7th International Conference on Mass Customization and Personalization in Central Europe (MCP-CE 2016)
Mass Customization and Open Innovation
September 21-23, 2016, Novi Sad, Serbia

OPEN INNOVATION IN WBC SMEs: CROSS-INDUSTRIAL PERSPECTIVE

Petar Vrgovic[1], Zeljko Tekic[2], Vladimir Todorovic[1]
[1]University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Republic of Serbia
[2]Skolkovo Institute of Science and Technology, Center for Entrepreneurship and Innovation, Moscow, Russian Federation

Abstract: *While the various aspects of how small and medium enterprises (SMEs) use open innovation (OI) practices are well documented in the developed countries, developing countries still lack thorough research on this subject, with most of the publications reporting results from a specific branch of industry, or a specific country. This research aims to add value by describing perspectives and practices of SMEs' in OI accros industries in three Western Balkan countries (WBC).*
On a sample of 134 SMEs from three developing WBCs: Serbia, Bosnia and Herzegovina and Montenegro, different aspects of OI are observed separately for the four industry branches: "manufacturing", "trading", "logistics, supply and construction", and "ICT sector". Significant differences between the industry branches are found regarding different aspects of OI. The paper discusses these differences and proposes methods for improving the performances.

Key Words: ***Open Innovation, SME, Developing countries, Western Balkan countries***

1. INTRODUCTION

Open innovation (OI) is a new paradigm firms use to manage and profit from innovation. It is based on active utilization of inflows and outflows of knowledge with the purpose to accelerate internal innovation, and to expand markets for external use of innovation [1]. OI concepts are used in a wide range of industries, in high and low-tech areas, and by companies of all sizes [2], [3]. First evidence about OI came from high-technology industries and large companies like Procter & Gamble, IBM, Intel and Millennium Pharmaceuticals, but companies in traditional and low-tech industries (e.g. Austrian jewellery producer Swarovski [4] and Belgian bank Fortis [5]) also adopted the concept.

Although large companies use more OI practices than SMEs, the growing number of studies on OI provided the evidence that SMEs are starting to adopt and benefit from OI approach (e.g. [6], [7]). Spithoven et al. [8] even found that SMEs are more dependent on OI than large companies as they have limited in-house resources for R&D, and they need to rely more heavily on external sources for innovation in order to stay competitive. However, Dodourova and Bevis [9] concluded that SMEs ability to benefit more from OI than the large enterprises is industry dependent. They argue that in dynamic, knowledge-based and labour-intensive industries (like the software industry) SMEs may profit more from OI than large firms, while in mature capital-intensive asset-based industries (like the car industry) it is opposite [9].

While the various aspects of how SMEs use and practice OI are well documented in the developed countries (e.g. [5], [6], [8]–[10]), developing countries still lack systematic research on this subject. The expected difference between OI practices in developed and developing countries is important because fundamentally different institutional and economic structures in developing countries shape unique conditions and thus offer interesting opportunities for researchers (and companies) in the area of OI. This research aims to add value in understanding OI practices in SMEs in developing countries by analysing data from 134 SMEs collected across industries from three Western Balkan countries (WBCs) - Serbia, Bosnia and Herzegovina (B&H), and Montenegro.

The remainder of the paper is organized as follows. Section 2 provides an overview of the relevant literature, while Section 3 describes the research methodology and dataset used. Section 4 presents and discusses the research results. Finally, Section 5 concludes our presentation with a summary of results and insights into our future research effort.

2. OPEN INNOVATION IN SMES: DEVELOPING COUNTRIES

In developing countries majority of SMEs are either forced to innovate as a reaction, or they do not innovate at all, which leads to stagnation and eventual closure; only few are capable of leading innovation proactively and independently [11]. This is additionally amplified in transitional (former socialist) countries, in which, companies are entering into free market competition, which is unfamiliar to their management, employees and all other stakeholders. Therefore, for these companies, the ability to innovate (both internally and externally)

with very limited resources and in very different market conditions becomes a matter of survival [12].

