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## Article

# A study on improving the effectiveness of a manufacturing company in the context of knowledge management: Research results

Foundations of Management

## Provided in Cooperation with:

Faculty of Management, Warsaw University of Technology

*Suggested Citation:* Patalas-Maliszewska, Justyna; Kłos, Sławomir (2017) : A study on improving the effectiveness of a manufacturing company in the context of knowledge management: Research results, Foundations of Management, ISSN 2300-5661, De Gruyter, Warsaw, Vol. 9, Iss. 1, pp. 149-160,  
<https://doi.org/10.1515/fman-2017-0012>

This Version is available at:

<https://hdl.handle.net/10419/184623>

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## A STUDY ON IMPROVING THE EFFECTIVENESS OF A MANUFACTURING COMPANY IN THE CONTEXT OF KNOWLEDGE MANAGEMENT – RESEARCH RESULTS

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**Abstract:** This paper presents the relationship between the various kinds of knowledge that should be acquired, created, accumulated, shared, and transferred within a manufacturing company in order to improve organizational effectiveness. It is based on the data obtained from 85 Polish and German manufacturing companies from the cross-border cooperation region of Lubuskie/Poland – Brandenburg/Germany. This is followed by a discussion of the results of empirical studies and of the supporting literature.

**Keywords:** knowledge management process, organizational effectiveness, manufacturing company.

### 1 Introduction

In the dynamic business environment, maximizing the firm's effectiveness is a critical requirement for building the competitive advantage (Ballard et al., 2005). In a knowledge-based economy, knowledge can play a critical factor in improving the effectiveness of manufacturing companies. Manufacturing companies would usually like to be optimally effective; therefore, managers often try to implement new concepts and methods in the management of their companies. Owing to an increased demand for new solutions by managers, the necessity to perform research to improve effectiveness of a manufacturing company in the context of knowledge management has become more noticeable.

According to Fan (2004), knowledge is the expression of core competences of workers in a company. Knowledge management is promoted as an important and a necessary factor for organizational survival of competitive strength in a company. Kebede (2010) states that knowledge management process in a company should facilitate access to information and knowledge in organizations, communities, business, research, and so on. Maurer (2010) stated that implementation of knowledge management process may increase the success rates of realized projects. We argue with Edvinsson (1997) and Lee et al. (2005) that nonfinancial measures, such as knowledge, have become increasingly important for companies' development. Cotoră (2007) suggests that it

is necessary to identify the relationships and the conversion processes among knowledge and situations, competencies, and partnerships in the companies for firm's performance improvement.

In the literature, we can find that several factors, such as leadership, systems, and processes, influence the effectiveness of an organization (Jian and Triandis, 1997), (Lee and Choi, 2003), (Cameron and Quinn, 2011). Knowledge management processes are understood to be processes of the following stages: (1) knowledge acquisition, (2) knowledge creation, (3) knowledge accumulation, (4) knowledge sharing, and (5) knowledge transference through an organization. Knowledge in a manufacturing enterprise can be divided into hidden, that is, tacit knowledge, and overt, that is, explicit knowledge (Nonaka and Takeuchi, 1995). Explicit knowledge is easy to codify and is transferable through various channels and media. Tacit knowledge is difficult to articulate and record and is typically associated with an individual worker or a group of workers. In agreement with Daft (1995), we state that the effectiveness of an organization can be measured as the achievement of its goals.

Based on the research results<sup>1</sup> from 85 manufacturing enterprises from the Lubuskie/Poland and Bran-

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<sup>1</sup> This work was supported in part by the project realized by Justyna Patalas-Maliszewska: "Assessing the relationship between business strategy and knowledge transfer in German Manufacturing Enterprises" by the German Academic Exchange Service (DAAD), Bonn, Germany, No: 235585, 2016.

denburg/Germany cross-border cooperation region, which were classified into “construction” or “automotive” (20% of the total number of such companies), our paper presents the relationship between the various kinds of knowledge that should be acquired, created, accumulated, shared, and transferred within a company in order to improve organizational effectiveness.

The remainder of this paper is organized as follows: a literature review follows in the subsequent section. Section 3 develops a research model to depict hypothesized relationships and data collection. A data analysis based on the research results from German and Polish manufacturing companies and the findings are reported in Section 4. The implications of this study and concluding remarks are discussed in Section 5.

## **2 Improving the effectiveness of a manufacturing company in the context of knowledge management – literature review**

The effectiveness of a company is dependent on how well knowledge is managed within an organization (Alavi and Leidner, 2001), (Argote and Ingram, 2000). Davenport and Prusak (1998), Hsu (2008), and Law and Ngai (2008) state that organizational outcome can be improved through the implemented knowledge management practices in a company.

Kim et al. (2003) define knowledge management process as creation, organization, transfer, and application of the knowledge within organizations. Moreover, Kingston and Macintosh (2000) and Lai and Liu (2009) state that knowledge support within a company is an important mechanism for increasing work effectiveness. Companies are noticing the importance of implementation of knowledge management process if they want to remain competitive (Zack, et al. 2009) and grow (Salojärvi, Furu, and Sveiby, 2005). Knowledge management process is the fundamental means through which a company can achieve the competitive advantage (Wang and Noe, 2010).

