</sub>	Among	1	0.123	0.22	0.635
		Within	398	0.543		
Greater customer satisfaction: the extent to which the perceived performance of the business corresponds with customer expectations	OC <sub>7</sub>	Among	1	5.760	10.45	0.001
		Within	398	0.551		
Higher market share: the share of the company in the whole market on which it operates, environmental sustainability elements in Supply Chain Management	OC <sub>8</sub>	Among	1	1.823	2.86	0.091
		Within	398	0.636		

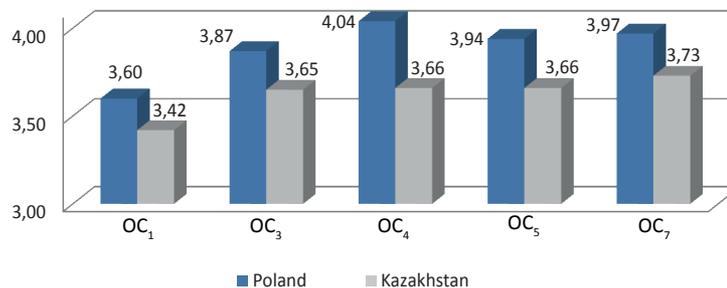


Fig. 5. Average evaluation level given to crucial factors related to the operation of the company within the supply chain area in the examined groups

adjust the delivery time to customer requirements (OC<sub>4</sub> – 6% more); appropriate quantity on time: the ability to meet specified or scheduled delivery times and ordered quantities of products (OC<sub>5</sub> – 5% more); and greater customer satisfaction: the extent to which the perceived performance of the business corresponds with customer expectations (OC<sub>7</sub> – 5.5% more). On the average, the highest scores were given by Polish companies to shorter delivery time: the ability to adjust the delivery time to customer requirements, while in the case of Kazakhstani companies, the focus was on the higher market share: the share of the company in the whole market on which it operates.

The value of the F test accepted the statistically significant value for six factors related to environmental sustainability elements in Supply Chain Management for  $p < 0.001$  (ES<sub>5</sub> and ES<sub>7</sub>) and  $p < 0.05$  (ES<sub>2</sub>, ES<sub>4</sub>, ES<sub>6</sub>, ES<sub>8</sub>). Therefore, an alternative hypothesis had to be adopted regarding differences between evaluation averages given to factors in the SCM area in relation to environmental sustainability elements in Supply Chain Management. This means that SMEs from different countries gave different assessments to active involvement in the reduction of waste, the use of renewable sources in production, the reuse of materials, recycling of defective and waste products, choosing of partners in the supply chain on the basis

Tab. 7. ANOVA analysis results for environmental sustainability elements in the Supply Chain Management area

ENVIRONMENTAL SUSTAINABILITY ELEMENTS IN SUPPLY CHAIN MANAGEMENT	SYMBOL	RESULTS FOR GROUPS	DF	MEAN SQUARE	F	SIGNIFICANCE
Environmentally-friendly production processes	ES <sub>1</sub>	Among	1	1.690	1.84	0.176
		Within	398	0.918		
Active involvement in the reduction of waste	ES <sub>2</sub>	Among	1	7.562	10.68	0.001
		Within	398	0.708		
Engaging in production processes free from the emission of harmful substances	ES <sub>3</sub>	Among	1	3.062	3.71	0.055
		Within	398	0.824		
Use of renewable sources in production	ES <sub>4</sub>	Among	1	9.303	10.39	0.001
		Within	398	0.895		
Reuse of materials	ES <sub>5</sub>	Among	1	31.360	29.41	0.000
		Within	398	1.066		
Recycling of defective and waste products	ES <sub>6</sub>	Among	1	4.623	4.03	0.045
		Within	398	1.145		
Choosing partners in the supply chain on the basis of environmental guidelines	ES <sub>7</sub>	Among	1	12.250	12.57	0.000
		Within	398	0.974		
Involving workers in environment protection schemes	ES <sub>8</sub>	Among	1	5.063	4.93	0.027
		Within	398	1.025		

