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The Importance of Knowledge Management Processes for the Creation of Competitive Advantage by Companies of Varying Size

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ABSTRACT

Objective: This article analyses the intensity of knowledge management processes in companies of different size. It also examines the role of these processes in the formation of competitive advantage by these businesses. Company size is defined as the number of employees.

Research Design & Methods: This article is based on a quantitative study in which 1258 companies were examined. Several statistical tests were used to analyse the data, including the U Mann-Whitney test, linear regression and Pearson correlation.

Findings: It was found that the intensity of knowledge management processes was higher for bigger firms. The results also show that, regardless of the size, entities with more intensive knowledge management processes were relatively more competitive. Another finding is that knowledge management processes were regarded especially important for the competitiveness of large companies, with 250 employees or more.

Implications & Recommendations: The implications of this study can be valuable for managers preparing to execute knowledge management processes. Based on insights from the study managers can plan strategically and make informed decisions about what type of knowledge management initiatives to implement.

Contribution & Value Added: The size of an organisation is a factor that so far has been ignored in the study of the relationship between the intensity of knowledge management and competitive advantage. Specific characteristics of a company that result from its size determine its unique approach to knowledge management – the principles and rules that apply to large organisations cannot easily be scaled down and implemented in SMEs.

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INTRODUCTION

Knowledge is one of the key assets that needs to be properly managed (Jashapara, 2004). The awareness of the importance of company knowledge has been recognized and investigated in the field of strategic management; for example, the resource-based view regards knowledge as a basic source of competitive advantage (Kalpic & Bernus, 2006). The company's competitive strength is derived from the uniqueness of its capabilities, such as knowledge (Conner & Prahalad, 1996; Schultze, 2002). Knowledge management has been an important topic of research for many years (Nonaka & Takeuchi, 1995; Wiig, 1997; Davenport & Prusak, 1998; Easterby-Smith & Lyles, 2005; Jashapara, 2014; Liebowitz, 2012, 2016; Becerra-Fernandez & Sabherwal, 2014; Kim, Lee, Chun, & Benbasat, 2014; Birasnav, 2014; Bolisani & Handzic, 2015; Edwards, 2015; Chouikha, 2016; Massaro, Handley, Bagnoli, & Dumay, 2016; Mohapatra, Agrawal, & Satpathy, 2016; Inkinen, 2016; Centobelli, Cerchione, & Esposito, 2017; Koohang, Paliszkiewicz, & Gołuchowski, 2017; Vătămănescu & Pînzaru, 2017; Pandey, Dutta, & Nayak, 2018; Syed, Murray, Hislop, & Mouzughi, 2018; Mahdi, Nassar, & Almsafir, 2019). According to Kalpic and Bernus (2006), research knowledge management includes the recognition of how difficult it is to deal with complexity in the business environment; interest in core competencies, their communication, leverage and possible transfer; issues concerning the dissemination of company knowledge in worldwide distributed companies; rapid development and adoption of ICT; and company awareness of issues concerning individual's knowledge and its externalisation and formalisation.

Many organisations have a worldwide distributed organisation, and the intensity of knowledge management, which involves acquisition, dissemination, intensity and application processes, requires special attention and special management techniques to gain competitive advantage (Soniewicki, 2015).

The goal of this article is to analyse the intensity of knowledge management in companies of different size and examine its role in the formation of competitive advantage in particular types of these businesses. It is based on quantitative research conducted in Poland in which 1258 companies were examined. Series of statistical methods were applied, including Mann Whitney U test and linear regression.

The first part of the article is devoted to the presentation of different definitions of knowledge management, and the formulation of the research hypothesis. The second part contains a description of the methodology and a discussion of the results. The last part contains conclusions and directions for future research.

LITERATURE REVIEW

In the literature there are many definitions of knowledge management. For example, Knapp (1998, p. 3) describes it as 'a set of processes for transferring intellectual capital to value'. Davenport and Prusak (1998) explain knowledge management as a systematic process for acquiring, organising, sustaining, applying, sharing, and renewing both tacit and explicit knowledge from employees to improve organisational performance and create value. Holsapple and Joshi (2004, p. 596) define knowledge management as '… an entity's systematic and deliberate efforts to expand, cultivate and apply available knowledge in

ways that add value to the entity, in the sense of positive results in accomplishing its objectives or fulfilling its purpose'. According to Mack, Ravin, and Byrd (2001), knowledge management refers to the methods and tools for capturing, storing, organising, and making knowledge and expertise accessible within and across communities.

Various distinctions between different forms of knowledge are proposed (e.g. Blackler, 1995; Spender, 1996). For example, Nonaka and Takeuchi (1995) describe tacit and explicit knowledge. Tacit knowledge is the knowledge acquired through experience, which is hard to articulate and convert to text or drawings. In contrast, explicit knowledge is readily available for use and represents content that has been captured in some tangible form, such as words, audio recordings, or images. Wiig (2004) distinguishes between actionable and passive knowledge.

