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TECHNOLOGY ACQUISITIONS AS A SUPPORTING TOOL FOR IMPROVING COMPANIES' INNOVATIVE POTENTIAL

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In line with the open innovation paradigm, technology acquisitions which seek to gain access to new technologies and knowledge are becoming an important strategic tool for enhancing the innovative potential of companies. This research study is aimed at showing how technology acquisitions can help companies be more successful in making an innovation a reality. In that sense, various possibilities of improving companies' innovative potential after the implementation of technology acquisitions are analyzed in the paper. The challenges that companies are faced with in a period after technology acquisitions are explained and possible ways to overcome those challenges are indicated as well. The results of the conducted empirical research in the impact of technology acquisitions on a company's innovation are presented. The paper confirms the fact that the process of acquiring technology and knowledge from external sources and the harmonization of external knowledge with the internally developed knowledge base improve a company's innovative potential. Additionally, the research results show that acquisitions increase the likelihood of innovation in integration companies. Innovations are also made a reality much faster than they would be without the cooperation of companies.

Keywords: technology acquisitions, open innovation, knowledge transfer, performance, innovativeness

JEL Classification: G34, O36, L25

INTRODUCTION

The knowledge era has brought significant changes on global and local markets. The generation and application of new ideas, technologies and knowledge are the fundamental preconditions for the development of sustainable competitive advantage (Duksaite & Tamošiuniene, 2009). The ability to create new knowledge, take over and improve the existing third-party knowledge and implement knowledge in new innovative solutions is crucial for achieving long-term profitability. In order to create successful innovation-based strategies, companies need the resources and capabilities difficult to internally develop. Consequently, as a modern approach to innovation management, the open innovation model emphasizes

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the importance of internal and external knowledge for accelerating innovation, as well as the expansion of the market for the external use of innovation. Businesses need to use external and internal ideas, as well as external and internal opportunities, to market innovations (Chesbrough, 2006). Among various strategic opportunities for innovation development both inside and outside the company, acquisitions may be one of the most effective responses to the need for the rapid integration of innovative elements into a business model (Dezi, Battisti, Ferraris & Papa, 2018). Technology acquisitions are aimed at taking over the target company's knowledge base, technology and specific capabilities. Companies may strive for technology acquisitions to bridge the gap between the current situation and what they would like to achieve in terms of innovation and performance (Cefis & Marsili, 2015).

Taking into account the increasing importance of innovation for improving companies' competitive advantage (Porter, 1996) and the fact that innovation is one of the key drivers of sustainable development, understanding the effects of technology acquisitions on the improvement of companies' innovative potential is an important and current research area.

As an instrument to support the improvement of the companies' innovative potential, technology acquisition is the subject matter of the research study presented in this paper. Technology acquisitions are considered in this paper as one of the strategic options for the implementation of open innovations as a modern paradigm in innovation management.

The research objective is to show how technology acquisitions can help companies be more successful in making innovations a reality.

In line with the defined research subject and research objective, the main scientific hypothesis in the paper is that technology acquisitions improve companies' innovativeness.

In the paper, the qualitative methodology based on the study and descriptive analysis of a research problem is applied. The relevant literature is analyzed in order to theoretically understand the research subject. Theory is combined with the results of the empirical research in the impact of acquisitions on innovation. In this regard, a comparative method is used, i.e. a review of empirical research studies of the impact of acquisitions on innovation helps identify certain similarities and differences in the obtained results. In order to identify the connection between acquisitions and innovation, systemic thinking is used and appropriate conclusions are drawn by applying the synthesis method.

The paper is structured into four interrelated parts. First, the open innovation paradigm is presented and technology acquisitions are identified as one of the strategic options for making open innovations, especially inbound open innovations, a reality. Then, appropriate ways how technology acquisitions may help improve companies' innovative potential are discussed, as well as the challenges companies are faced with during knowledge transfer and the implementation of innovations. Finally, there is an overview of empirical research in the impact of technology acquisitions on innovation, certain theoretical and practical implications being included.