It is difficult to find a clear definition of knowledge management in the literature. Grzeszczuk (2006) defines knowledge management as an integrated,

systematically coordinated set of activities aimed at the collection, processing, and sharing of knowledge. Knowledge management is a continuous process of the implementation of management functions, focused on internal and external, existing and nonexisting, openly acknowledged, and concealed resources of knowledge within a company (Perechuda, 2005). The knowledge management process in a company should focus on three interconnected areas: (1) the acquisition of knowledge and its creation, (2) the dissemination of knowledge, and (3) the use of knowledge (Dudek and Patalas-Maliszewska, 2015). According to Schultze and Leidner (2002), knowledge management practices are now implemented in organizations to increase their effectiveness.

According to the knowledge management literatures, the following questions are formulated: what kinds of useful knowledge in a manufacturing company that would be supported by knowledge management activities which would result in firm’s effectiveness? Whether the knowledge management process implementation influences the effectiveness of a manufacturing company?

Therefore, before the survey was carried out, any applicable knowledge that might be useful for the development of manufacturing firms was defined by five managers and the survey items were modified based on their feedback. As a result, the following kinds of useful knowledge in a manufacturing company for the improvement of a company’s effectiveness were identified:

- tacit and explicit knowledge about new IT solutions,
- tacit and explicit knowledge about production processes,
- tacit and explicit knowledge about realized projects,
- tacit and explicit knowledge about the work of innovative solutions for a company,
- tacit and explicit knowledge about a firm’s strategy,
- tacit and explicit knowledge about sales methods,
- tacit and explicit knowledge about the firm’s structure.

This study expects that certain kinds of knowledge, which will be defined and used in each stage of the knowledge management process, will positively influence the company's effectiveness. From an economic point of view, effectiveness can be seen as the result of economic activities of a manufacturing company and it is the relationship between effects and expenditure. McAdam and Bailie (2002) stated that the effectiveness of an organization can be defined as the level of achievement of its goals.

The discovery of relationships between the implementation of knowledge management processes and the improvement of an organization's effectiveness may well be crucial for a company's development. In accordance with Cameron and Quinn (2011), we state that knowledge management processes should be implemented in a company to enhance organizational effectiveness. According to the results of the literature study, the following research model is defined (Fig. 1).