Ruggles and Holtshouse (1999) describe the following key characteristics of knowledge management: generating new knowledge; accessing valuable knowledge from outside sources; using accessible knowledge in decision making; embedding knowledge in processes, products, and/or services; representing knowledge in documents, databases, and software; facilitating knowledge growth through culture and incentives; transferring existing knowledge into other parts of the organisation; measuring the value of knowledge assets and/or impact of knowledge management.

Knowledge management provides benefits to individual employees and to the organisation itself. It 'helps people do their jobs and save time through better decision making and problem solving; it builds a sense of community bonds within the organization; it helps employees to keep up to date; it provides challenges and opportunities to contribute' (Dalkir, 2005, p. 20). For the organisation, knowledge management 'helps drive strategy; solves problems quickly; diffuses best practices; improves knowledge embedded in products and services; cross-fertilizes ideas and increases opportunities for innovation; enables organizations to stay ahead of the competition better; builds organizational memory' (Dalkir, 2005, p. 20).

As markets grow more complex and unpredictable, the capacity of organisations to improve performance depends increasingly on their competence to acquire and develop knowledge. Knowledge-intensive organisations have received a great deal of attention from scholars and practitioners (e.g. Gadrey & Gallouj, 2002; Miles, 2005; Miozzo & Grimshaw, 2006; Muller & Doloreux, 2009).

The term 'knowledge-intensive companies' (Alvesson, 1995; Robertson & Swan, 1998; Starbuck, 1992) refers to organisations where most work is said to be of an intellectual nature and where well-educated and qualified employees make up the majority of the workforce (Alvesson, 2001). In organisations of this kind, knowledge is considered to be the primary asset and is more important than other kinds of inputs or resources. Knowledge intensive organisations tend to strongly support the creation of knowledge. Many scholars believe that there is a unique link between knowledge creation and competitive advantage (Hitt, 1998; Hitt *et al*., 1999; Bijlsma-Frankema, Rosendaal, & Taminiau, 2006). For example, Drucker (1988) argues that knowledge is the most meaningful economic resource. Nonaka (1994) insists that in an economy where the only certainty is uncertainty, knowledge remains the only sure source of lasting competitive advantage. Many authors have argued that designing a framework for knowledge management is a central

task of management in an effort to gain competitive advantage (Starbuck, 1992; Quinn, Anderson, & Finkelstein, 1996; Choo, 1996; Brown & Duguid, 2001).

A review of previous research reveals that there is a great deal of academic literature on knowledge management and competitive advantage. Nevertheless, the size of an organisation is a factor that has been ignored so far in the study of the relationship between the intensity of knowledge management and competitive advantage. In the literature we can find studies which show relationship between size and organisational effectiveness (Amah, Daminabo-Weje, & Dosunmu, 2013), efficiency (Burton, Minton, & Obel, 1991), performance (Manojlović, 2016) and innovation (Forés & Camisón, 2016). The practice of knowledge management varies depending on the company size. Specific characteristics of a company that result from its size determine its unique approach to knowledge management; for example, the principles and rules that apply to large organisations cannot easily be scaled down and implemented in SMEs.

Therefore, the present study specifically focuses on the intensity of knowledge management and organisational competitiveness and develops the following hypotheses:

H1: Bigger companies tend to engage in more intensive knowledge management processes.

H2: Regardless of the size, companies which are more intensively engaged in knowledge management processes tend to have a higher competitive position.

MATERIAL AND METHODS

Sample and Questionnaire

The goal of this article is to analyse the intensity of knowledge management in companies of different size and examine its role in the formation of competitive advantage in particular types of these businesses. It is based on a survey which was conducted in Poland in 2012 and at the beginning of 2013. The sampling frame for the survey was the Kompass Poland database. It was a convenience sample as only such an option was offered by available databases. Data were collected using a paper questionnaire sent by post and as an online survey created with the help of a computer scientist. Over 1200 completed questionnaires were returned. Response rate in the case of questionnaires sent by post was 6.4% and in the case of online survey it was 3.5%.

The sample included companies of various sizes – Table 1. The biggest group consisted of small companies (10-49 employees), but micro companies (fewer than 10 employees) and medium-sized firms both made up considerable shares of the sample. The smallest group was composed of large companies (250 or more employees). The overall number of entities in the sample was 1283.

The sample consisted of companies from various industries – Table 2. Most of them operated in service and manufacturing industries. A considerable part of the sample included trading companies. Other sectors were represented in the sample included construction and building industry, mining or energy industry, and the other category selected by respondents who could not classify their company's activity into any of the industries listed in the questionnaire.