OPEN INNOVATION AND TECHNOLOGY ACQUISITIONS

Today's products rely on different technologies and the largest number of companies are unable to achieve a high sophistication level in a great number of different technologies. Hence, the exploitation of external ideas and technologies is becoming imperative. The open innovation model signifies the phenomenon by means of which companies make better use of external ideas and technologies in their business, simultaneously having the opportunity to give their own unused ideas and technologies to others to use. The paradigm shift from closed to open innovation is conditioned by a number of the factors characteristic of the knowledge-based economy (Erić-Nielsen, Stojanović-Aleksić & Zlatanović, 2019; Simić & Slavković, 2019), such as increasing labor mobility, growing the ability and competence of universities across the world and facilitated access to capital

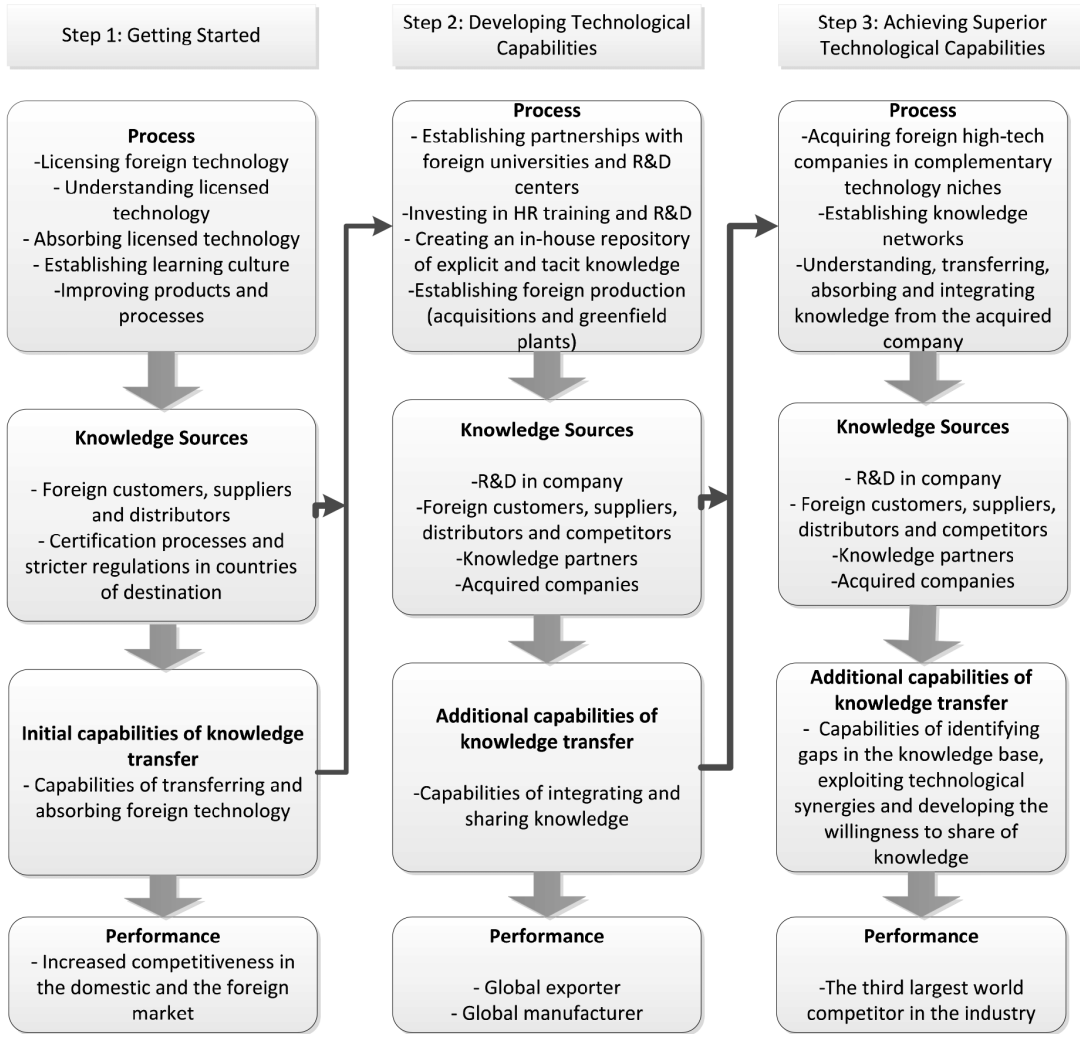

Figure 1 The phased improvement and development of the technological capabilities of a multinational company

Source: Authors, adapted according to Kogut *et al*, 2019

as well. At the same time, open innovation finds adequate support in the development of information and communication technologies, which has changed the way of connecting and communicating with individuals, groups and organizations. Even more so, changes in production, technologies, fast prototyping and flexible production at a low cost have led to a big change in the way of innovation understanding and creation. That is why it is necessary for innovation models to take into account new technologies that enable fast and extensive cooperation during the entire innovation process from the conceptualization phase to commercialization (Zlatanović, 2020). Of particular importance are the changes related to new technologies in the following three areas: the technologies that encourage creativity, the technologies that facilitate communication and the technologies that facilitate production (Trott, 2017).