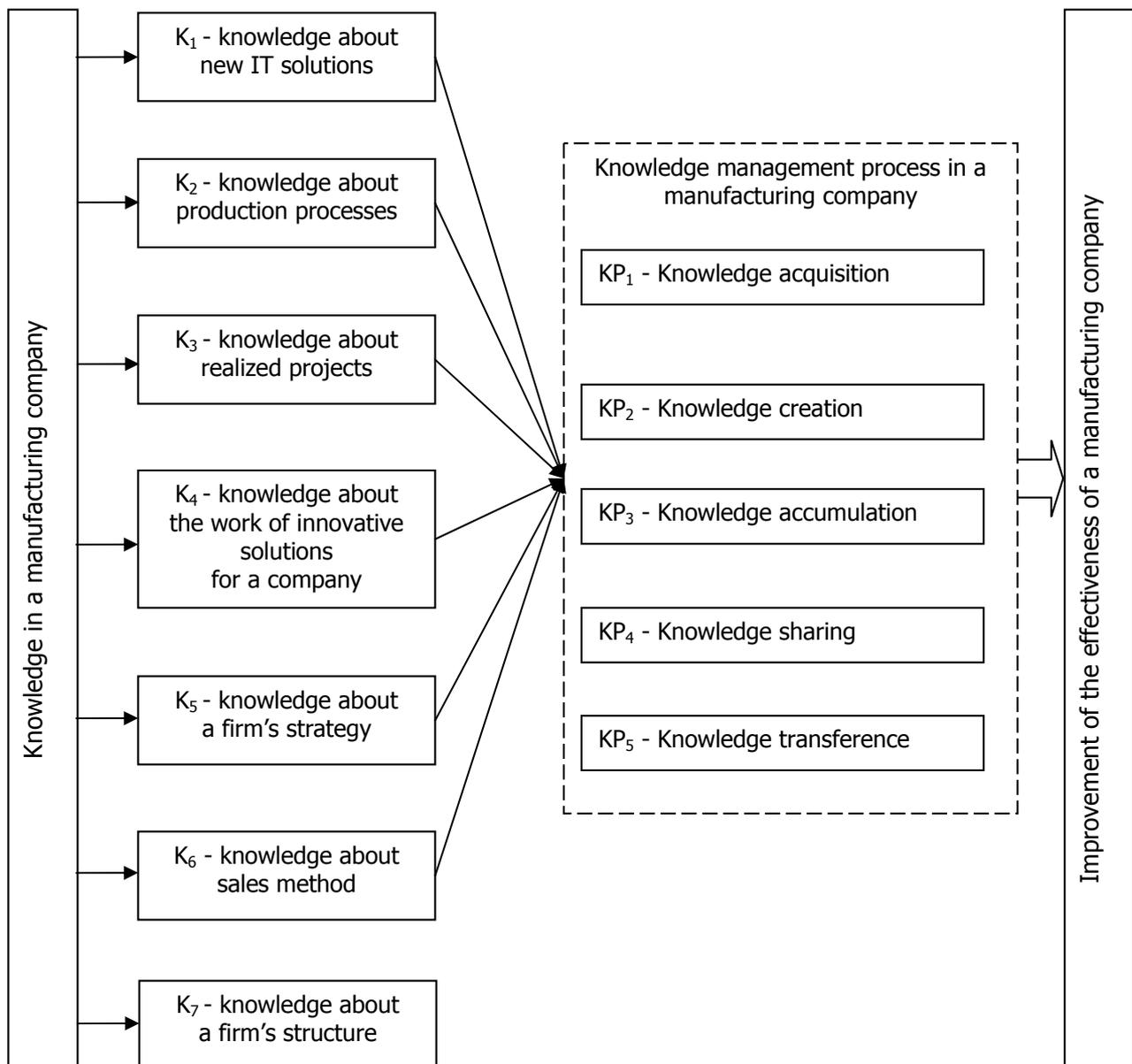


Figure 1. A research model  
(source: own elaboration)

The research model (see Fig. 1) posits (from the preceding argument) that implementation of knowledge management processes will have an influence on the improvement of an organization's effectiveness. We will estimate (based on the research results) what kind of knowledge in the knowledge management process is most important for the improvement of an organization's effectiveness.

### 3 Research method

In order to develop the research model (see Fig. 1), survey data were collected from a total of 85 manufacturing enterprises (62 Polish manufacturing enterprises from the Lubuskie region and 23 German manufacturing enterprises from the Brandenburg region) from the cross-border cooperative region of Lubuskie/Poland and Brandenburg/Germany in which the companies were categorized as either construction or automotive (20% of the total number of such companies).

The data were collected between January and September 2014 (Polish enterprises) and between November 2015 and January 2016 (German enterprises). The respondents were managers and chief executive officers and were surveyed in the form of direct meetings, email surveys, and/or phone surveys.

The factors relating to an awareness of acquiring the profits of knowledge management in a manufacturing company were based on feedback surveys and their sources are listed here:

Awareness: The importance of knowledge includes five key items that describe a firm's ability to perform: knowledge acquisition (K-A), knowledge creation (K-C), knowledge accumulation (K-AC), knowledge sharing (K-S), and knowledge transference (K-T):

- K-factor1 – I know that in my department, knowledge acquisition (K-A), knowledge creation (K-C), knowledge accumulation (K-AC), knowledge sharing (K-S), and knowledge transference (K-T) are not important for the achievement of company goals.

- K-factor2 – I know that in my department, knowledge acquisition (K-A), knowledge creation (K-C), knowledge accumulation (K-AC), knowledge sharing (K-S), and knowledge transference (K-T) are not very important for the achievement of company goals.
- K-factor3 – I know that in my department, knowledge acquisition (K-A), knowledge creation (K-C), knowledge accumulation (K-AC), knowledge sharing (K-S), and knowledge transference (K-T) are marginally important for the achievement of company goals.
- K-factor4 – I know that in my department, knowledge acquisition (K-A), knowledge creation (K-C), knowledge accumulation (K-AC), knowledge sharing (K-S), and knowledge transference (K-T) are important for the achievement of company goals.
- K-factor5 – I know that in my department, knowledge acquisition (K-A), knowledge creation (K-C), knowledge accumulation (K-AC), knowledge sharing (K-S), and knowledge transference (K-T) are very important for the achievement of company goals.

Factors that describe the improvement of the effectiveness of a company were also based on the feedback surveys and their sources are listed here:

Factor: The degree to which the company's goals have been at least 70% achieved after a time period of one year (Patalas-Maliszewska, 2015).

- Effect-factor1: I do not know that the implementation of knowledge management processes influences the success of the achievement of company goals.
- Effect-factor2: I know only a little that the implementation of knowledge management processes influences the success of the achievement of company goals.
- Effect-factor3: I know marginally that the implementation of knowledge management processes influences the success of the achievement of company goals.

- Effect-factor4: I know well that the implementation of knowledge management processes influences the success of the achievement of company goals.
- Effect-factor5: I know very well that the implementation of knowledge management processes influences the success of the achievement of company goals.

The surveys used for testing the research model (see Fig. 1) were developed by a five-point defining scale.

#### 4 Research results

In our research results, we can match the relationships between the various kinds of knowledge that should be supported by knowledge management process within a company and the improvement of the effectiveness of a manufacturing company.

The structural model (see Fig. 1) was defined using a correlation approach with Statistica ver. 12.5. The data were carefully examined with respect to linearity, equality of variance, and normality. No significant deviations were detected. Tables 1 and 2 present the descriptive correlations for the main variables.