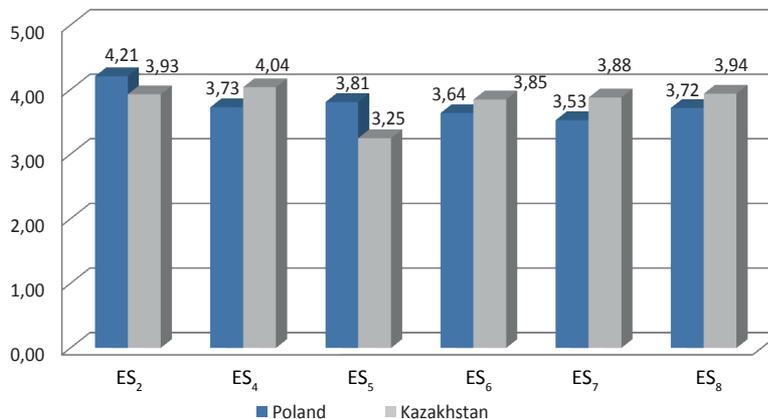


Fig. 6. Average evaluation level given to crucial factors related to environmental sustainability elements in the SCM area for the examined groups

of environmental guidelines and involving workers in environment protection schemes.

As observed, on the average, Polish companies gave higher assessments to two factors, namely, active involvement in the reduction of waste (ES<sub>2</sub> – 5% more positive compared to Kazakhstani companies) and the reuse of materials (ES<sub>5</sub> – 16.5% more). On the other hand, Kazakhstani companies gave the highest scores to the use of renewable sources in production (ES<sub>4</sub> – 7% more), recycling of defective and waste products (ES<sub>6</sub> – 3% more), choosing partners in the supply chain on the basis of environmental guidelines (ES<sub>7</sub> – 7.5% more), and involving workers in environment protection schemes (ES<sub>8</sub> – 5% more). On the average, Polish companies gave the highest scores to active involvement in the reduction of waste,

while in the case of Kazakhstani companies, the focus was mainly on the use of renewable sources in production.

The value of the F test accepted the statistically significant value for nine factors related to social aspects of sustainability in Supply Chain Management for  $p < 0.001$  (SA<sub>1</sub>, SA<sub>4</sub>, SA<sub>5</sub>, SA<sub>6</sub>, SA<sub>7</sub>, SA<sub>8</sub>, SA<sub>9</sub>, SA<sub>10</sub>) and  $p < 0.05$  (SA<sub>2</sub>). Therefore, an alternative hypothesis had to be adopted regarding essential differences between evaluation averages given to factors in the SCM area in relation to social aspects of sustainability in Supply Chain Management. This means that SMEs from different countries gave different assessments to applying the code of ethical conduct to employees and contractors, applying fair employment practices in the local community, investments

Tab. 8. ANOVA analysis results for social aspects of sustainability in the SCM area

SOCIAL ASPECTS OF SUSTAINABILITY IN SUPPLY CHAIN MANAGEMENT	SYMBOL	RESULTS FOR GROUPS	DF	MEAN SQUARE	F	SIGNIFICANCE
Applying the code of ethical conduct to employees and contractors	SA <sub>1</sub>	Among	1	37.210	69.41	0.000
		Within	398	0.536		
Applying fair employment practices in the local community	SA <sub>2</sub>	Among	1	5.760	10.66	0.001
		Within	398	0.540		
Providing health and safety equipment	SA <sub>3</sub>	Among	1	0.063	0.16	0.686
		Within	398	0.381		
Investments in infrastructural facilities	SA <sub>4</sub>	Among	1	9.000	14.49	0.000
		Within	398	0.621		
Timely and lawful payment of taxes and fees	SA <sub>5</sub>	Among	1	6.502	14.92	0.000
		Within	398	0.436		
Clearance of taxable income	SA <sub>6</sub>	Among	1	17.640	36.36	0.000
		Within	398	0.485		
Applying ethical business and trade standards	SA <sub>7</sub>	Among	1	19.360	46.56	0.000
		Within	398	0.416		
Investments in poverty reduction programmes	SA <sub>8</sub>	Among	1	42.903	53.93	0.000
		Within	398	0.795		
Contribution to local community charities	SA <sub>9</sub>	Among	1	74.823	91.43	0.000
		Within	398	0.818		
Contribution to regional and supra-regional development initiatives	SA <sub>10</sub>	Among	1	75.690	87.55	0.000
		Within	398	0.864		