Taking into consideration these changes, as well as the development of new concepts, H. Chesbrough and M. Bogers (2014) define open innovation as "a distributed

innovation process based on the designed process of managing knowledge flows outside the organization using financial and non-financial mechanisms, depending on the business model". These knowledge flows may include the use of the external sources of knowledge through internal processes, the use of internal knowledge through commercialization external processes or the use of both, i.e. pairing the external sources of knowledge and commercialization activities. That business model can be either explicit or implicit and describes not only the way in which value is created, but also the way in which all organizations involved treat and encompass the created value (Zlatanović, 2020).

Accordingly, the basic three types of open innovation can be distinguished (Chesbrough & Bogers, 2014):

- outside-in or inbound,
- inside-out or outbound, and
- combined open innovation.

Within the framework of inbound open innovations, various strategic options can be identified, such as obtaining licenses from other companies, university research programs, financing industry ventures, cooperation with intermediaries, suppliers and customers, the use of certain agreements, crowdsourcing, and the implementation of technology acquisitions. S. Mawson and R. Brown (2016) view technology acquisitions as the key strategic aspect of inbound open innovation. Technology acquisitions are a specific type of acquisitions focused on the acquisition of the target company's knowledge, technical expertise, employee skills and specific new technologies (Savović, 2018).

Before improving the knowledge base and technological capabilities through acquisitions, a company may initially absorb certain knowledge through licensing arrangements or through strategic alliances or partnerships. Figure 1 shows the phased improvement and development of the technological capabilities of a multinational company. In the first phase (the creation and improvement of technological capabilities), the company first licenses foreign technology and, thanks to the expansion of the knowledge base, improves its competitive advantage on the domestic market and the international market. In the second phase (the development of technological capabilities), it establishes partnerships with foreign universities and research and development (R&D) centers and acquires a foreign market in order to start production. In the final phase (the achievement of superior technological capabilities), it takes over a foreign high-tech company in an effort to become one of the three leading companies in the sector which it operates in (Kogut, de Mello & Rocha, 2019).

As acquisitions enable access to new products or resources, they have recently become the strategic means of accelerating innovation (Dezi *et al*, 2018). More precisely, acquiring technological know-how and employee skills is one of the key motives for acquisitions (Savović & Domanović, 2011). Therefore, acquisitions are tools for "expanding the knowledge base of the acquiring company and creating a new and innovative combination of the knowledge of integrated companies" (Vermeulen & Barkema, 2001; Björkman, Stahl & Vaara 2007).

OPPORTUNITIES FOR IMPROVING COMPANIES' INNOVATIVE POTENTIAL AFTER TECHNOLOGY ACQUISITIONS

Companies must continually build their core competences by adapting themselves to a changing environment. Hence, there is significant intensification of takeover activities in these industries in order to facilitate access to other companies' research and innovation capacities, which further results in the improvement of companies' knowledge base and innovative potential (Ferraris, Santoro & Dezi, 2017).

A review of the relevant literature reveals several alternative ways in which technology acquisitions may affect a company's innovative potential. Proceeding from the resource-based approach, technology acquisitions "can enhance innovative performance by increasing the knowledge base, technological know-how and technical capabilities of the acquiring company" (Ahuja & Katila, 2001). According to E. Cefis and O. Marsili (2015), "acquisitions can

encourage new organizational models and facilitate access to the research and innovation capacities of other companies, improving the knowledge base of the acquiring company and enabling it to access new technologies". Acquiring companies gain access to new, valuable knowledge, which may generate a new innovation when combined with their own knowledge.

Due to the asymmetry of knowledge that is often present, i.e. due to the fact that the acquiring company and the acquired company may have different knowledge bases, the "competence creation" process and the "competence exploitation" process are introduced. On the one hand, the acquiring company expects that it will contribute to the creation of the acquired company's competences by introducing new knowledge, simultaneously expecting that it will use the acquired company's competences by using its knowledge, on the other (Yang, Lin & Peng, 2007). The extensive flows of knowledge between employees in the acquiring company and in the acquired company allow employees to deepen their knowledge and way of thinking and improve their innovative ideas, which may then encourage radical innovation. Moreover, the knowledge acquired through acquisitions directly and positively affects the technological knowledge base necessary for the development of new products, thus raising the ability and willingness to experiment, be creative and develop new ideas and innovations (Xie, Wang & Zeng, 2018).