Table 1. Number of companies with particular employment level in the examined sample

Employment	*No. of companies in the sample*
Fewer than 10	300
10-49	540
50-249	327
250 or more	91
Total:	*1258*

Source: own study.

Table 2. Number of companies operating in a particular industry in the sample

Industry	*No. of companies in the sample*
Services	380
Manufacturing	333
Trade	240
Building construction	130
Mining or energy industry	32
Other	143
Total:	*1258*

Source: own study.

The survey questionnaire included other questions in addition to those related to knowledge management and competitive advantage of companies, which are the subject of this article. The questionnaire was created by Soniewicki (2015) on the basis of various literature sources – Appendix 1. The part which concerns knowledge management consists of four sections: intensity of knowledge acquisition, intensity of knowledge dissemination, ICT supporting knowledge management processes and intensity of knowledge application. Every section contains a number of questions. All of them were measured on a 5-point Likert scale, where particular answers always mean: 1 – negative, 3 – neutral and 5 – positive. In order to compare the overall intensity of knowledge management processes an aggregate measure was created – the Knowledge Management (KM) Index, which is the mean of the results obtained in the four questionnaire parts (Soniewicki, 2015) – Figure 1.

Measuring companies' competitiveness in a quantitative study is a very difficult task. There is no perfect and commonly used method of measuring competitiveness in this kind of research. Nevertheless, Fonfara (2012) proposes measuring competitive advantage in reference to the company's competitors. This approach was also adopted in the present study: the company's competitive position was measured using the Competitiveness Index. The measure was created by Fonfara (2012) and has been tested by many authors e.g. Ratajczak-Mrozek (2012). The index is based on four financial and non-financial variables: profit, the value of sales, return on investment (ROI) and the market share. These indicators are evaluated on a 5-point Likert scale relative to the company's closest competitors. In the actual survey, respondents were asked to evaluate the firm's position relative to their closest competitors, taking into account the four indicators. Answer options included: 1 – much worse (compared to the closest competitors), 2 – worse, 3 – more or less the same, 4 – better, 5 – much better. The Competitiveness Index is an arithmetic average of responses to these four questions.

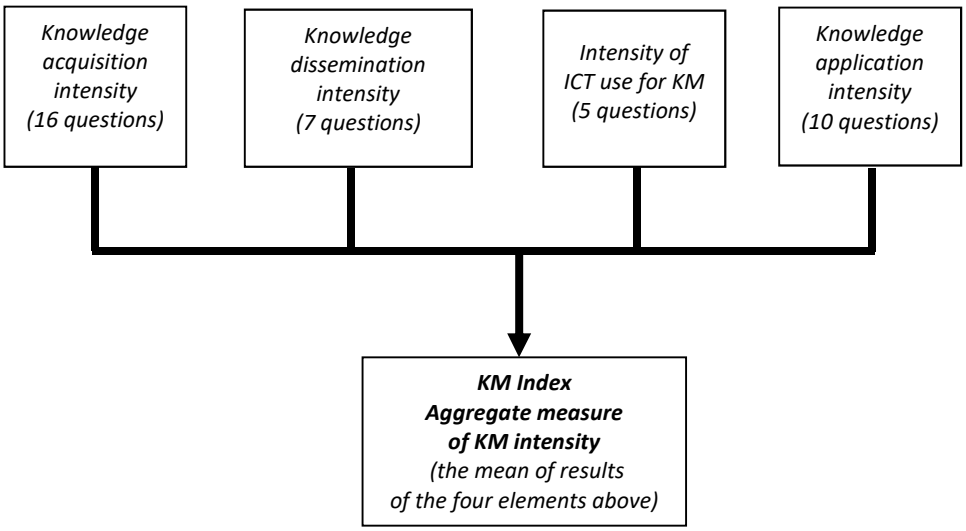

Figure 1. The design of KM Index
Source: Soniewicki (2015).

Establishing the Reliability of the Model

The reliability of the research tool was tested by means of Cronbach's alpha – Table 3. The statistic ranges from 0 to 1. In the literature it is widely accepted that α values higher than 0.7 mean that a research tool is reliable (Kainth & Verma 2011; Liu & Wohlsdorf-Arendt, 2016). As can be seen in Table 3, values of Cronbach's alpha for all the components of the research tool are appropriate.

Table 3. Results of Cronbach's alpha reliability test – KM Index and Competitiveness Index

Component		*Cronbach's alpha*	*Cronbach's α based on standardized items*	*No. of items*
KM Index	Knowledge acquisition intensity	0.828	0.829	16
	Knowledge dissemination intensity	0.840	0.843	7
	Intensity of ICT use for KM	0.777	0.767	5
	Knowledge application intensity	0.892	0.895	10
KM Index		0.789	0.798	4
Competitiveness Index		0.900	0.900	4

Source: own calculations prepared using SPSS software.