When it comes to the degree of openness of the innovation processes in developing countries, it is found to be more open at the beginning (idea generation phase) and decreases as the company moves to the later stages of the process [13]. This is serious issue, since SMEs in developing countries need open innovation implementation especially in technology exploration and technology exploitation stages, because they lack either ideas, partnership outside their cluster, knowledge about managing the idea diffusion stage, or business development services [14]. At the same time, SMEs in low-technology sectors in developing countries face another problem – innovation process is informal and highly influenced by the company's owner [15]. This means that innovation processes have high risk of failure, since they depend on personality traits and opinions of the owner, instead of having a strict procedure and structure that ensures support in idea realization.

There is evidence that opening the innovation process leads to better business performance for small firms in developing countries [16]. However, when practice OI, SMEs in developing countries face additional problems that their counterparts in developed countries do not have, such as poor ground infrastructure [17], lack of IT support [18], ethnic divisions in multi-ethnic societies [19], lack of networking knowledge [20], and poor legislative and regulation [21]. Therefore, it is frequently suggested that SMEs in developing countries need external help in order to open and realize their innovation processes (e.g. [22]). In most cases, governments could provide that help by: organizing information hubs to help companies find the best markets and partners [23], sponsoring networking projects [24], and by helping SMEs to adopt ICTs [25].

3. RESEARCH METHODOLOGY

In order to better describe and understand the current practices of SMEs regarding the open innovation approach, a quantitative analysis was conducted, using an original questionnaire on a sample of companies.

For this purpose, the authors have designed a questionnaire comprised of a number of close-ended questions, in which different aspects of open innovation activities are observed. Some questions offered a few answers, while the others asked respondents to evaluate the intensity to which a certain activity is present or important in their company on a 0-to-3 scale, where 0 meant that certain activity is not present at the company at all, and 3 meant that the activity is present to a great extent.

The questionnaire was dispersed in the three WBCs: Serbia, Montenegro, and B&H, using two methods: using a professional online survey platform, and also by mailing a printed form of the questionnaire to the companies, if they preferred so. The companies were asked for the questionnaire to be filled in by a CEOs, CFOs or similar high-level position that is strategically included in any innovation activity. The answer rate was 32%, while additional 3% of the received questionnaires were eliminated due to a significant number of empty fields. There was no significant bias found between early respondents and late respondents. The final sample therefore consisted of 134 SMEs, which were grouped in four activity groups, as depicted in Figure 1.

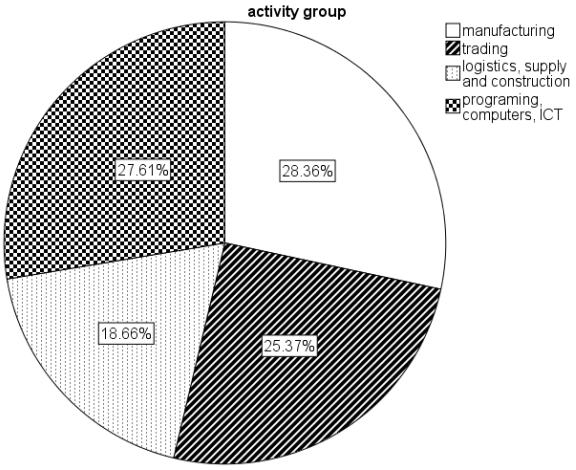

Fig. 1. The distribution of companies from the sample in the four activities groups

The sample of companies was found to be quite diverse in its age, with companies ranging from just a few months of practice, to a few of them being in their business for over 90 years. The median age was found to be 10 years, with a little more than half of the companies from the sample being younger than that, as depicted in Figure 2.