Table 1. Research results from Polish manufacturing companies  
(source: own elaboration)

Construct/Item: K-factor1/ K-factor2/ K-factor3/ K-factor4/ K-factor5 Effect-factor1/ Effect-factor2/ Effect-factor3/ Effect-factor4/ Effect-factor5	Correlation	r2	t	p
K <sub>1</sub> / Effect	0.257566	0.066340	2.064764	0.043275
K <sub>2</sub> / Effect	0.097346	0.009476	0.757640	0.451632
K <sub>3</sub> / Effect	0.102571	0.010521	0.798725	0.427600
K <sub>4</sub> / Effect	-0.098990	0.009799	-0.770559	0.443992
K <sub>5</sub> / Effect	0.128615	0.016542	1.004588	0.319130
K <sub>6</sub> / Effect	0.142776	0.020385	1.117389	0.268282
K <sub>7</sub> / Effect	0.041198	0.001697	0.319388	0.750542

Our research results present that for managers of Polish manufacturing companies from the Lubuskie Region, the knowledge about new IT solutions (K<sub>1</sub>) is important in the knowledge management process for the improvement of an organization's effectiveness (corr = 0.2575). It is not a significant relationship; however, we can observe only this one.

We state that managers of those firms perceive the knowledge management process similar to the process of implementation of dedicated IT tools

for knowledge management support. We know that implementation of knowledge management process in a manufacturing company provides to the firm's leadership (Linderman, et al., 2010), but we still do not know that if the implementation of dedicated IT tools for knowledge management support can also influence the firm's effectiveness. Ruggles (1997) defined that applications of knowledge management support mostly consist of IT-based systems.

Information systems support explicit knowledge management within a company (Koduru et al., 2010), and applications such as knowledge maps, e-learning, web-blogs, social media, internal networks of practitioners, internal compendia of knowledge, video-conferencing, newsletters, and corporate portals support tacit knowledge management within a company.

We state that managers in Polish companies are aware of the importance of the implementation of knowledge management process, but we think that the practice of enterprises knowledge management in Poland is still at the initial stage. Therefore, we

should provide more meaningful research on what tools are expected from managers and to whom those tools should be available with the company.

The relationships between the kinds of useful knowledge in a manufacturing company, knowledge management process, and firm's effectiveness may provide a guide as to how companies should achieve better outcome by using knowledge management concept.

In German manufacturing companies from Brandenburg region, we can observe the following interactions (see Table 2):

Table 2. Research results from German manufacturing companies  
(source: own elaboration)

Construct/Item: K-factor1/ K-factor2/ K-factor3/ K-factor4/ K-factor5 Effect-factor1/ Effect-factor2/ Effect-factor3/ Effect-factor4/ Effect-factor5	Correlation	r <sup>2</sup>	t	p
K <sub>1</sub> / Effect	0.212832	0.045297	0.998187	0.329552
K <sub>2</sub> / Effect	0.212832	0.045297	0.998187	0.329552
K <sub>3</sub> / Effect	0.372437	0.138709	1.839024	0.080096
K <sub>4</sub> / Effect	0.307921	0.094816	1.483136	0.152892
K <sub>5</sub> / Effect	0.478842	0.229289	2.499516	0.020800
K <sub>6</sub> / Effect	0.414300	0.171644	2.086009	0.049361
K <sub>7</sub> / Effect	0.475884	0.226465	2.479537	0.021716

In German manufacturing companies, we can observe three significant relationships between the useful knowledge that should be supported by the knowledge management process within a company and an increase in the firm's effectiveness.

Table 2 includes the results of the correlation analyses that estimate the effect of knowledge process implementation within a company. The primary interaction of the defined knowledge – knowledge about a firm's strategy – makes a significant contribution to the improvement of the effectiveness of

a manufacturing company (corr = 0.4788). The second relationship between the knowledge – knowledge about sales method and its effects on the effectiveness of a company – is also positive (corr = 0.4143). The third interaction of the defined knowledge – knowledge about a firm's structure – is expressed (corr = 0.4759).

In our research results, we did not receive similar research results from both German and Polish manufacturing enterprises. We state that managers in German companies do not perceive knowledge

management process similar to the implementation of dedicated IT tools for knowledge management support.

They are aware of the importance of knowledge management in the context of formulating and implementing a model for the management of knowledge in a manufacturing company.

According to Trajer (2012), knowledge management model should consist the following stages: knowledge building, knowledge retention, adding knowledge, and the application of knowledge. So, we define that in a manufacturing company, the knowledge about a firm's strategy and structure and also the knowledge about sales method should be managed and supported not by the implementa-

tion of the dedicated IT tools for knowledge management support but by the implementation of a knowledge-based structure within a company.

However, to determine the nature of significant interactions between the knowledge that should be supported by knowledge management process within a company and any associated influence on the effectiveness of a manufacturing company, the study tests the research model using regression analyses, which estimate this effect based on the research results from a total of 85 Polish and German companies in a special joint cross-border region of Lubuskie/ Poland and Brandenburg/Germany (see Table 3).