The statistical significance of the observed differences was verified using the Mann-Whitney U test. The test was conducted by means of IBM SPSS software *(Statistical Package for the Social Sciences)*. Four levels of statistical significance were distinguished: *p<0.1, **p<0.05, ***p<0.01, ****p<0.001. The correlation between the KM Index and the level of competitiveness of the analysed companies, including the possibility of predicting competitiveness on the basis of KM Index, was determined by applying linear regression.

RESULTS AND DISCUSSION

This part of the article is devoted to the presentation of results of the quantitative study. Table 4 shows the average intensity of knowledge management processes among companies of specific sizes.

Table 4. Average intensity of knowledge management in companies depending on the number of employees

No. of employees	*Knowledge Management intensity (KM Index)*	*Difference in relation to the previous category* (in terms of KM Index)	*p-value of Mann-Whitney test*
Fewer than 10	3.08	-	-
10-49	3.17	+0.09	**0.065***
50-249	3.29	+0.12	**0.001*****
250 or more	3.38	+0.10	**0.053***

Source: own calculations prepared using SPSS software.

Figures in Table 4 reveal a certain regularity – knowledge management processes intensify with an increasing company size. Moreover, Mann-Whitney U test results indicate that these differences are statistically significant. This tendency may be due to the fact that larger companies need more coordination to manage knowledge processes, which implies more advanced activities in the area of knowledge management. Nevertheless, knowledge management processes are only a tool used for creating companies' competitive advantage. That is why the following analyses concentrate on the competitiveness of enterprises. The next table is the only one where four groups of companies are analysed together. Further analyses concentrate on the performance of firms of a particular size and depending on the intensity of knowledge management processes.

Table 5. Competitiveness Index for all companies depending on the intensity of knowledge management

Knowledge Management intensity (KM Index)	*Competitiveness Index*	*Difference in relation to KM Index <=3* (in terms of Competitiveness Index)	*p-value of Mann-Whitney test*	*No. of companies*	*Share*
<=3	2.85	-	-	444	35%
>3	3.31	+0.46	**<0.001****	814	65%
			Total:	1258	100%
>3.5	3.51	+0.67	**<0.001****	362	29%
>4	3.79	+0.94	**<0.001****	81	6%

Source: own calculations prepared using SPSS software.

As can be seen from Table 5, for more than a third of companies in the sample (35%) the intensity of knowledge management processes is below the average level (KM Index <= 3). These firms evaluate themselves as less competitive than their closest competitors – Competitiveness Index = 2.85. The second group is characterised by KM Index > 3. These companies see themselves as more competitive than their competitors – Competitiveness Index = 3.31. We can note that competitiveness of companies with even more intensive knowledge

management processes (KM > 3.5 and KM > 4) is the highest – Competitiveness Index – 3.51 and 3.79, respectively. This confirms the tendency that competitiveness of enterprises increases with the growing intensity of their knowledge management processes. Moreover, the increases in competitiveness are considerable and all differences are statistically significant. The purpose of the following analysis is to test the importance of KM Index to predict competitiveness of all companies using linear regression – Tables 6, 7 and 8.

Table 6. Summary of the regression model – KM Index and Competitiveness Index – all companies

Model	*R*	*R squared*	*Adjusted R squared*	*Standard error of the estimate*
1	0.376	0.142	0.141	0.73094

Source: own calculations conducted using SPSS software.

Table 7. Anova – KM Index and Competitiveness Index – all companies

Model		*Sum of squares*	*df*	*Mean square*	*F*	*Significance*
1	*Regression*	110.806	1	110.806	207.394	<0.001
	Residual	671.055	1256	0.534	-	-
	Total	781.861	1257	-	-	-

Source: own calculations conducted using SPSS software.

Table 8. Coefficients – KM Index and Competitiveness Index – all analysed companies

Model		*Unstandardised coefficients*		*Standardised coefficients*	*t*	*Significance*
		B	*Standard error*	*Beta*		
1	*(Constant)*	1.398	0.123	-	11.370	<0.001
	KM Index	0.547	0.038	0.376	14.401	<0.001

Source: own calculations conducted using SPSS software.

As can be seen, Pearson correlation coefficient is 0.376, and the model predicts 14.2% of the variation in the competitiveness of a company. The p value of the F test is a lot lower than the standard value of 0.05, so the model is well fitted to the data. In general, the linear regression shows that a unit increase in KM Index is associated with an increase in competitiveness by 0.547.

The analyses presented in Tables 5, 6, 7 and 8 refer to companies of various sizes. The results shown in Table 4 indicate that the average intensity of knowledge management processes in companies depends on their size. This may suggest that this tool is more important for larger companies. That is why it was reasonable to analyse the impact of knowledge management on competitiveness separately for enterprises of a particular size. The results of these analyses are presented in the following tables – 9-24.