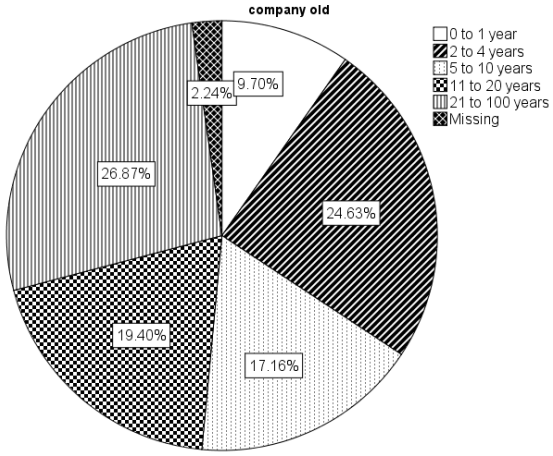

Fig. 2. The distribution of companies from the sample based on their age

4. RESEARCH RESULTS

The companies were first asked about their familiarity with the term "open innovation" with the question "To what extent are you familiar with the term "open innovation", which describes collaboration in innovation activities that a company has with external partners?". Since the respondents were CEOs, CFOs or similar high-level positions that are strategically included in any innovation activity, it was expected for them to be familiar with this term. However, the results show that 65% of the respondents indicate that they are either not at all familiar, or familiar only to a small extent with the term "open innovation", as shown in Table 1. This shows

that the phenomenon itself is rather unknown in the population of companies.

The next question observed the extent to which the companies perceive external subjects as factors in their innovation activities, which is the essence of open innovation. Here, the situation is quite different, and 68% of the companies believe that external partners are either moderately or highly significant for their innovation activities, with every fourth company stating to perceive external partners to be highly significant. This shows that companies care about collaboration with external partners, and that this influences their innovation activities.

Table 1. *Cross-tabulation of questions about basic familiarity and perception of open innovation*

		To what extent is collaboration with external subjects perceived as a factor for innovation activities in your company?				Total
		not at all	to a small extent	moderately	to a large extent	
To what extent are you familiar with the term "open innovation"...?	not at all	9	8	6	4	27
	to a small extent	2	23	22	13	60
	moderately	0	1	25	12	38
	to a large extent	0	0	2	7	9
Total		11	32	55	36	134

When answers to these two questions were cross-tabulated, a paradox could be observed. There are a number of companies that are not familiar with the term "open innovation", although they observe external partners as significant for their innovation-related activities. This basically means that there are companies that engage in some form of open innovation, but are not aware of that phenomenon.

Next, companies were asked to identify to which extent they successfully collaborate with different external partners in their innovation activities or innovative projects. Here, it can be seen that the highest rated external collaborators are company's end users. Other companies and suppliers follow, as well as external advisors and experts, as shown in Table 2.

Table 2. *The extent to which companies successfully collaborate with different external partners in their innovation activities or innovative projects*

External partner	Mean
our end users	2,13
other companies and suppliers	1,75
external advisors and experts	1,49
employees	1,41
mother/sister/daughter companies	1,11
universities	1,10

If we observe extent of successful collaboration with external partners in innovation activities for each activity group, there is a number of significant differences between the groups, reported by the ANOVA analysis ($p<.01$). The four activity groups are equal only in alternatives "other companies and suppliers" and "our end users", while they differ on other partners, as shown in Figure 3.

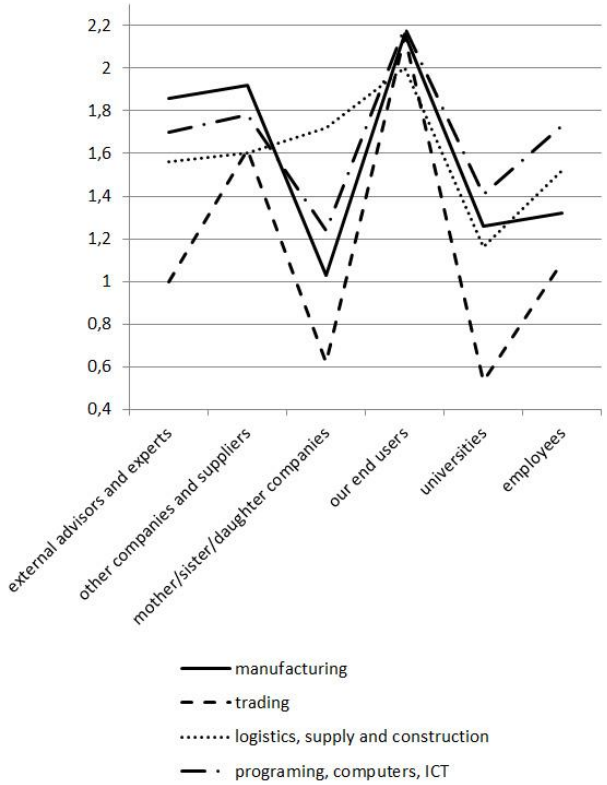

Fig. 3. Differences between activity groups related to successful partners in open innovation

Companies were then asked about the preferred means for communication with their external partners in innovation activities. As it can be seen in Table 3, companies dominantly use oral communication and face-to-face talks with their external partners, when there is an ongoing innovative project or action. Simple electronic communication such as email or instant messages are also highly saturated.