The effects of acquisitions on innovation depend on the degree of the relatedness of companies' technological knowledge bases. From the organizational learning perspective, the relatedness of the technological knowledge base may positively affect innovative performance. The positive effect is derived from the ability to better evaluate and use the related external knowledge compared to the unrelated, which is based on the idea that a company's absorption capacity mainly depends on the degree of the relatedness of knowledge in a specific area. M. Cloodt, J. Hagedoorn and H. Van Kranenburg (2006) emphasize the fact that, "if the knowledge base of the acquiring company is not sufficiently adapted to the knowledge that is taken over, the absorption process becomes more difficult". Hence, unrelated technological changes often require radical changes in organizational research, which may easily become counterproductive. However, these authors point out the fact that "technological knowledge which is too similar to the existing knowledge of the acquiring company will have little effect on post-acquisition innovative performance. A certain degree of differentiation in technological capabilities between companies can enrich the knowledge base of the acquiring company and create learning opportunities". If companies have complementary technology after the acquisition, they become more efficient in research and development. Specifically, after the takeover, companies try to reallocate resources to ensure existence in a number of technological fields and increase diversification based on the skills of the acquired companies (Fernandez, Triguero & Alfaro-Cortes, 2019). If merging companies have a complementary knowledge base, the positive effects of the acquisitions on innovation might occur due to the implementation of economies of scope (Fernandez *et al*, 2019). Economies of scope exist if the total cost of the production and sale of several products of a multiproduction company is lesser than the sum of the costs of the production and sale of the same products of the individual companies specializing in the production of each of those products (Sudarsanam, 2003). They arise because different knowledge bases complement each other, become richer and create a bigger potential for learning and creating new knowledge.

In addition, acquisitions may increase the overall R&D budget of the companies involved. Integrated companies may achieve economies of scale (due to the allocation of high fixed research and development costs) and engage themselves in big research and development projects, which otherwise they would be unable to do on their own. In this way, more attention is paid to the fundamental research leading to the development of more advanced technologies. Also, a larger budget allows an integrated company to enter a larger number of research projects, which affects the diversification of innovation risks. Finally, firms are rarely efficient in all the aspects of innovation management. Businesses are likely to use

a variety of innovation management techniques. The exchange of the best practices within an integrated entity will increase R&D productivity, i.e. several new technologies will be developed with the same budget (Man & Duysters, 2005).

CHALLENGES IN THE IMPLEMENTATION OF TECHNOLOGY ACQUISITIONS AND WAYS TO OVERCOME THEM

In certain areas, such as artificial intelligence, machine learning, data science, etc., experts are scarce and demand for them by far exceeds their availability. Hence, the takeover of technology and talent is one of the key motives for acquiring companies to consider start-ups and other less innovative companies. However, takeovers focused on human resources are among the riskiest and the most challenging. Any business in which human resources are significant assets is at risk that they may leave, thereby affecting the competitive position of a given company. Hence, the key challenge is to retain the talented employees who may have a negative attitude towards the new company. These are the individuals who have "passionately created technology that could change the world" (Krlkhaar, Loucks & Sguazzin, 2018) inspired by the leaders who have conveyed a vision with a strong emotional charge. After the acquisition, the leadership team of the acquired start-up may no longer be part of the new organization or may be assigned marginal roles. In such circumstances, employees lose motivation, are less committed to the work they do and think about leaving the organization, which has a negative impact on performance. E. Aminova (2016) points out the fact that, due to a lack of integrative decision-making, the conflict of cultures, as well as the management style, employees are demotivated, which negatively affects the degree and quality of product innovation. J. Krlkhaar *et al* (2018) refer to the results of the conducted research study, stating that innovators in the acquired companies generate 50% less patents compared to a comparative group of innovators in the companies not taken over.

An important prerequisite for the transfer of knowledge in such acquisitions implies that there is no loss of employees during the implementation of an acquisition. Thus, the possibility of knowledge transfer ceases if the key employees leave the organization, whereas retaining the key employees during the implementation of an acquisition makes knowledge transfer possible. In addition, technological know-how is often tacit knowledge and therefore cannot be easily transferred from one company to another. The transfer of hidden knowledge requires the voluntary cooperation of employees. The source of knowledge may be opposed to the sharing of essential knowledge for fear of losing power in the organization or due to a lack of trust in the knowledge recipient. Likewise, knowledge recipients may be unwilling to accept knowledge from a source due to a lack of interest or confidence in knowledge usefulness. As these forms of knowledge are difficult to transfer, a high degree of post-acquisition integration may be required in order to achieve the expected benefits of acquisitions (Puranam, Sing & Zollo, 2003; 2006)