Table 9 shows competitiveness of micro companies (fewer than 10 employees) depending on the intensity of knowledge management. As can be seen, about 60% of micro companies are characterised by a higher than average intensity of knowledge management processes. However, these companies perceive themselves as only a bit more competitive than their closest competitors. Firms less intensively engaged in knowledge management activities rate themselves as much less competitive – Competitiveness Index = 2.74. One can note that competitiveness of micro companies also rises with the

growing intensity of knowledge management, but this growth is slower than for the entire sample containing firms of all sizes. Similarly, shares of companies with a higher than average (>3), high (>3.5) and very high (>4) intensity of knowledge management processes are smaller than in the case of the whole sample. This aspect was examined with the use of linear regression – Tables 10, 11 and 12.

Table 9. Competitiveness Index for micro companies (fewer than 10 employees) depending on the intensity of knowledge management

Knowledge Management intensity (KM Index)	***Competitiveness Index***	***Difference in relation to KM Index <=3*** *(in terms of Competitiveness Index)*	***p-value of Mann-Whitney test***	***No. of companies***	***Share*** *(in the group of micro companies)*
<=3	2.74	-	-	125	42%
>3	3.13	+0.39	**<0.001******	175	58%
			Total:	300	100%
>3.5	3.32	+0.58	**<0.001******	68	23%
>4	3.63	+0.89	**0.001*****	14	5%

Source: own calculations prepared using SPSS software.

Table 10. Summary of the regression model – KM Index and Competitiveness Index – micro companies (fewer than 10 employees)

Model	***R***	***R squared***	***Adjusted R squared***	***Standard error of the estimate***
1	0.311	0.096	0.093	0.78421

Source: own calculations conducted using SPSS software.

Table 11. Anova – KM Index and Competitiveness Index – micro companies (fewer than 10 employees)

Model		***Sum of squares***	***df***	***Mean square***	***F***	***Significance***
1	*Regression*	19.558	1	19.558	31.803	<0.001
	Residual	183.266	298	0.615	-	-
	Total	202.824	299	-	-	-

Source: own calculations conducted using SPSS software.

Table 12. Coefficients – KM Index and Competitiveness Index – micro companies (fewer than 10 employees)

Model		***Unstandardised coefficients***		***Standardised coefficients***	***t***	***Significance***
		B	***Standard error***	***Beta***		
1	*(Constant)*	1.605	0.246	-	6.528	<0.001
	KM Index	0.443	0.079	0.311	5.639	<0.001

Source: own calculations conducted using SPSS software.

The results of linear regression show that Pearson correlation coefficient is a bit lower than that calculated for all companies combined and amounts to 0.311. The model predicts less variation in the competitiveness level of micro companies – 9.6%. However, the p value of the F test is still a lot lower than the standard value of 0.05, so it can be inferred that the model is well fitted to the data. The linear regression shows that a unit increase

in KM Index is associated with a rise in competitiveness by 0.443, so less than the value obtained for all the companies combined.

The following tables – 13, 14, 15 and 16 – refer to small firms (10-49 employees).

The results in Table 13 show that there is a large difference in competitiveness between companies with a low intensity of knowledge management (<=3) and those with a higher than average intensity (>3). Just like in the case of micro companies, one can also see that a growing intensity of knowledge management processes in small firms is correlated with a rise in their competitiveness. Shares of companies with higher than average (>3) and high (>3.5) levels of KM Index are also larger than in the case of micro companies. Nevertheless, the share of companies with a very high intensity of knowledge management processes is smaller (4%) than that obtained for micro companies. This aspect is examined further by applying linear regression – Tables 14, 15 and 16.

Table 13. Competitiveness Index for small companies (10-49 employees) depending on the intensity of knowledge management

Knowledge Management intensity (KM Index)	***Competitiveness Index***	***Difference in relation to KM Index <=3*** *(in terms of Competitiveness Index)*	***p-value of Mann-Whitney test***	***No. of companies***	***Share*** *(in the group of small companies)*
<=3	2.83	-	-	202	37%
>3	3.28	+0.45	**<0.001******	338	63%
			Total:	540	100%
>3.5	3.48	+0.65	**<0.001******	138	26%
>4	3.75	+0.92	**<0.001******	22	4%

Source: own calculations prepared using SPSS software.

Table 14. Summary of the regression model – KM Index and Competitiveness Index – small companies (10-49 employees)

Model	***R***	***R squared***	***Adjusted R squared***	***Standard error of the estimate***
1	0.387	0.150	0.148	0.67992

Source: own calculations prepared using SPSS software.

Table 15. Anova – KM Index and Competitiveness Index – small companies (10-49 employees)

Model		***Sum of squares***	***df***	***Mean square***	***F***	***Significance***
1	*Regression*	43.774	1	43.774	94.688	<0.001
	Residual	248.716	538	0.462	-	-
	Total	292.490	539	-	-	-

Source: own calculations conducted using SPSS software.

