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Impact of knowledge transfer on ecological innovations of acquired companies in Serbia

Утицај трансфера знања на еколошке иновације преузетих компанија у Републици Србији

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Abstract: Knowledge transfer is a key determinant of the development and implementation of innovations. It has not yet been sufficiently investigated how knowledge transfer can influence the environmental innovations of acquired companies in Serbia. This study investigates the role of knowledge transfer in acquired companies in Serbia and examines the impact of knowledge transfer on environmental innovation, *i.e.* on environmental innovation activities and strategy. The research was conducted based on the answers of 91 respondents, i.e. employees from five companies that were part of the acquisition process in Serbia. Collected primary data were processed in the SPSS program, using statistical analysis such as descriptive statistical analysis, correlational statistical analysis, and regression statistical analysis. Empirical results show that knowledge transfer in acquisition processes has a positive impact on the environmental innovations of acquired companies. The results show that knowledge transfer activities encourage the development and implementation of environmental innovations in those acquired companies. Since there is a lack of studies investigating the environmental orientation of acquired companies, this study contributes to the understanding of how knowledge sharing promotes the development of environmental innovations in acquired companies.

Keywords: knowledge transfer, acquisition, ecological innovations, sustainability
JEL classification: Q56; O44

Сажетак: Трансфер знања је кључна одредница развоја и имплементације иновација. Не постоје истраживања на тему како трансфер знања може да подстакне развој еколошких иновација у преузетим компанијама у Србији. Ова студија истражује улогу трансфера знања у преузетим компанијама у Србији и испитује утицај трансфера знања на еколошке иновације, односно на еколошке иновацијске активности и стратегију. Истраживање је спроведено на основу одговора 91 испитаника, односно запослених из пет компанија које су биле део процеса аквизиција у Србији. Прикупљени примарни

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подаци су обрађени у СПСС програму, коришћењем статистичке анализе попут дескриптивне статистичке анализе, корелационо статистичке анализе и регресионе статистичке анализе. Емпиријски подаци показују да трансфер знања у процесима аквизиције има позитиван утицај на еколошке иновације у преузетим компанијама. Такође, резултати истраживања потврђују да активности трансфера знања, од предузећа купца ка преузетом предузећу, подстичу развој и имплементацију еколошких иновација (еколошка иновативна стратегија и еколошке иновативне активности) у преузетим предузећима. Будући да недостају студије које истражују еколошку оријентацију преузетих компанија, ова студија доприноси разумевању колико трансфер знања, из предузећа купца у преузето предузеће, подстиче развој еколошких иновација у тим предузећима.

Кључне речи: трансфер знања, аквизиција, еколошке иновације, одрживи развој
ЈЕЛ класификација: Q56; 044

Introduction

In line with the current environmental revolution at the global level, the issue of environmental protection is a major concern for enterprises (Chuang and Huang, 2018). With the increasingly frequent consideration of environmental issues in the business sector, environmental procedures and regulations are accepted as a crucial part of company management. Some authors concluded that there are different incentives that motivate companies to implement activities in the field of environmental protection, such as financial resources (Friede et al., 2015), environmental legislation (Feng and Liao, 2016) and ethical consideration (Helfaya et al., 2018). Companies that are inclined to use innovative technologies in the production process and the concept of knowledge management usually support the vision of sustainable development.

The most important resource of the modern global economy is knowledge. During the past two decades, the concept of knowledge management has gained publicity and has been recognized as a major factor in the production and modernization of new products and services (Mardani et al., 2018). In addition, this concept has a dominant and decisive influence on the implementation and management of operational activities (Kasravi et al., 2017). One of the fundamental activities, or stages in the concept of knowledge management, is knowledge transfer. Argote and Ingram (2000) point out that knowledge transfer is the process of transferring knowledge and experience between different organizations and especially provides the opportunity for acquired companies to become more innovative. For this reason, a significant number of companies use this concept as a strategic resource, which ensures the achievement of competitive advantages on the market (Bolisani & Bratianu, 2018). A significant number of acquisitions are motivated by gaining access to knowledge, obtaining technical expertise, employee skills or specific new technologies. Acquisitions provide an opportunity for companies to expand their knowledge base and gain access to new knowledge that will be important for developing a sustainable competitive advantage. The acquisition process is relevant to research on the transfer of environmental knowledge to determine whether, among other things, better environmental performance is achieved through organizational transformation. Acquisitions in transition economies aim to further exploit knowledge and technology.