Table 3. Research results from a total of 85 manufacturing enterprises from the cross-border cooperative region of Lubuskie/Poland and Brandenburg/Germany  
(source: own elaboration)

Construct/Item: K-factor1/ K-factor2/ K-factor3/ K-factor4/ K-factor5 Effect-factor1/ Effect-factor2/ Effect-factor3/ Effect-factor4/ Effect-factor5	Correlation	r2	t	p
K <sub>1</sub> / Effect	0.225212	0.050720	2.105875	0.038237
K <sub>2</sub> / Effect	0.224859	0.050562	2.102404	0.038548
K <sub>3</sub> / Effect	0.201605	0.040645	1.875215	0.064280
K <sub>4</sub> / Effect	0.083993	0.007055	0.767925	0.444711
K <sub>5</sub> / Effect	0.232291	0.053959	2.175784	0.032415
K <sub>6</sub> / Effect	0.241968	0.058549	2.271950	0.025676
K <sub>7</sub> / Effect	0.152046	0.023118	1.401497	0.164794

Fig. 2 presents the effects of the significant contributions of the defined knowledge that should be supported in knowledge management process and an increasing firm's effectiveness.

We can observe that firm's effectiveness clearly increases when knowledge about new IT solutions is supported by the knowledge management process

in a company. Fig. 3 presents the effects of the significant contributions of the importance of the knowledge about production processes (K<sub>2</sub>) in the knowledge management process and the improvement of the effectiveness of a manufacturing company.

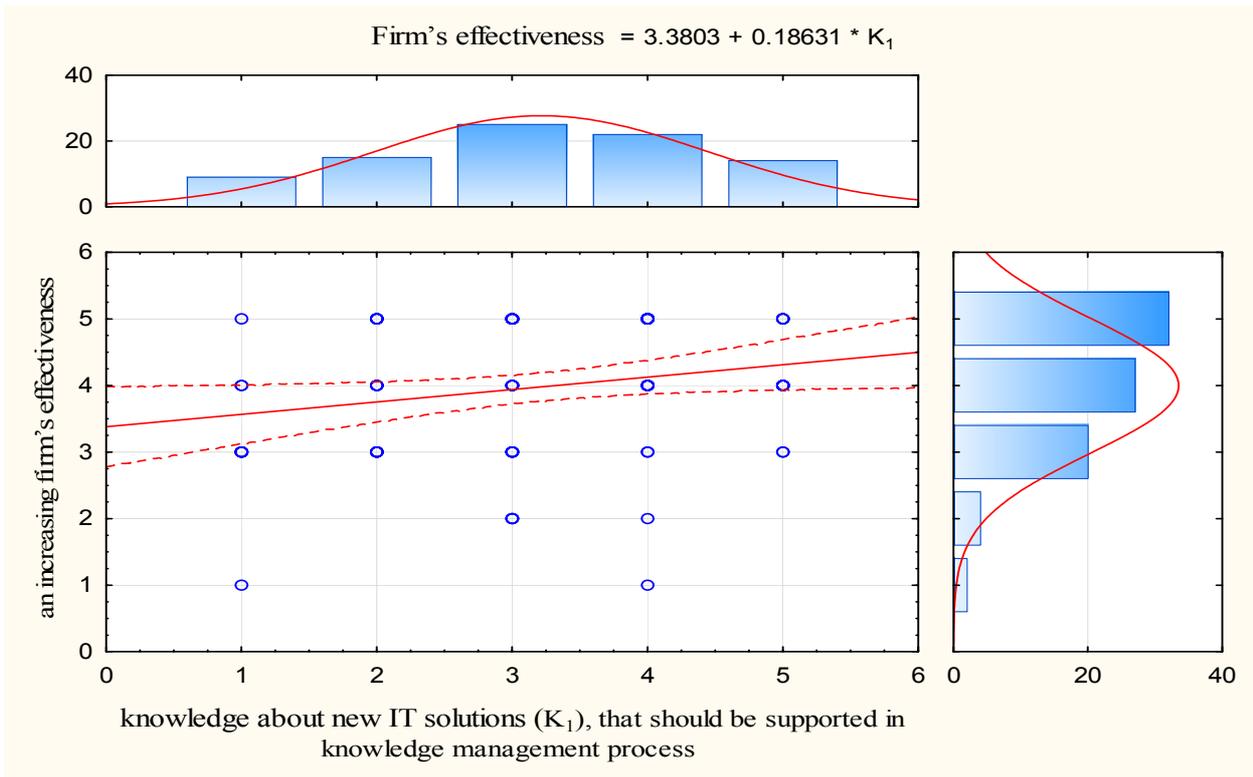


Figure 2. Interactions involving knowledge about new IT solutions ( $K_1$ ) that should be supported in knowledge management process and an increasing firm's effectiveness  
(source: own elaboration)