Table 16. Coefficients – KM Index and Competitiveness Index – small companies (10-49 employees)

Model		***Unstandardized coefficients***		***Standardized coefficients***	***t***	***Significance***
		B	***Standard error***	***Beta***		
1	*(Constant)*	1.312	0.187	-	7.002	<0.001
	KM Index	0.569	0.058	0.387	9.731	<0.001

Source: own calculations conducted using SPSS software.

The results of linear regression show that Pearson correlation coefficient is 0.387 and is higher than the value obtained for micro companies. The model is also able to predict 15% of the variation in the Competitiveness Index of small companies, which is an improvement of 5.4 percentage points compared to the result obtained for micro companies. The p value of the F test is also very low, which means that the model is well fitted to the data. In other words, a unit increase in KM Index is associated with a growth in competitiveness by 0.569, considerably more than in the case of micro companies.

The following tables summarise the relationship between knowledge management and competitiveness for medium-sized companies (50-249 employees).

Table 17. Competitiveness Index for medium-sized companies (50-249 employees) depending on the intensity of knowledge management

Knowledge Management intensity (KM Index)	***Competitiveness Index***	***Difference in relation to KM Index <=3*** *(in terms of Competitiveness Index)*	***p-value of Mann-Whitney test***	***No. of companies***	***Share*** *(in the group of medium companies)*
<=3	2.99	-	-	92	28%
>3	3.37	+0.38	**<0.001******	235	72%
			Total:	327	100%
>3.5	3.57	+0.59	**<0.001******	121	37%
>4	3.69	+0.70	**<0.001******	27	8%

Source: own calculations conducted using SPSS software.

In the group of medium-sized companies, there is a bigger share of entities with a higher than average intensity of knowledge management – 72%. There are also more firms with high (>3.5) and very high (>4) levels of KM Index. Nevertheless, the rise in competitiveness associated with an increasing intensity of knowledge management processes is smaller than that observed for small companies. This issue is further explored by means of linear regression – Tables 18, 19 and 20.

Table 18. The summary of the regression model – KM Index and Competitiveness Index – medium-sized companies (50-249 employees)

Model	***R***	***R squared***	***Adjusted R squared***	***Standard error of the estimate***
1	0.317	0.100	0.097	0.73725

Source: own calculations prepared using SPSS software.

Table 19. Anova – KM Index and Competitiveness Index - medium companies (50-249 employees)

Model		***Sum of squares***	***df***	***Mean square***	***F***	***Significance***
1	*Regression*	19.674	1	19.674	36.197	<0.001
	Residual	176.652	325	0.544	-	-
	Total	196.326	326	-	-	-

Source: own calculations conducted using SPSS software.

As can be seen, Pearson correlation coefficient is 0.317, which is lower than the corresponding value for small companies, but a bit higher than that obtained for micro companies.

The model predicts 10% of the variation in the Competitiveness Index of medium-sized companies. The p value of the F test is very low, which means that the model is well fitted to the data. A unit increase in KM Index is associated with a rise in competitiveness by 0.467.

Table 20. Coefficients – KM Index and Competitiveness Index – medium-sized companies (50-249 employees)

Model		Unstandardised coefficients		Standardised coefficients	t	Significance
		B	Standard error	Beta		
1	(Constant)	1.728	0.258	-	6.690	<0.001
	KM Index	0.467	0.078	0.317	6.016	<0.001

Source: own calculations conducted using SPSS software.

The final part of the analysis concerns the group of large companies (250 or more employees).

Table 21. Competitiveness Index for large companies (250 employees or more) depending on the intensity of knowledge management

Knowledge Management intensity (KM Index)	Competitiveness Index	Difference in relation to KM Index <=3 (in terms of Competitiveness Index)	p-value of Mann-Whitney test	No. of companies	Share (in the group of large companies)
<=3	2.94	-	-	25	27%
>3	3.67	+0.73	**<0.001****	66	73%
			Total:	91	100%
>3.5	3.81	+0.87	**<0.001****	35	38%
>4	4.11	+1.17	**<0.001****	18	20%

Source: own calculations conducted using SPSS software.

In the group of large companies, an increasing intensity of knowledge management processes is associated with the highest growth in the self-reported level of competitiveness. The shares of entities with high (>3.5) and very high (>4) values of KM Index are also the biggest of all the groups considered so far. This is particularly evident in the case of firms with a very high intensity of knowledge management processes (>4), which account for 20% of all companies in this group. This share is around 2.5 times bigger than the corresponding share of medium-sized companies with the same intensity of knowledge management processes. Competitiveness of firms so intensively involved in knowledge management activities is much higher than that reported by companies with a lower intensity of these processes. This indicates particularly high importance of knowledge management in the creation of competitive advantage for large companies (250 or more employees). This correlation is probably because such companies crucially depend on knowledge management processes and tools to operate effectively. They need to gain, transfer and use knowledge, which needs to flow efficiently through their complex structures to finally reach the right place. The issue is analysed further using linear regression.