Also, acquisitions provide access to cheap labor, natural resources, and local marketing knowledge (Marković & Savović, 2022).

According to Miletić et al. (2021), innovations and new creative ideas in business arise from unplanned technological changes and new knowledge. Crucial factors in the development of innovations are the market and the technology on the basis of which the idea is later commercialized. Environmental innovation is being researched increasingly to examine its impact elements that will aim to minimize the negative impact of business on the environment. Xu et al. (2017) point out that environmental innovation should be classified into environmental innovation strategies and environmental innovation activities. The ecological innovation strategy is a plan of recognizable environmental protection processes and practices, designed or proposed by the company's executive directors. Ecological innovation activities are directly implemented by employees in lower hierarchical positions. Examples of ecologically innovative activities are the development of ecological product designs, the promotion of ecological awareness among employees, the implementation of trainings on the topic of environmental protection, disposal of production hazardous and non-hazardous waste, and ecological management of the supply chain (Su et al., 2020). During the implementation of ecological innovative strategy and activities in the company, the common denominator of these two dimensions is the development and sharing of explicit and implicit knowledge. Some empirical studies show that by sharing and transferring knowledge between companies, as well as by including external knowledge and the environmental orientation of the company, innovations are successfully developed (Hamdoun et al., 2018). In line with the growing interest and relevance of the relationship between knowledge transfer and eco-innovation, our understanding of whether knowledge transfer to acquired firms affects the stimulation and implementation of eco-innovation remains rather unclear. Previous research that examined the effect of knowledge transfer on environmental innovations does not analyze the specific impact of the acquired companies in Serbia, which represents the research motivation of the authors of this study.

The subject of research in this paper is primarily focused on the effect of knowledge transfer in acquired companies on environmental innovations, specifically on environmentally innovative strategies and environmentally innovative activities. Consequently, from the subject of the research comes the proposition that examining how the transfer of knowledge to the acquired company affects the ecological innovations of those companies and whether it stimulates the development of new ecological solutions. Starting from the defined subject and goal of the research, the basic scientific assumption is that the transfer of knowledge from the acquiring company to the acquired company has a positive effect on environmental innovations after the acquisition. Taking into account the goal and subject of research work, the application of the qualitative methodology in work refers to the creation of a theoretical basis for the implementation of quantitative methodology, on the basis of which research hypotheses are accepted or rejected. Data were collected on the basis of a structured questionnaire, with the help of which data analysis was carried out, using various statistical methods and techniques.

Also, for the research variables in the work, an analysis of the reliability of the application was carried out. Regression analysis was used to test hypotheses. After the introduction, in the first part of the paper, based on previous literature, the foundation for formulating research hypotheses is laid. The third and fourth part of the paper present the methodology on the basis of which later in the next part the research is carried out and the results are presented. In the last part, a summary of previous research on this topic is presented, as well as the conclusion of this research with the contribution of the work and directions for future research.

1. Literature preview

1.1. Knowledge transfer

Knowledge is the main resource that creates and sustains the competitive advantage of companies in knowledge-based economies (Došenović & Zolak Poljašević). There are numerous definitions of knowledge, from representing information and skills acquired by a certain person through experience or education, to representing a theoretical or practical understanding of a subject. According to Bolisani and Bratianu (2018), knowledge as a multidimensional concept can be *explicit* and *tacit*. Explicit knowledge is formal knowledge that can be handed over to others because it is documented on paper or in specific databases (Ooi, 2014). Implicit knowledge represents knowledge that is difficult to transfer to another and appears in the form of intuition or study, which is difficult to explain or present (Maravilhas and Martins, 2019). Consequently, there is a continuous need for the development of employees, i.e. their knowledge, skills and abilities. Alavi and Tiwana (2002) describe the concept of knowledge management as "a necessity for achieving organizational effectiveness and competitiveness in the new millennium". Savović (2013) points out that there is an asymmetry of knowledge between the company carrying out the acquisition and the acquired company. More precisely, the acquiring company represents a crucial source of knowledge for the acquired company because it has significant intangible assets and capabilities that can contribute to the development of the acquired company. On the other hand, the acquired company contributes to the acquiring company through the existing knowledge of the local market.