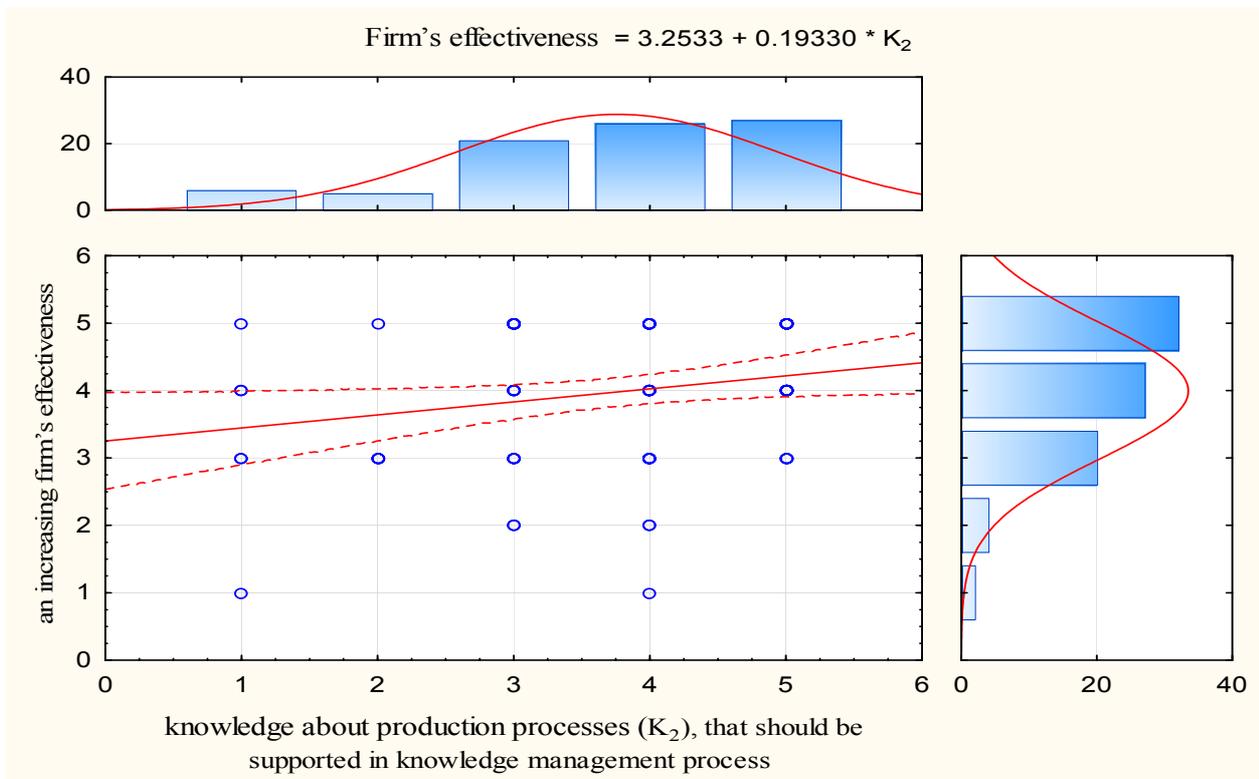


Figure 3. Interactions involving knowledge about production processes ( $K_2$ ) that should be supported in knowledge management process and an increasing firm's effectiveness  
(source: own elaboration)