The decision on the degree of the integration of the companies depends on the two key factors: differences in the business model (difference in products or markets between the acquiring company and the acquired company) and differences in the company size. As can be seen in Figure 2, the four integration approaches are distinguished (Krlkhaar *et al*, 2018). The tuck-in model is applied if there are large differences in the size of the companies, but they still have similar business models (the similarity of products and/or markets). In such transactions, the acquired company assimilates and drowns in the business of the acquiring company. This approach is characteristic of more than 90% of all acquisitions in the technology sector. Additionally, the bolt-on model is applied when there are large differences in the size of the companies and differences in business models as well. In this case, the largest part of the acquired company's business remains unintegrated. The bolt-on model can take various forms:

- "the acquired company becomes a fully non-integrated subsidiary,
- acquired company becomes the business unit

that retains most of its independence (and is responsible for its profitability),

- acquired company becomes a partially integrated division (activities such as information technology, human resources and finance are usually integrated, but R&D, sales and support activities remain separate),
- companies choose to use a hybrid approach focused on the target company's business and achieving synergies."

When companies are of a similar size and have similar business models, consolidation is applied. By consolidating the largest number of activities, the new entity strives to achieve economies of scale or preserve the key part of the value chain. Finally, transformation is applied when companies are of a similar size, but have different business models. In this approach, both companies are likely to achieve economies of scale by integrating certain operations due to their relatively large sizes. Since transformation requires significant changes, it is the most difficult to achieve. However, it may create the most value if done correctly.

It is necessary to successfully integrate two companies not only at the operational and procedural levels, but also at the level of human resources (Birkinshaw, Bresman & Hakanson, 2000; Savović, 2012), which, among other things, implies the creation of friendly knowledge-sharing atmosphere (Haspeslagh & Jemison, 1991). Here, synergy is the outcome of the integration of knowledge, not of knowledge itself (Grant, 1996). Hence, as A. Ranft and M. Lord (2002, 422) state: "It is not enough for the acquiring company to merely buy technology or capabilities and preserve them in that state; in order to create value, it is necessary to improve it and integrate by the end of the acquisition process, long after the acquisition process is complete". Synergy is created through learning effects as the acquisition provides an opportunity for both companies to the access knowledge areas located outside their organizational and cultural contexts (Zander & Zander, 2010). M. Hitt, R. Hoskisson, and D. Ireland (1991) state that large companies, such as Cisco Systems and GE, "have had significant success in implementing acquisitions and this success can be attributed in part to their ability to learn from acquired companies and to absorb and integrate new knowledge in order to build new skills".

Certain post-acquisition mechanisms may facilitate knowledge transfer between companies. These mechanisms include the informal socialization of the activities aimed at building trust and fostering close

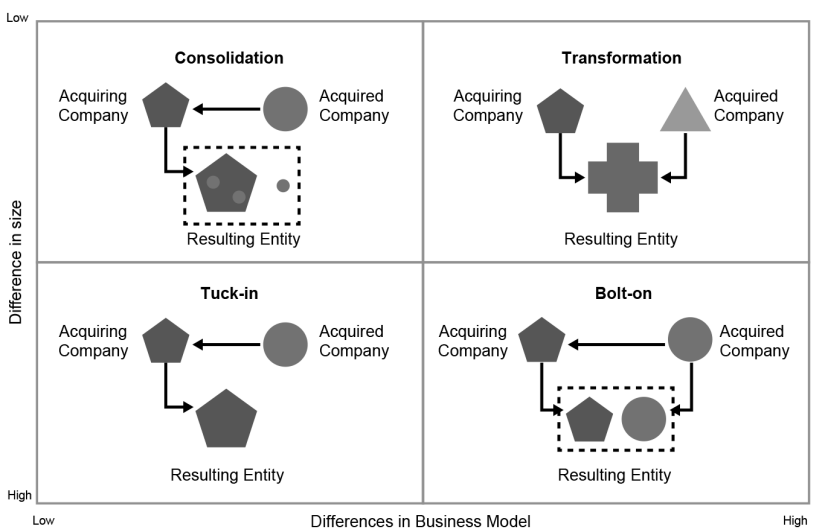

Figure 2 Integration approaches

Source: Krlkhaar *et al*, 2018

and open communication and formal mechanisms for company integration (Gupta & Govindarjan, 2000; Björkman, Barner-Rasmussen & Li, 2004). The informal socialization of activities, such as visits and trips, international commissions, teams and working groups or trainings involving participants from different units support knowledge transfer, especially when the goal is to share tacit (implicit) knowledge. Collective learning is particularly useful for the transfer of tacit and socially complex knowledge. The direct observation of everyday routines and interactions enables employees to learn and adopt tacit and socially complex aspects of the partner company's knowledge (Sarala, Junni, Cooper & Tarba, 2016).