One of the most common motives for carrying out acquisitions is employees. Empirical studies on knowledge transfer between companies led to the conclusion that knowledge transfer can facilitate communication between employees (Bresman et al., 1999), and influence the increase of employee productivity in acquired companies (Piscitello & Rabbiosi, 2003), but the transfer of implicit knowledge is quite difficult in acquired companies (Ranft, 1997). However, acquisition of the company and the existing knowledge base can represent a certain handicap, especially if certain problems arise with employees, which can cause a drop in productivity due to various affective reactions (Ahammad et al., 2016). Knowledge transfer, as an essential part of the concept of knowledge management, is dominantly significant for achieving a synergistic effect in acquisitions and is an indispensable parameter for examining the impact on the company's performance after the acquisition (Savović, 2013). Heo & Yoo (2008) analyzed the

impact of knowledge transfer in the period after the implemented merger on the organizational performance of the company. The research results indicate that there was a positive impact on organizational performance, emphasizing the personalization approach through knowledge transfer.

When talking about the relationship between knowledge transfer and innovation in companies, there are studies that analyzed the specific relationship and showed that knowledge transfer stimulates the generation of creative ideas for the development of new products and overall business. Cader (2008) points out that by transferring different types of knowledge in the acquired company, high-quality products are created, or more precisely, innovations are developed through which a competitive advantage is created in the market. Empirical research shows the positive impact of knowledge transfer on the innovativeness of companies (Wijk et al., 2008). The study by Ibidunni et al. (2020) shows that factors such as research and development and social connection have a partially positive impact on innovation in the company, while the third dimension, employee training, showed a statistically insignificant impact on innovation. Yu and Yan (2021) believe that the knowledge base (width and depth of knowledge) positively affects the growth of the company, which is driven by innovation. The research results show that organizational culture has a direct positive effect on the business innovation process and that it strengthens the impact of knowledge transfer on enterprise innovation. Habib et al. (2019) point out that knowledge transfer significantly increases the innovative abilities of employees in companies.

1.2 Knowledge transfer and environmental innovation

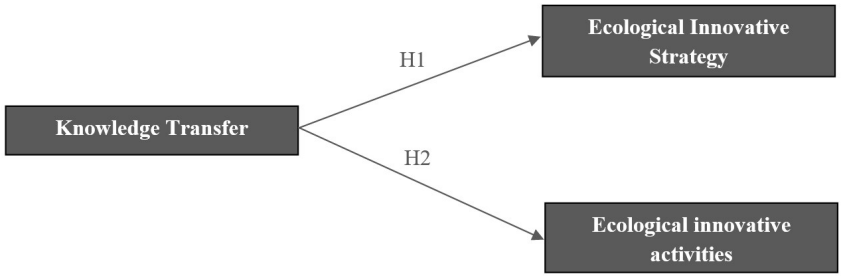
Creating value through product innovations, by the knowledge-based concept, implies the implementation of existing internal knowledge in a new way, as well as the application of new external knowledge. External knowledge can be acquired through research and development or by acquiring knowledge from other organizations through mergers and acquisitions (Savović, 2013). Innovation initiatives largely depend on the knowledge, skills and experience of employees in the value-creation process. Taking into account this notion, knowledge transfer can be seen as a relevant input for the creation of innovative activities and the strategy (Chiang & Hung, 2010). The use and transfer of knowledge is crucial in achieving innovation in the organization. In order to realize certain innovations from different fields, employees should take implicit knowledge from their colleagues and use well-founded defined explicit knowledge in the company (Ben Arfi et al., 2017). The promotion of knowledge transfer in the company will influence the development of new ideas that will later be the basis and reason for the implementation of activities in the field of environmental protection (Lundvall & Nielsen, 2007). The extended form of the environmental knowledge management model is environmental knowledge, which is also nurtured, maintained, used and shared in enterprises (Tseng, 2014). Environmental innovation strategy and environmental innovation activities are most often designed by the chief executive officers of the acquired companies. Due to constant environmental pollution and climate change, environmental innovation is considered a long-term remedy for it. Technology and its constant development contribute to mitigating polluting