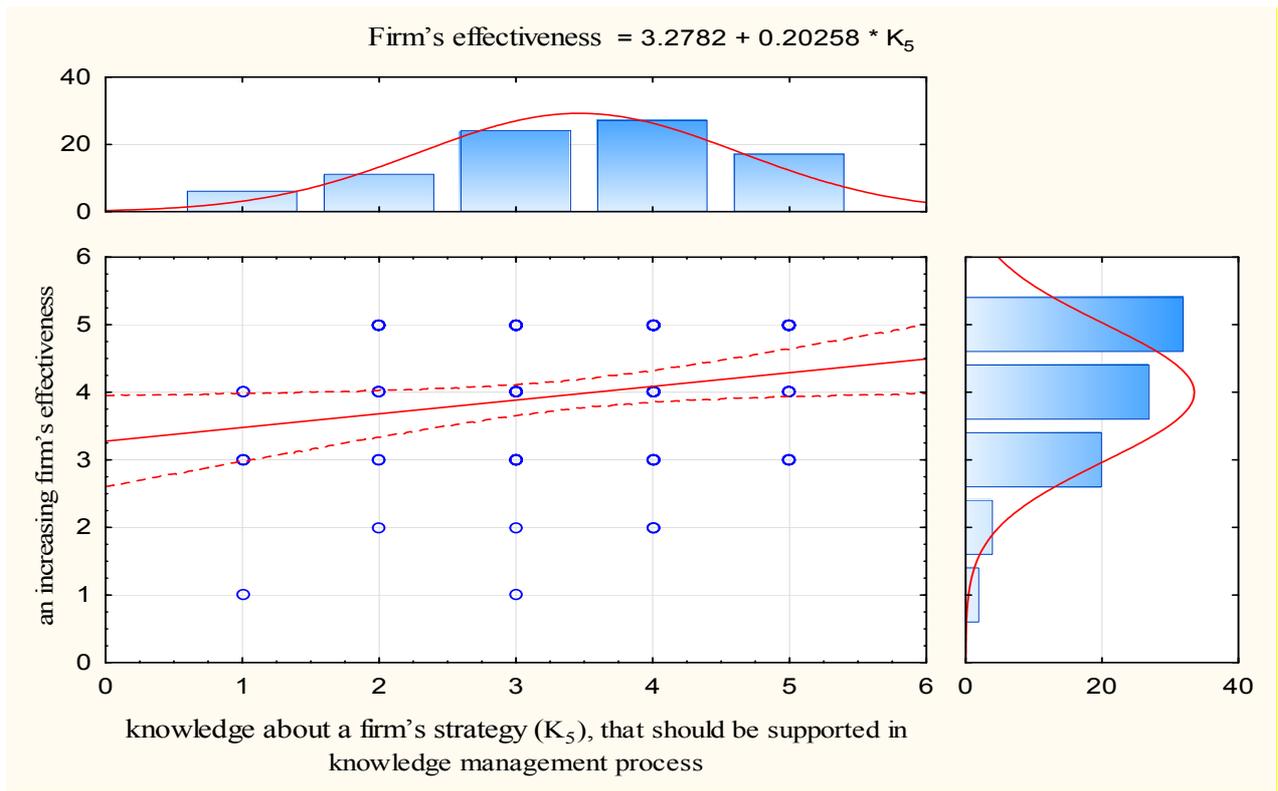


Figure 4. Interactions involving knowledge about firm's strategy ( $K_5$ ), which should be supported in knowledge management process and an increasing firm' effectiveness (source: own elaboration)

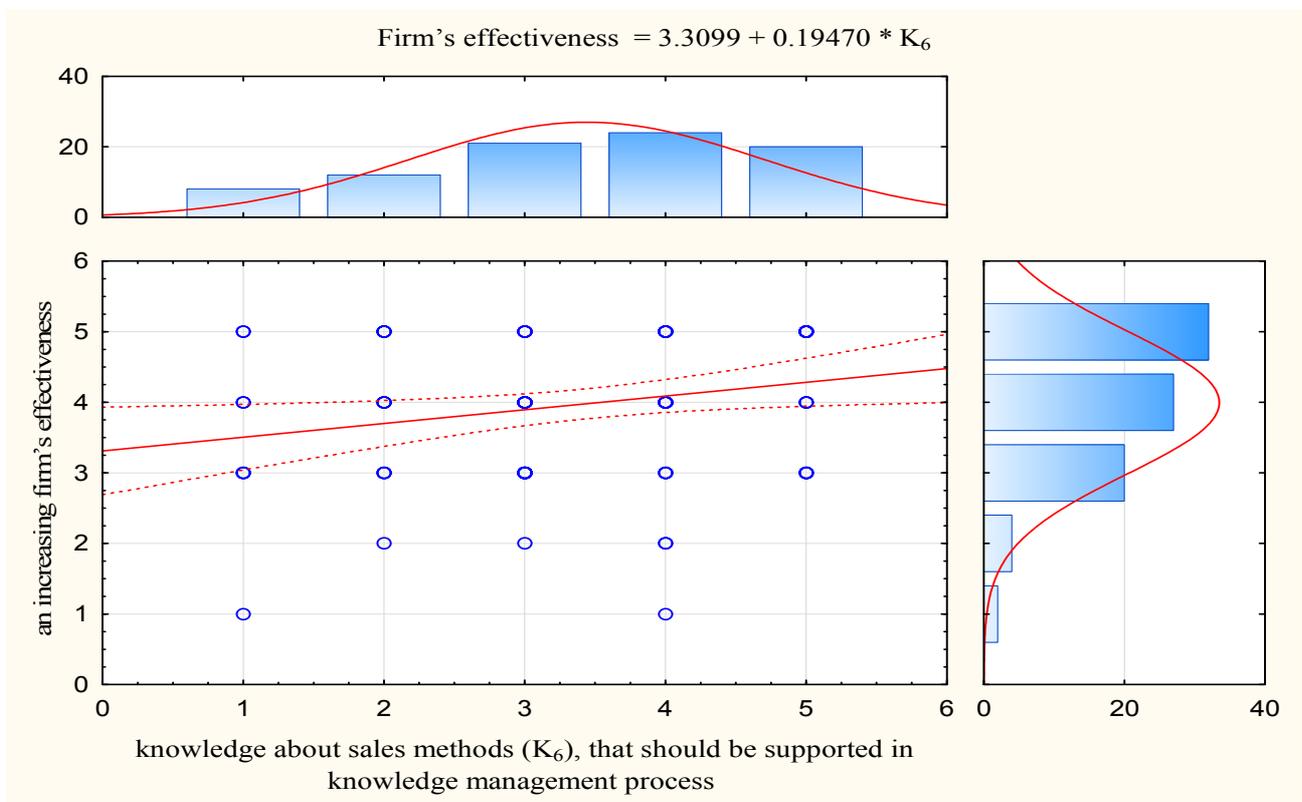


Figure 5. Interactions involving knowledge about sales methods ( $K_6$ ) that should be supported in knowledge management process and an increasing firm' effectiveness (source: own elaboration)

Furthermore, the results indicate that the management of knowledge about a firm's strategy ( $K_5$ ) and of knowledge about sales methods ( $K_6$ ) is useful for improving the firm's effectiveness (Figs. 4 and 5).