The effects of formal integration mechanisms are sometimes mixed. On the one hand, it is important to create adequate incentives and rewards to motivate people to share knowledge (Gupta & Govindarjan, 2000; Ranft & Lord, 2002), whereas on the other, the imposition of a large number of rules and procedures for the implementation of formal company integration and the exercise of control over acquisitions may create resistance and dissatisfaction in the acquired company (Datta & Grant, 1990). T. Gerpott (1995) focuses on the successful integration of R&D activities after acquisitions so as to analyze the acquisitions of German companies. He points to the importance of "using management interventions designed to promote learning opportunities, reduce uncertainty for employees in the acquired company (e.g. meetings of small groups to exchange information), as well as reduce the degree of the centralization of strategic R&D decisions in the hands of the acquiring company."

THE INFLUENCE OF TECHNOLOGY ACQUISITIONS ON INNOVATION - AN OVERVIEW OF THE RESULTS OF THE EMPIRICAL RESEARCH

A scientific interest in studying the impact of technology acquisitions on innovations has recently been growing. However, the results of the existing research studies are all but uniform. Certain studies have found a positive effect on the innovative activities of combined companies (Ahuja & Katila, 2001; Cassiman, Colombo, Garrone & Veugelers, 2005; Cloodt *et al*, 2006; Zhao, 2009; Makri, Hitt, & Lane, 2010; Frey & Hussinger, 2011; Bena & Li, 2014; Wu *et al*, 2015; Jo, Park & Kang, 2016; Han, Jo & Kang, 2017), whereas others have found a negative impact (Hitt *et al*, 1991; Szücs, 2014). Table 1 provides an overview of the results of the empirical research studies of the impact of technology acquisitions on innovation.

The positive impact of technology acquisitions on the innovation of combined companies comes from the expanded knowledge base of the acquiring company and the more efficient reorganization of the innovative processes after the takeover as well. If a takeover includes the acquisition of high-quality knowledge from the acquired company, the positive effect on innovation performance is particularly relevant.

In order to assess the effects of technology acquisitions on innovation, G. Ahuja and R. Katila (2001) study the 72 companies in the chemical industry in Europe, America and Japan that participated in the acquisitions in the period from 1980 to 1991. They measure innovation by the number of the patents obtained in the period of one to four years after the acquisition. The authors distinguish between technology and non-technology acquisitions, and analyze the impact of the size of the knowledge base being taken over. The authors conclude that non-technology acquisitions do not have a significant impact on innovation. In technology acquisitions, they find that the absolute size of the knowledge base of the target company has a positive impact on innovation, while the relative size of the knowledge base of the target company (the relationship between the knowledge base of the target company and the acquiring company) has a negative impact on innovation. The authors conclude that, if they want to improve their innovative performance, large companies should focus on smaller target companies. Also, the authors show that the technological complementarity of the acquiring company and the target company leads to more efficient R&D activities.

Table 1 An overview of the results of the empirical research studies of the impact of technology acquisitions on innovation

Studies	Research objectives	Sample	Research results	Impact
Hitt *et al*, 1991	The impact of acquisitions on the intensity of R&D and the output of R&D (patents)	191 acquisitions during the period 1970-1986	Acquisitions had negative effects on the intensity of R&D and the output of R&D (the patents)	Negative
Ahuja & Katila, 2001	The effects of technology acquisitions on innovation	72 companies in the chemical industry (technical and non-technical acquisitions)	The positive effects of acquisitions of small technical firms on the acquiring companies' innovation	Positive
Cassiman *et al*, 2005	The effects of acquisitions on R&D activities.	31 acquisitions	The acquisitions of the companies with complementary technologies had a positive impact on R&D activities	Positive
Cloodt *et al*, 2006	The effects of acquisitions on innovation		Acquiring the knowledge that is too similar to the existing knowledge has a small effect on post-acquisition innovation performance	Positive
Zhao, 2009	The impact of technology acquisitions on acquisition decisions The impact of acquisitions on technological innovation		Acquisitions have an impact on the improvement of technological innovation	Positive
Makri *et al*, 2010	The impact of acquisitions on innovation		Acquisitions have a positive impact on innovation	Positive
Frey & Hussinger, 2011	The impact of acquisitions on the improvement of companies' technological capabilities	420 M&A during the period 1994-2000	Acquisitions improve companies' technological capabilities	Positive
Bena & Li, 2014	The impact of innovation activities on a decision on acquisition The impact of acquisitions on innovation	1762 acquisitions during the period 1984-2006	Innovation is an important driver of acquisitions Acquisitions have a positive impact on innovation	Positive
Szücs, 2014	The impact of acquisitions on intensity R&D	265 acquiring companies and 133 acquired companies during the period 1990-2009	If companies use the same technology, acquisitions have a negative impact on innovative performance	Negative
Wu *et al*, 2015	The effects of international acquisitions on innovative performance	222 Chinese MNCs	International acquisitions have a positive impact on innovative performance	Positive
Jo *et al*, 2016	The effects of technology acquisitions on innovation	212 technology acquisitions during the period 1993-2007	The acquisitions of small technical firms have a positive impact on acquiring companies' innovation	Positive
Han *et al*, 2017	The impact of acquisitions on the degree of companies' innovation	192 acquisitions by 162 high-technology firms during the period 2001-2009	Acquisitions have a positive impact on the degree of companies' innovation	Positive