emissions by increasing energy efficiency in the production process (Hung et al., 2023). Consequently, the transfer of knowledge from managers to other employees is essential for achieving environmental innovation. The dominant factor influencing the acquisition of external knowledge and the development of innovative solutions is social integration (Ebers & Maurer, 2014). Social integration mechanisms "enable the enterprise to share, communicate and transfer knowledge from the individual level to the enterprise level" (Lane et al., 2006). Based on this, by transferring knowledge from managers to other employees in the company, greater chances are provided for the implementation of ecologically innovative activities, an implementation that contributes to increasing results in the field of finance and environmental protection (Su et. al., 2020). According to Poch and others (2004), the transfer of knowledge about environmental protection promotes the generation of creative ecological ideas of the enterprise employees, which will indirectly positively affect the degree of innovation in the company as well as its performance. Consequently, it is assumed that sharing knowledge between the employees of the acquired companies would have a positive impact on the development and implementation of environmental innovations.

H1: The transfer of knowledge after the acquisition has a positive effect on the environmental innovation strategy of the acquired company.

H2: The transfer of knowledge after the acquisition has a positive effect on the environmental innovation activities of the acquired company.

Figure 1. Research model



Source: the authors' research

2. Materials and methods

Empirical research on the impact of knowledge transfer in the process of acquisitions on environmental innovations was conducted on a sample of acquired companies in Serbia, i.e. companies that were in the process of acquisition. A survey was used to collect primary data.

The research was carried out with the help of the Google Forms platform and by physically completing the survey, in the period from May to June 2022. Before the actual research and data collection, the target population for the needs of the research was identified. The sample includes 91 managers and employees who are employed in five companies in Serbia, which were the subject of the acquisition. The respondents are employed in the acquired companies in operational, tactical and strategic positions that directly or indirectly influence the realization of ecological innovations with their knowledge or skills. Through the survey, the respondents expressed their views on adopted environmental innovation strategies (adapted from: Zhang et al., 2015; Chen, 2006) and activities (adapted from: Zhang et al., 2015; Chen, 2006; Wu and Qu, 2021), as well as the achieved knowledge transfer after acquisitions (adapted from: Gupta & Govindarajan, 2000). The statements answered by the respondents are shown in Table 5.

Dependent variables Environmental innovation strategy and Environmental innovation activities and the independent variable Knowledge transfer were assessed by all respondents in the sample (n=91). Based on a five-point Likert scale, the degree of agreement of respondents with the statements from the questionnaire was determined. Respondents chose answers from 1 (Strongly disagree) to 5 (Strongly agree). As shown in Table 1, the number of men in the sample (51.6%) is more numerous than the number of women (48.4%). Observed according to the age structure, the most numerous groups of respondents are in the age categories of 26 to 35 years (33%) and 36 to 45 years (27.5%). If we look at the years of service, we come to the following results: up to five years (15.4%), from 6-10 years (28.6%) and from 11-15 years (19.8%), while slightly higher participation of respondents with work experience of 16-25 years (15.4%) and over 25 years (20.9%).

Table 1. Sample description

Socio-demographic characteristics		**Frequency**	**Percentage**
Gender	Men	47	51.6%
	Women	44	48.4%
Age	18-25	7	7.7%
	26-35	30	33%
	36-45	25	27.5%
	46-55	18	19.8%
	>55	11	12.1%
Years of work	<5	14	15.4%
	6-10	26	28.6%
	11-15	18	19.8%
	16-25	14	15.4%
	>25	19	20.9%
Work position	Management	31	34.1%
	Operative	60	65.9%
Total		**91**	100%

Source: the authors' calculation

The collected data were analyzed in the statistical package for social sciences

(Statistical Package for Social Sciences - SPSS, Version 23.0). Cronbach's Alpha coefficient was used to measure the reliability and internal consistency of the variables. Descriptive statistical analysis was used in order to measure the arithmetic mean and standard deviation of the analyzed variables. The testing of the research hypotheses was carried out using a simple regression analysis.