Table 3. *The extent to which companies use different communication channels in their innovation activities or innovative projects*

Communication channels	Mean
face-to-face conversation	2,29
simple electronic communication (email, instant messages)	2,23
special collaboration software and communication networks	1,32
collecting written ideas	0,99

If we observe these answers separately for each activity group, there are significant differences found between the groups, reported by the ANOVA analysis ($p<.01$). The alternatives "simple electronic communication" and "special collaboration software" have significant differences between groups, with "programing, computers and ICT" group having the highest score, and "trading" group having the lowest score, as shown in Figure 4. This is an expected result,

since the ICT industry is closely related to electronic means of communication.

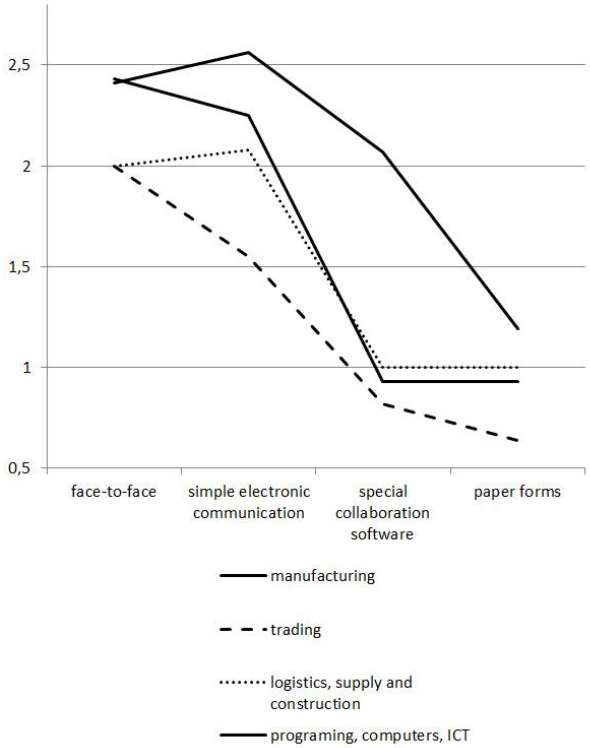

Fig. 4. Differences between activity groups related to usage of different communication channels in their innovation activities or innovative projects

5. DISCUSSION AND CONCLUSION

The enterprise sector that emerged from the transition in Serbia, B&H and Montenegro has a low propensity to invest in research and innovation [26]. In line with that, open innovation, as a term and as a practice, is very new for SMEs in WBCs. Ebersberger and Mevenkamp [27] speculate that international ownership is linkage that facilitate the diffusion and implementation of OI practices in firms in these countries.

On the other hand, it seems that SMEs are intuitively aware of the need to collaborate with range of external partners in order to innovate. As it is case in many other studies [6], [28], [29], we found that users / customers are most important external partners for SMEs for open innovation. This supports recent findings of Pilav-Velic and Marjanovic [12], who using sample of companies from B&H and focusing on the relationship between OI and business process innovation, showed that customers can be significant external partners, not only in product innovation, but also in process innovation.

Low scores that "universities" get as external partners in innovation is something that is already known in this region – collaboration between industry and academia is very limited. This as well, fits to what is known - Gans and Stern [30] found that universities and research centres are very important sources of external knowledge for larger high-tech companies, but much less for SMEs. Although a large part of the innovation process in the WBCs is not technology or R&D-driven, a number of activities and incentives should be employed in order to broaden and strengthen this collaboration. Good example is recent iDEAlab project [31].

The "trading" activity group scores the lowest scores in both intensity of collaboration and used communication tools dimensions, which suggests that SMEs who are in the trading business could mostly benefit from obtaining knowledge about open innovation.