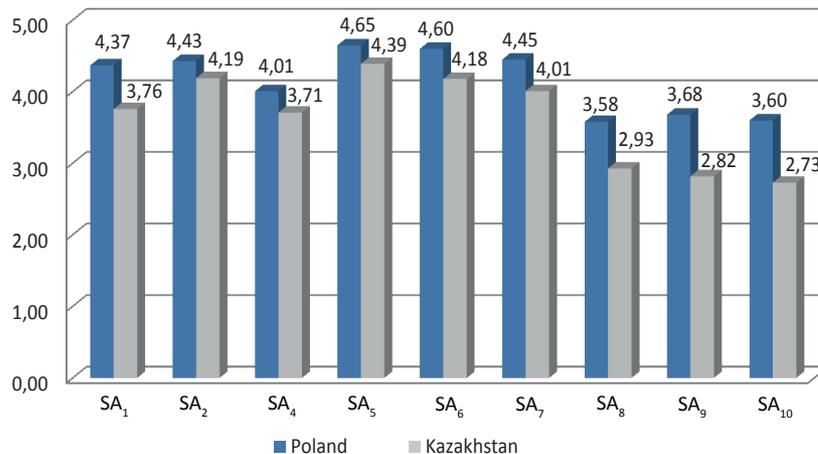


Fig. 7. Average evaluation level given to crucial factors in relation to social aspects of sustainability in SCM area for the examined groups

in infrastructural facilities, timely and lawful payment of taxes and fees, clearance of taxable income, applying ethical business and trade standards, investments in poverty reduction programs, contribution to local community charities, and contribution to regional and supra-regional development initiatives.

As observed, on the average, Polish companies gave higher scores to all crucial factors, including applying the code of ethical conduct to employees and contractors (SA<sub>1</sub> – 13% more positive compared to Kazakhstani companies), applying fair employment practices in the local community (SA<sub>2</sub> – 5% more), investments in infrastructural facilities

(SA<sub>4</sub> – 8% more), timely and lawful payment of taxes and fees (SA<sub>5</sub> – 5% more), clearance of taxable income (SA<sub>6</sub> – 6% more), applying ethical business and trade standards (SA<sub>7</sub> – 8.5% more), investments in poverty reduction programs (SA<sub>8</sub> – 12% more), contribution to local community charities (SA<sub>9</sub> – 20.5% more), and contribution to regional and supra-regional development initiatives (SA<sub>10</sub> – 22.5% more). Both Polish and Kazakhstani companies gave the highest scores to timely and lawful payment of taxes and fees.

## 4. DISCUSSION OF THE RESULTS

Making a progress report from individual SCM areas, it is possible to observe important differences in the average evaluation of the vast majority of its individual elements, which attest results accumulated in Tab. 9.

At least a half of elements from every SCM area demonstrated important differences in the perception depending on the country of operation. Therefore, the main zero research hypothesis should be rejected. Polish SMEs have a different view of the SCM strategy in their country. The majority of country-dependent differences were observed in relation to barrier elements and social aspects of sustainability in SCM areas.