3. Research result

In order to investigate the favorability and homogeneity of employees' attitudes toward the findings, a descriptive statistical analysis was conducted with indicators such as the arithmetic mean and standard deviation (Table 2). Variable Knowledge transfer has its arithmetic mean, which is 3.99, which means that the employees partially confirm the transfer of knowledge from the company carrying out the acquisition to the acquired company. Environmental innovations (Ecological innovative activities and Ecological innovative strategy) record values above 4, based on which it can be concluded that employees are relatively in agreement with the findings related to the implementation of innovations in the acquired companies, in the field of environmental protection.

Table 2. Arithmetic means, standard deviations, and Cronbach's Alpha coefficients of the analyzed variables

Variables	Mean	SD	Cronbach's alpha
Knowledge transfer	3.99	0.78	0.912
Ecological innovative strategy	4.07	0.68	0.825
Ecological innovative activities	3.94	0.79	0.904

Source: the authors' calculation

Cronbach's Alpha coefficient is used to check the internal consistency and stability of the primarily collected data. According to Hair et al. (2014), when the value of this coefficient is greater than 0.7, it can be concluded that the claims are reliable and consistent. Based on Table 2, it can be concluded that all three variables, which were observed in the research, have a very good internal consistency.

To determine the strength of the relationship between the variables, a correlational statistical analysis was conducted, the results of which are shown in the following table.

Table 3. Correlation statistics analysis

Variables	Ecological Innovative Strategy	Ecological Innovative Activities	Knowledge Transfer
Ecological Innovative Strategy	1	0.676**	0.588**
Ecological Innovative Activities	0.676**	1	**0.700****
Knowledge Transfer	0.588**	**0.700****	1

***Values are statically significant at level p < 0.01*

Source: the authors' calculation

Between all the analyzed variants, it can be concluded that there is a significant positive relationship at the level of 0.01, according to the values of the Pearson correlation coefficient. Ecological innovative activity as a variable records the strongest degree of linear correlation (0.700) with the variable Knowledge transfer, while the smallest connection between variables is present between Knowledge transfer and Ecological innovative strategy (0.588).

Table 4. Regression statistics analysis

	Ecological innovative strategy				**Ecological innovative activities**			
Variables	β	t	Sig.	VIF	β	t	Sig.	VIF
Knowledge transfer	0.588	6.861	0.000**	1.000	0.700	9.236	0.000**	1.000
***** Values are statically significant at level p < 0.01***	R^2=0.346; F= 47.070**				R^2=0.489; F=85.295**			

Source: the authors' calculation

It can be concluded that 34.6% of the variability of Environmental innovation strategy and 48.9% of the variability of Environmental innovation activity are described by the given regression models, which are shown by the coefficient of determination values of 0.346 and 0.489. The prior target values are statistically significant at the 0.01 level. The regression analysis has determined that Knowledge transfer has a statistically significant impact on the Environmental Innovation Strategy (β=0.588; p<0.01), as well as on the Environmental innovation activities (β=0.700; p<0.01) of the acquired companies in Serbia. Based on the obtained results, hypotheses H1 and H2 can be accepted, that is, the results show that knowledge transfer has a positive effect on environmental innovation in acquired companies.

4. Conclusions and discussion

A review of the literature in the field of company acquisitions shows that studies that analyze the impact of knowledge transfer on innovation are limited, especially since there is a limited understanding of the relevance of implementing environmental innovations in acquired companies, thus creating space and the need for research. According to Pavlović (2020), human capital is the most relevant determinant of success and sustainable competitive advantage, for the reason that the competencies of the company's employees cannot be imitated so easily, as is the case with tangible assets. Acquisitions represent one of the ways in which companies can acquire valuable and authentic knowledge, abilities and skills. In the preparation of the literature review, a theoretical model was constructed that indicates the relationships and impacts of knowledge transfer on company innovations, specifically on environmental innovations. The purpose of this paper is to examine the effects of knowledge transfer, from the acquiring company to the acquired

company, on the environmental innovations of the acquired companies in Serbia. The results of empirical research show that the transfer of knowledge in acquisition processes has a positive effect on the development of environmental innovations in those acquired companies. Previous research on this topic indicates that the concept of knowledge management has a positive effect on ecological innovation and encourages the development of ecological innovation activities (Yusr et al., 2017). According to Albort-Morant and others (2018), knowledge transfer improves the company's ability to use natural resources efficiently, which also affects the creation of an ecologically oriented company. With the help of knowledge transfer in the company, a realistic basis is created to produce quality products with low costs. If such high-quality products are created, it leads directly to the achievement of ecological sustainability, which affects the increase in customer satisfaction and loyalty.