The results presented here shed some light on SMEs perceptions of open innovation in three WBCs, across different industries. The fact that a number of companies uses open innovation concept, but is not aware of that phenomenon, suggests that these companies should be educated about the open innovation concept in order to fully utilize it and understand it. Not a small number of SMEs is neither familiar with this concept, nor do they collaborate with external partners in innovation activities. These companies should be thoroughly informed and educated about the principles and benefits of open innovation. However, culture should be especially carefully considered as it is observed that OI is deeply connected with and dependant on the culture of a particular region [32] and it can be seen as an obstacle in WBCs [33].

6. REFERENCES

[1] H. Chesbrough, "The Era of Open Innovation," *MIT Sloan Manag. Rev.*, vol. 44, no. 3, pp. 35–41, 2003.

[2] H. W. Chesbrough and A. K. Crowther, "Beyond high-tech: early adopters of Open Innovation in other industries," *R D Manag.*, vol. 36, no. 3, pp. 229–236, 2006.

[3] OECD, *OECD Science, Technology and Industry Scoreboard 2013*. OECD Publishing, 2013.

[4] R. Reichwald and F. Piller, *Interaktive Wertschöpfung: Open Innovation, Individualisierung und neue Formen der Arbeitsteilung*, 2nd ed. Wiesbaden: GWV Fachverlage GmbH, 2009.

[5] B. Ebersberger, C. Bloch, S. J. Herstad, and E. Van de Velde, "Open Innovation Practices and Their Effect on Innovation Performance," *Int. J. Innov. Technol. Manag.*, vol. 9, no. 6, p. 1250040, 2012.

[6] V. van de Vrande, J. P. J. de Jong, W. Vanhaverbeke, and M. de Rochemont, "Open innovation in SMEs: Trends, motives and management challenges," *Technovation*, vol. 29, no. 6–7, pp. 423–437, 2009.

[7] S. Lee, G. Park, B. Yoon, and J. Park, "Open innovation in SMEs-An intermediated network model," *Res. Policy*, vol. 39, no. 2, pp. 290–300, 2010.

[8] A. Spithoven, W. Vanhaverbeke, and N. Roijakkers, "Open innovation practices in SMEs and large enterprises," *Small Bus. Econ.*, vol. 41, no. 3, pp. 537–562, 2013.

[9] M. Dodourova and K. Bevis, "Networking innovation in the European car industry: Does the Open Innovation model fit?," *Transp. Res. Part A Policy Pract.*, vol. 69, pp. 252–271, 2014.

[10] M. O. Idrissia, N. Amaraa, and R. Landrya, "SMEs' degree of openness: The case of manufacturing industries," *J. Technol. Manag. Innov.*, vol. 7, no. 1, pp. 186–210, 2012.