Therefore, based on the research results of a total of 85 manufacturing enterprises from the cross-border cooperative region of Lubuskie/Poland and Brandenburg/Germany, a structural model is presented (see Fig. 6).

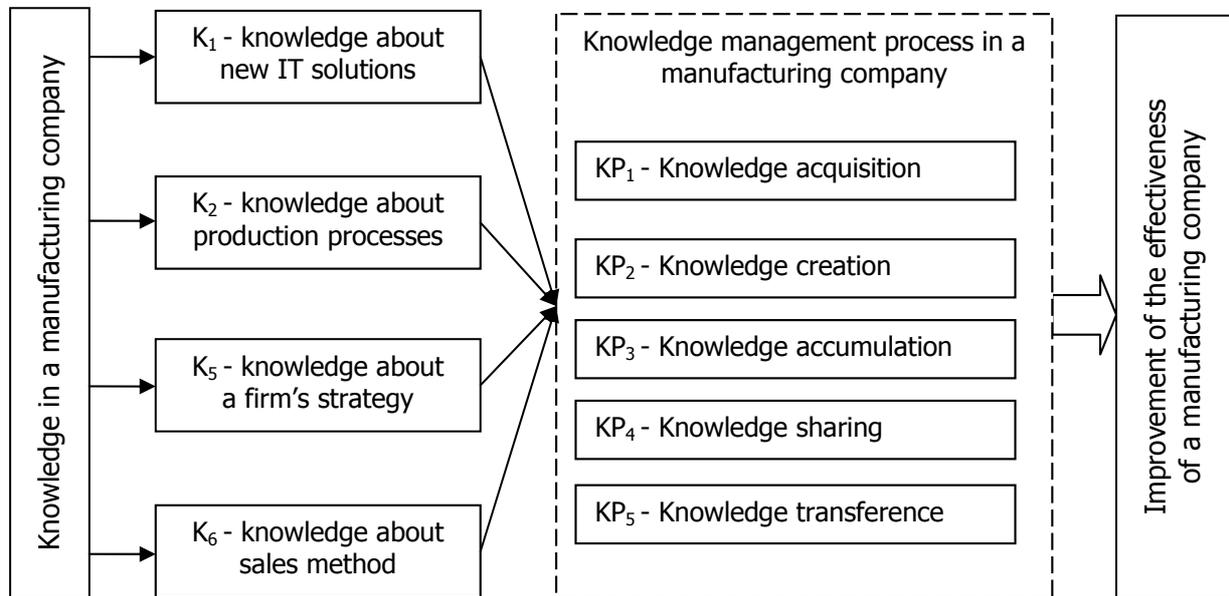


Figure 6. A structural model  
(source: own elaboration)

So, based on our research results, we state that following are the kinds of knowledge that should be acquired, created, accumulated, shared, and transferred within a company in order to improve organizational effectiveness:

- tacit and explicit knowledge about new IT solutions,
- tacit and explicit knowledge about production processes,
- tacit and explicit knowledge about a firm's strategy,
- tacit and explicit knowledge about sales methods.

For increasing the firm's effectiveness, organizations need to change their structure into the knowledge-based structure that facilitate knowledge management across the organization (Gopalakrishnan and Santoro, 2004). Therefore, managers in manufacturing companies may create and introduce the management structure by aligning the knowledge groups with the existing functional areas of a company (Walczak, 2005). We argue with Wang and Ahmed

(2003) that building competitive advantage requires constant knowledge management within a company.

Discovering the significance of the knowledge, which should be supported in knowledge management process and an increasing firm's effectiveness, involves identifying the useful and important knowledge within a company and deriving the implementation of dedicated knowledge management system and knowledge culture in a company. It can be concluded that adapting the research results in a manufacturing company can play a role in increasing the firm effectiveness.

## 5 Conclusion

In this paper, it was found that four kinds of useful knowledge (knowledge about new IT solutions, knowledge about production processes, knowledge about a firm's strategy, and knowledge about sales methods) in a manufacturing company supported by knowledge management process may positively influence on increasing the firm's effectiveness.

The knowledge that was most indicated by the managers of Polish companies was the knowledge about new IT solutions and by the managers of German companies was the knowledge about a firm's strategy, knowledge about sales methods, and knowledge about the firm's structure. Moreover, it can be stated that in the Lubuskie/Poland and Brandenburg/Germany cooperative region, in the companies categorized as either "construction" or "automotive," the knowledge that can be identified in a company is the knowledge about sales methods, which should be supported in knowledge management process in terms of an increasing firm's effectiveness.

As a practical implication, manufacturing companies that aim to implement the knowledge management process and, moreover, knowledge-based structure to achieve an improvement of the firm's effectiveness should adopt model of knowledge management in the context of four defined kinds of useful knowledge. Therefore, it would be useful to carry out further research in this context.

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