This research offers several important theoretical contributions. The first contribution is in the research of knowledge transfer and its impact on environmental innovations of acquired companies. Previous research has mainly focused on the impact of knowledge transfer on innovation, with a very limited number of studies investigating its effects on environmental innovation in acquired firms (Wang et al., 2023; Ben Arfi et al., 2017). The contribution of this study is determining whether environmental knowledge transfer has a positive impact on environmental innovation in acquired companies.

Especially for countries in transition, the implications of this research are twofold. In a practical sense, the results of this research influence the strengthening of managers' awareness of the advantages created by knowledge transfer in acquisition processes, emphasizing environmental innovations in acquired companies and the impact of knowledge transfer on those innovations. Unlike previous works that analyzed environmental performance (Dubei et al., 2015) and environmental leadership (Singh et al., 2019), this research provides a theoretical and practical foundation for the development of environmental innovations in transition economies. In transition economies, such as Serbia, it is necessary for managers in foreign acquired companies to consider the option of implementing the transfer of knowledge in the field of environmental protection from the parent company, to encourage the development of ecological innovative strategies and activities in newly acquired companies. However, the implementation of knowledge transfer is not simple or easy; it is necessary to focus attention on three key prerequisites for implementation: documentation, technology, and direct communication (Perrin and Rolland, 2007). According to Su et al. (2020), managers should motivate other employees to absorb as much information as possible. In addition, an efficient system of environmental knowledge transfer should be developed to improve internal communication and information exchange. Also, communication with various external stakeholders can be useful for adapting the environmental innovation strategy and activities in the acquired company. Managers must focus on high environmental standards, which are beyond state regulations, with the aim of successfully transferring knowledge to other employees and thus generating environmental

innovations. Through environmental innovation, companies introduce new technologies that enable employees to produce high-quality and environmentally friendly products that affect the improvement of the environmental and financial performance of acquired companies.

There are several limitations of the research conducted, which should be investigated in the future. Primarily, the precision and accuracy of the results may be affected by an insufficient sample size. Directions for future research indicate the necessity of including a larger number of employees and a larger number of companies in the research itself. Second, our research was conducted exclusively in the acquired manufacturing companies in Serbia, and it is believed that many service and other companies face environmental problems. The next research on this topic should analyze a specific type of industry in the economic structure of Serbia or observe a specific region of Serbia in which they operate.

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Appendix:

The questionnaire

Statements
Knowledge transfer
1. After the acquisition, your business skills and knowledge are improved.
2. After the acquisition, managerial skills in your company have been improved.
3. After the acquisition, your company's marketing activities were improved and developed.
4. After the acquisition, technical skills and knowledge were improved.
5. After the acquisition, administrative and sales skills and knowledge were improved and developed.
Ecological innovative strategy
7. After the acquisition, our company sets short-term goals for the realization of ecological innovations and activities.
8. After the acquisition, our company has a clear long-term vision of implementing activities that contribute to environmental protection.
9. After the acquisition, our company adapted its business activities in order to reduce the negative impact on the ecological environment.
10. In our company, there is a clear plan of activities on how environmental protection is implemented.
Ecological innovative activities
11. After the acquisition, our company voluntarily undertakes some of the environmental activities, although the state regulations do not require it.
12. After the acquisition, our company uses materials and raw materials in the production process which can be recycled or reused in the same process.
13. After the acquisition, our company produces products that save material and energy fuels in the production process.
14. After the acquisition, our company constantly improves the production process in order to reduce the emission of hazardous substances and waste.
15. After the acquisition, our company has largely replaced traditional fuels with new, less polluting fuels.

Source: the authors' research