Source: Authors

An analysis of the effects of technology acquisitions on the R&D process is the subject matter of a research study conducted by B. Cassiman *et al* (2005), who use information about 31 takeovers in order to focus on the role of the technological and market linkages between the acquiring company and the acquired company. They generate the data from a survey of company managers. The R&D criteria include changes in inputs (employees, laboratories, etc.), outputs (a higher speed of the development of technological knowledge, more patents, etc.), performance (higher productivity of R&D employees, increased R&D yield, etc.) under the influence of acquisitions. Their results can be summarized as follows: acquisitions in which companies have complementary technology increase the R&D activity, whereas quite an opposite conclusion applies to the acquisitions in which companies have substitute technologies. The efficiency of R&D is also higher when there are complementary technologies.

M. Cloodt *et al* (2006) emphasize the fact that acquiring the knowledge that is too similar to the existing knowledge has a small effect on post-acquisition innovation performance, given the high costs of the takeovers and transfers not accompanied by the enrichment of the existing knowledge base, which would create a potential for a new innovation. The authors conclude that a certain degree of differentiation in the technological capabilities of the company will enrich the acquiring company's knowledge base, create learning opportunities and improve innovative performance. Hence, in order to improve innovative performance through acquisitions, firms should avoid the takeovers of the firms whose knowledge bases are either too unrelated or too related. X. Zhao (2009) investigates whether technological innovation drives decisions on acquisition and how acquisitions affect technological innovation in the coming years. The author shows that, after a takeover is made a reality, the acquiring companies that were previously less innovative achieve a significant increase in the number of patents and market performance compared to the companies that were not involved in the acquisition processes. The author concludes that technology acquisitions could be one way to address innovation gaps.

M. Makri *et al* (2010) emphasize the fact that "the quality and originality of company innovations improve after mergers due to technological complementarity, as well as that technological similarity contributes to the emergence of economies of scale, while technological complementarity enables economies of scope". Analyzing 420 acquisitions in the period 1994-2000, R. Frey and K. Hussinger (2011) show that acquisitions improve companies' technological capabilities.

J. Ben and K. Li (2014) investigate the ex-ante effect of innovative activities on the implementation of technology acquisitions and the ex-post effect of technology acquisitions on corporate innovation. The research focuses on a sample of the 2621 acquisitions made a reality in the period 1984-2006 (the data are available for the acquiring companies) and 1762 acquisitions (the data are available for the acquiring companies and the target companies). The results of the research show that both acquiring companies and target companies are active in innovation, but have different innovation characteristics. In particular, acquiring companies have a big patent portfolio and low R&D costs, while target companies have high R&D costs and slow patent growth. The results indicate the fact that innovation is an important driver of acquisitions. When ex-post effects on acquisitions are concerned, the research results have shown that acquisitions have a positive effect on innovative activities.

X. Wu *et al* (2015) analyze 222 Chinese multinational companies with the aim to show how international acquisitions affect innovative performance. The results of the study reveal that, by taking tacit knowledge, multinational companies improve their innovative capacities, which has a positive impact on innovative performance. The authors conclude that it is necessary to establish the effective mechanisms that promote knowledge transfer, as well as organizational learning mechanisms, in order to improve innovative performance. G. Jo *et al* (2016) investigate how the acquiring company absorbs and assimilates the knowledge of the acquired company and creates innovations. The results of the research show a positive effect of the takeover of small technology

companies on the acquiring company's innovation. J. Han *et al* (2017) analyze the 192 acquisitions performed by 162 high-tech companies in the period 2001-2009 so as to confirm the positive impact of acquisitions on the degree of innovation after a takeover.