[11] A. Hadjimanolis and K. Dickson, "Innovation strategies of SMEs in Cyprus, a small developing country," *Int. Small Bus. J.*, vol. 18, no. 4, pp. 62–79, 2000.
[12] A. Pilav-Velić and O. Marjanovic, "Integrating open innovation and business process innovation: Insights from a large-scale study on a transition economy," *Inf. Manag.*, vol. 53, pp. 398–408, 2016.
[13] L. Dries, S. Pascucci, Á. Török, and J. Tóth, "Keeping your secrets public? Open versus closed innovation processes in the Hungarian wine sector," *Int. Food Agribus. Manag. Rev.*, vol. 17, no. 1, pp. 147–162, 2014.
[14] J. Hamdani and C. Wirawan, "Open Innovation Implementation to Sustain Indonesian SMEs," *Procedia Econ. Financ.*, vol. 4, pp. 223–233, 2012.
[15] D. Prihadyanti, "Process and Source of Innovation in SME: Case of Indonesia's Food and Beverage Firms," *J. Manaj. Teknol.*, vol. 12, no. 3, pp. 319–329, 2013.
[16] I. Chaston and G. J. Scott, "Entrepreneurship and open innovation in an emerging economy," *Manag. Decis.*, vol. 50, no. 7, pp. 1161–1177, 2012.
[17] P. M. Achuama and A. Usoro, "Dancing with the stars: e-CRM and SMEs in developing countries," *J. Econ. Dev. Manag. IT, Financ. Mark.*, vol. 2, no. 2, pp. 68–80, 2010.
[18] J. Pradhan, "Information Technology in Nepal: What Role for the Government ?," *Electron. J. Inf. Syst. Dev. Ctries.*, vol. 8, no. 3, pp. 1–11, 2002.
[19] T. Biggs and M. K. Shah, "African SMEs, networks, and manufacturing performance," *J. Bank. Financ.*, vol. 30, no. 11, pp. 3043–3066, 2006.
[20] A. Salman, "Elusive challenges of e-change management in developing countries," *Bus. Process Manag. J.*, vol. 10, no. 2, pp. 140–157, 2004.
[21] F. Eid, "Recasting Job Creation Strategies in Developing Regions: A Role for Entrepreneurial Finance," *J. Entrep.*, vol. 15, no. 2, pp. 115–143, 2006.
[22] P. Vrgovic, P. Vidicki, B. Glassman, and A. Walton, "Open innovation for SMEs in developing countries - An intermediated communication network model for collaboration beyond obstacles," *Innov. Manag. Policy Pract.*, vol. 14, no. 3, pp. 290–302, 2012.
[23] M. A. Abdullah, "The accessibility of the government-sponsored support programmes for small and medium-sized enterprises in Penang," *Cities*, vol. 16, no. 2, pp. 83–92, 1999.
[24]P. Ghauri, C. Lutz, and G. Tesfom, "Using networks to solve export-marketing problems of small- and medium-sized firms from developing countries," *Eur. J. Mark.*, vol. 37, no. 5/6, pp. 728–752, 2003.
[25]S. S. Alam and M. K. M. Noor, "ICT adoption in small and medium enterprises: an empirical evidence of service sectors in Malaysia," *Int. J. Bus. Manag.*, vol. 4, no. 2, pp. 112–125, 2009.
[26] World Bank, "Overview of the Research and Innovation Sector in the Western Balkans," 2013.
[27] B. Ebersberger and N. Mevenkamp, "Open Innovation in Eastern Europe and Central Asia," *J. Bus. Adm. Res.*, vol. 5, no. 4, pp. 8–19, 2016.
[28] E. Enkel and O. Gassmann, "Driving open innovation in the front end. The IBM case.," St. Gallen, 2008.
[29] N. Theyel, "Extending open innovation throughout the value chain by small and medium-sized manufacturers," *Int. Small Bus. J.*, vol. 31, no. 3, pp. 256–274, 2012.
[30] J. S. Gans and S. Stern, "The product market and the market for 'ideas': commercialization strategies for technology entrepreneurs," *Res. Policy*, vol. 32, no. 2, pp. 333–350, 2003.
[31] Z. Tekic, I. Kovacevic, P. Vrgovic, A. Orcik, V. Todorovic, and M. Jovanovic, "iDEA Lab : Empowering university – industry collaboration through students' entrepreneurship and open innovation," *Int. Conf. Technol. Transf.*, pp. 269–272, 2013.
[32] M. Hossain, "A review of literature on open innovation in small and medium-sized enterprises," *J. Glob. Entrep. Res.*, vol. 5, no. 6, pp. 1–12, 2015.
[33] A. Orcik, Z. Tekic, J. Borocki, and Z. Anisic, "Unused Potential of Co-Creation in South-East Europe: Is it about the Culture?," *Int. Conf. Entrep. Innov. Reg. Dev. ICEIRD 2014*, pp. 13–21, 2014.

CORRESPONDENCE

Dr Petar Vrgovic, Assistant Prof.
University of Novi Sad
Faculty of Technical Sciences,
Trg Dositeja Obradovića 6
21000 Novi Sad, Serbia
vrgovic@uns.ac.rs

Dr Zeljko Tekic, Assistant Prof
Skolkovo Institute of Science and Technology,
Center for Entrepreneurship and Innovation,
Skolkovo Innovation Centre,
Nobel street 3
143026, Moscow, Russia
z.tekic@skoltech.ru

Vladimir Todorovic, PhD student
University of Novi Sad
Faculty of Technical Sciences,
Trg Dositeja Obradovića 6
21000 Novi Sad, Serbia
todorovic.ftn@gmail.com