As can be seen, Pearson correlation coefficient for this group of companies is 0.492, which is the highest value of all the groups. In this case, the model predicts as much as 24.2% of the variation in the Competitiveness Index of large companies, which is, again,

much more than in the previous cases. The p value of the F test is a bit higher – 0.008, but is still much less than 0.05, so the model can be considered to be well fitted to the data. A unit increase in KM Index is associated with a rise in competitiveness by 0.678.

Table 22. The summary of the regression model – KM Index and Competitiveness Index – large companies (250 employees or more)

Model	*R*	*R squared*	*Adjusted R squared*	*Standard error of the estimate*
1	0.492	0.242	0.234	0.75094

Source: own calculations prepared using SPSS software.

Table 23. Anova – KM Index and Competitiveness Index – large companies (250 employees or more)

Model		*Sum of squares*	*df*	*Mean square*	*F*	*Significance*
1	*Regression*	16.041	1	16.041	28.445	<0.001
	Residual	50.189	89	0.564	-	-
	Total	66.229	90	-	-	-

Source: own calculations prepared using SPSS software.

Table 24. Coefficients – KM Index and Competitiveness Index – large companies (250 employees or more)

Model		*Unstandardised coefficients*		*Standardised coefficients*	*t*	*Significance*
		B	*Standard error*	*Beta*		
1	*(Constant)*	1.177	0.437	-	2.695	0.008
	KM Index	0.678	0.127	0.492	5.333	<0.001

Source: own calculations conducted using SPSS software.

Table 25 shows values of Competitiveness Index for companies with a higher than average intensity of knowledge management processes (>3) depending on the company size.

Table 25. Comparison of Competitiveness Index for companies intensively involved in knowledge management (KM Index >3) depending on the company size

Employment	*Competitiveness Index for companies with KM Index > 3*
Fewer than 10	3.13
10-49	3.28
50-249	3.37
250 or more	3.67

Source: own study.

Based on the information presented in Table 25, it can be concluded that the importance of knowledge management for competitiveness increases with the increasing number of employees. This means that it is particularly important for larger enterprises to introduce advanced, well-planned knowledge management strategies and tools, in order to coordinate, use and develop their knowledge resources, which are crucial in the creation of competitive advantage.

CONCLUSIONS

This study makes two kinds of contributions to the existing body of knowledge in the area of knowledge management. The first kind is a theoretical contribution. The second kind is of practical nature. The study shows that the average intensity of knowledge management processes grows along with the number of employees in the company. The difference in the intensity of these processes is particularly notable for small (10-49 employees) and medium-sized companies (50-249 employees). This trend probably reflects bigger enterprises' need for more advanced knowledge management processes. This outcome confirms hypothesis 1. The study results also indicate that the company's competitiveness, regardless of its size, improves with the growing intensity of knowledge management processes. How much the intensity of these processes affects competitiveness varies depending on the size of an enterprise but the growing trend can be observed for all four size categories of enterprises. This means that firms, irrespective of the size, which are less intensively engaged in knowledge management processes perceive themselves as less competitive than their closest competitors. All the observed differences were found to be statistically significant, which provides additional support for the observed regularity. Moreover, the results of linear regression indicate that for companies of all sizes the intensity of knowledge management (measured by KM Index) was correlated with their perceived level of competitiveness (measured by Competitiveness Index), all of which confirms hypothesis 2. The studied sample contained a substantial number of companies characterised by a low intensity of knowledge management processes. These entities tended to evaluate themselves as less competitive than their closest competitors. There was, however, a small elite of companies that place a lot of emphasis on knowledge management, especially those with a very high intensity of these processes (KM Index > 4); those companies viewed themselves as the most competitive ones, comparatively speaking. Another conclusion is that the development of knowledge management is, in general, of most importance to large companies (250 or more employees). In this size category, the difference in competitiveness between companies with a low intensity (KM Index <=3) of knowledge management processes and a very high intensity (KM Index > 4) is particularly evident.

The implications of this research are likely to be valuable for managers intending to implement knowledge management processes. Managers could use insights from the study to make strategic plans and informed decisions about knowledge management initiatives to carry out. Such a preparation is crucial because managers make important investments in terms of time, money and personnel when they decide to get involved in knowledge management (Becerra-Falezernandez, Gonzalez, & Sabherwal, 2004; Parikh, 2001).