Certain studies show a negative impact of acquisitions on innovative performance. M. Hitt *et al* (1991) analyze a sample of the 191 acquisitions performed in the period 1970-1986 and find that acquisitions have a negative effect on the intensity of R&D, as well as the results of research and development activities, i.e. patents. The authors point out the fact that managers view acquisitions as a substitute for innovation. Hence, managers can take on the technology or products that are new to their company, but are not new to the market. Reducing R&D expenditure over time leads to a decline in innovation. In addition, a reduction in the relative number of patents after acquisitions suggests that acquiring companies do not take the full advantage of the technology taken over.

F. Szücs (2014) analyzes the impact of acquisitions on R&D intensity focusing on the example of 265 acquiring companies and 133 acquired companies in the period 1990-2009. The results of this study demonstrate the fact that, due to the reallocation of technological resources (R&D rationalization) and technological similarities, research and development decreases in both companies after the acquisition. Acquisitions negatively influence innovative performance if companies use the same technology, unless they achieve a top technological position after the takeover. In acquisitions not motivated by financial reasons or by the reasons of market dominance, integration costs may absorb the management and organizational resources that would otherwise be allocated to other activities (Cefis & Marsili, 2015). In these cases, acquisitions can be harmful to innovative activities and may have a negative effect on R&D.

CONCLUSION

In modern business conditions, the generation and application of new ideas, technologies and knowledge are fundamental prerequisites for company growth and for achieving long-term profitability. Relying on external knowledge and applying the open innovation model, companies can expand the base of possible ideas, improve the effect of internal scientific research activities and significantly improve innovation performance. In that sense, technology acquisitions are one of the main strategic levers for making open innovations a reality and improving companies' innovative capacities. There are several ways how the innovation potential can be improved through technology acquisitions. The knowledge transfer process between two companies, as well as the mutual learning process, increases companies' ability to experiment, be creative and develop innovations. A company's ability to take over, transfer and integrate the acquired knowledge base into its own knowledge base contributes to the creation of a sustainable competitive advantage. Companies with complementary knowledge can combine their specific strengths, which results in the development of the new technologies or products that neither partner would otherwise be able to develop on their own. In addition to that, acquisition integrates budgets for conducting research and development activities and increases the likelihood of developing more advanced technologies and innovative products.

The key challenges that companies are faced with after technology acquisitions are a possible loss of the key employees who may leave the company due to cultural conflicts or the nonacceptance of the new management style. Additionally, since technological know-how is largely the tacit knowledge that cannot be easily transferred, an additional challenge is to ensure an efficient transfer of this knowledge. As major organizational changes, acquisitions are characterized by a significant decline in confidence among employees. Therefore, only those companies that are able to develop a sense of trust and identity among employees with a newly combined company will be able to create an organization which encourages knowledge exchange.

The literature review of the effects of technology acquisitions on innovation shows that there are no consistent views, given the fact that there are the studies that have found a positive impact of

technology acquisitions on innovation, as well as the studies that have come to quite opposite conclusions. However, it can be seen that the studies that have shown a positive impact of technology acquisitions on the improvement of companies' innovative potential are dominant. So, the paper results in confirming the fact that the process of acquiring technology and knowledge from the external sources, as well as the harmonization of external knowledge with the internally developed knowledge base, improves the innovative potential of the integrated company. Additionally, the results show that acquisitions increase the likelihood of innovations in the integrated company. Also, innovations are made a reality much faster in relation to the situation where partners do not cooperate. Accordingly, it can be concluded that technology acquisitions contribute to the improvement of a company's innovative potential, which confirms the initial hypothesis.

The contribution of the paper reflects in the systematization of the knowledge of the effects of technology acquisitions on the improvement of a company's innovative potential. Given the fact that innovations will be one of the biggest strategic drivers of acquisitions in the coming years both in the world and in the Republic of Serbia, the results obtained and presented in this research study are important guidelines for the managers involved in technology acquisition processes. In fact, understanding possible ways to improve the innovation potential, as well as challenges in performing technology acquisitions, may help managers to adequately lead their companies through the process of change after technology acquisitions are made.

The research conducted in this paper is of a theoretical-methodological nature, which can be considered as a certain research limitation. Given the fact that technology acquisitions have only recently become relevant and that they will intensify in the coming years, however, building an appropriate theoretical basis for conducting future empirical research is of particular importance. In future empirical research, the effects of technology acquisitions on the improvement of the innovative potential of the companies in the Republic of Serbia could be analyzed in a methodologically valid manner. In addition to research in acquisitions as an instrument to support the improvement of companies' innovative potential, it is also important to explore the impact of innovations on encouraging acquisitions. This two-way connection between innovation and acquisition is an important area of potential future research.

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