Amongst the identified elements, which differed depending on the country, the most important ones were chosen for the Polish and Kazakhstani SMEs. SMEs operating in Kazakhstan and Poland recognised end customer needs as the most important SCM determinant in terms of practice; however, Polish companies gave more weight to this factor. The most important factor facilitating the SCM implementation in Kazakhstani companies was the integration of processes amongst members of the supply chain, while in the case of Polish companies, it was trust and openness amongst members of the supply chain. The greatest concerns in relation to the SCM implementation in Kazakhstan were laws and provisions hampering relations in SCM; meanwhile, in Poland, the issues were mostly related to quality problems caused by members of the supply chain. Kazakhstani companies underlined common procedures to provide feedback from a customer involved in product development as the most important business element of the sustainable development in SCM. In this respect, Polish companies chose

the use of information technologies to increase the efficiency of communication. Comparing companies to their chief competitors and with reference to the possibility of basing a supply chain on an end customer requirement, Kazakhstani companies were superior in evaluating customer satisfaction: the extent to which the perceived performance of the business corresponds with customer expectations. Polish companies believed that compared to their competitors, they had shorter delivery time: the ability to adjust the delivery time to customer requirements. The most important element of the sustainable development in SCM in Kazakhstan was the use of renewable sources in production, while Polish companies emphasised active involvement in the reduction of waste. The most important social element of sustainable development for companies operating in Kazakhstan as well as Poland was timely and lawful payment of taxes and fees.

While most assessed areas were considered important, the operation of a company within the supply chain generally received the lowest average scores from both countries. It was also the area that had the larger differences between average evaluations given from companies of the explored countries. The smallest differences between average evaluations of individual countries were received in the case of environmental sustainability elements in the SCM area.

The analysis of the main components for the seven SCM areas allowed a significant reduction in the number of variables to approximately a dozen factors that were supposed to explain the variance of the results for the whole studied phenomenon. Preliminary observations indicated that the main reasons for the SCM implementation were the desire to increase the efficiency of processes and meet the needs of end customers. The latter was also a key factor supporting the SCM implementation. At the same time,

Tab. 9. Number of significant differences in the assessment of SCM areas

SCM AREA	TOTAL NUMBER OF ELEMENTS IN THE AREA	NUMBER OF ELEMENTS FOR WHICH $P < 0.05$	ALTERNATIVE HYPOTHESIS
SCM determinants	7	4	support
Factors supporting the area (SCM)	7	4	support
Barriers to Supply Chain Management	7	6	support
Business elements in Supply Chain Management	13	8	support
Operation of the company within the supply chain	8	5	support
Environmental sustainability elements in Supply Chain Management	8	6	support
Social aspects of sustainability in Supply Chain Management	10	9	support

the biggest barriers were the formal and communicative constraints and the reluctance of employees to change. Practices implemented in the field of information exchange and the formalisation and standardisation of activities resulted in high-level customer service and, thus, increased sales compared to those of competitors. Waste recycling and the use of pro-environmental technologies played an important role in sustainable development. Ethical behaviour towards the local society was also very important.

## CONCLUSIONS

Previous research on SCM in SMEs targeting Romanian and Kazakhstani companies primarily focused on the association between product diversity and topology of the supply chain. SCM is achieved through partnerships with 3PL suppliers/transportation companies and customers. According to some studies, this could be resolved through the expansion of upstream and downstream company activities. Data analysis and interpretation for the logistics services market in Kazakhstan indicated its growth over the last decade, considering the construction of logistics parks that provided multiple facilities and the increase in the quality of transport operations through the appropriate support of the industry. The survey used in this study evaluated the SCM concept in SMEs and measured averages of evaluations given to factors concerning different SCM areas.

The research aimed to assess the differences in the perception of individual SCM areas depending on the country of SME operation. Sample sizes were identical for each surveyed country, and the sample structure was chosen randomly. Although the statistical models used in this study appeared robust, there were limitations concerning the number and choice of industries (more industries may be needed to ensure a representative sample) and the size of companies (the sample represented a wide range of sizes). Even though a systematic approach was used, it was still difficult to evaluate all aspects based on tertiary data. Future research could benefit from a deeper investigation of the present research results.

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