One of the limitations of this study which should be mentioned is the fact that both factors – knowledge management intensity and competitiveness might always be influenced by some another factor not examined here. Another limitation is the fact that the study is based on a convenience sample of companies. Although this is an acceptable approach to data collection (Garson, 2013), results based on a random sample would have been more generalisable. We recommend that future studies use random samples from different countries.

The study results indicate that this is a very interesting area of research and should be explored further, for example by means of qualitative methods. It would be particularly

useful to examine what sort of knowledge management processes are important for the competitiveness of companies of a particular size.

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Appendix A: Questions from the survey

Table A1. Knowledge acquisition

No.	*How intensively company is using particular knowledge sources (5-grade Likert scale)*	*Literature on which the question is based*
1.	External trainings and courses	Sparrow (2010); Darroch (2003); Probst, Raub and Romhardt (2004); Davenport and Probst (2002)
2.	Consulting companies	
3.	Scientific, journalistic and industry publications	
4.	Ordered expertise	
5.	Market research – ordered or commissioned	
6.	Internet	
7.	Knowledge and previous experience of new employees	
8.	Other subsidiaries or affiliates and related entities	
9.	Customers	
10.	Suppliers and subcontractors	
11.	Competitors	
12.	Strategic alliances	
13.	Industry organizations / networking clubs	
14.	Research institutions, universities	
15.	Government institutions	
16.	Own research and development activities	

Source: Soniewicki (2015).

Table A2. Knowledge dissemination

No.	*Question (5-grade Likert scale)*	*Literature on which the question is based*
1.	In our company there are conditions for joint meetings and exchange of experiences, for example social spaces or canteens	On the basis of: Wang, Hult, Ketchen and Ahmed, (2009) and Darroch (2003)
2.	Employees of various departments of our company often cooperate with each other – informally or formally	On the basis of: Wang, Hult, Ketchen and Ahmed (2009)
3.	All employees of our company and the management board most often have no problems in obtaining the information and knowledge they need at any given moment	On the basis of: Wang, Hult, Ketchen and Ahmed (2009)
4.	Best practices of other companies – for example competitors – are regularly disseminated in our company	On the basis of: Kohli, Jaworski and Kumar (1993); Narver and Slater (1990)
5.	Managers in our company – individually or in groups – often meet with employees	On the basis of: Darroch (2003)
6.	In our company, if it is possible, we introduce teamwork mode	On the basis of: Busch (2008)
7.	In our company, there are ongoing efforts to improve the flow of information and knowledge	Geisler and Wickramasinghe (2009)

Source: Soniewicki (2015).

Table A3. IT knowledge management systems

No.	*Please assess the intensity of use of particular information technology in your company (5-grade Likert scale)*	*Literature on which the question is based*
1.	Basic information technology (Internet, e-mail, text editors, spreadsheets)	On the basis of: Alavi and Tiwana (2006); Geisler and Wickramasinghe (2009)
2.	Data storage systems (for example: systems gathering, providing and managing documents and other data, CRM, data warehouses)	
3.	IT communication systems (for example: corporate portals, intranet, company forums or newsgroups)	
4.	Group collaboration systems (groupware/collaboration) (comprehensive support systems for collaborative work)	
5.	Decision support systems, expert systems (Business Intelligence, Executive Information Systems)	

Source: Soniewicki (2015).

Table A4. Knowledge implementation

No.	*Question (5-grade Likert scale)*	*Literature on which the question is based*
1.	Our company has specific goals and plans for the upcoming years, written and well-known to employees	On the basis of: Moorcroft (2006);Tagiuri and Davis (1992)
2.	From the perspective of our company's strategy, continuous development of new knowledge is the most important element of the competition	On the basis of: Wang, Hult, Ketchen and Ahmed (2009)
3.	Our company is constantly working on new products and / or services as well as organisational improvements	On the basis of: Pasher and Ronen (2011) and Darroch (2003)
4.	Our company is constantly identifying its shortcomings in the matter of information and knowledge	Pasher and Ronen (2011) and Probst, Raub and Romhardt (2004)
5.	Information and knowledge accumulated in our company are actively used in everyday business activities, especially in making decisions	On the basis of: Wang, Hult, Ketchen and Ahmed (2009)
6.	Many ideas, initiatives or improvements emerge in our company because of the efficient flow of information and knowledge	On the basis of: Busch (2008)
7.	Employees of our company often submit various ideas	On the basis of: Wang, Hult, Ketchen and Ahmed (2009)
8.	The process of evaluating (and possibly implementing) the ideas submitted by the employees is most often efficiently performed in our company	On the basis of: Wang, Hult, Ketchen and Ahmed (2009)
9.	In our company cooperation dominates over competition	Geisler and Wickramasinghe (2009) and Anantatmula (2008)
10.	We thoroughly analyse each of our failures to prevent similar events in the future	On the basis of: Wang, Hult, Ketchen and Ahmed (2009), Darroch (2003).

Source: Soniewicki (2015).

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