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THE ROLE OF FEMALE TOP MANAGER IN INNOVATION ACTIVITIES: CASE OF CEECS' FIRMS

Abstract:

The aim of this paper is to explore whether the gender of top manager plays an important role in innovation activities in selected CEE countries. For this purpose, a framework of logistic binary regressions is applied to the firm-level data from Business Environment and Enterprise Performance Survey (BEEPS). The research assesses the differences in firm innovation activities in CEECs considering the gender structure of the top management. Findings indicate that, on average, there is a lower possibility that a firm innovates when it is governed by a female manager. However, women in top management are underrepresented in all the industries but this is specially the case in highly innovative sectors such as IT industry.

Keywords:

process innovation, product innovation, gender diversity, top management, CEECs firms

JEL Classification: J16, O30

1 Introduction

The importance of top management performance in the firm's success and failures is widely recognised since top management team is the group that creates firm's objectives and ways to achieve them (Rubio-Banón and Aragón-Sánchez, 2009; Kor, 2006; Lerner and Almor, 2002; Martin and Staines, 1994). Participation in all activities of the firm can encourage creativity, cooperation and generation of ideas, which creates a strong relationship between top management and innovation activities in the firm (Ruiz-Jimenez and Fuentes-Fuentes, 2016).

Gender diversity can be defined as the balance between the two genders and is associated with diversity in knowledge, experiences and skills. The literature on this topic also emphasises that gender diversity of top management teams could improve management capabilities and innovation performance (Bagshaw, 2004; Dessler, 2001; Díaz-García et al., 2013; Torchia et al., 2011). One way of doing so is through improved social relations since female managers tend to be more democratic and inclined to interpersonal relations creating open work climate in which new ideas are generated (Brown et al., 2002; Nielsen and Huse, 2010 Milliken and Martins, 1996).

Furthermore, gender diversity means also the diversity of skills, life experiences and risk propensities (Nkomo and Cox, 1996; Dessler, 2001; Bagshaw, 2004; Croson and Gneezy, 2009) what contributes to the richness of the different perspectives in the firm (Barczak et al. , 2010). Diverse knowledge and experiences can complement each other and therefore can foster development and innovation (Ritter-Hayashi, 2016).

Latimer (1998) argues that diversity promotes creativity and problem-solving capability. He suggests that groups have been found to be less risk-averse than an individual's 'risky shift'. Increased diversity leads to lower levels of risk aversion and better decision-making and problem-solving capability. Therefore, creativity is a necessary precondition for successful innovation (Bassett-Jones, 2005).

In CEEC countries (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia) EU membership resulted in the implementation of the EU's gender equality acquis which has improved gender diversity. However, women and men remain far from equal in the EU as high levels of employment segregation, persistent pay gaps, extant gender stereotypes and tolerance of sexism still exist. Due to a sharp decline in women's participation in the labour market during the transition period, many CEECs encountered problems associated with female poverty. They also experienced a process of public policies as a response to the stereotypes that women experienced during the period of socialism. At the same time, in CEECs state intervention in relation to important functions concerning the provision and organisation of social policy programmes was reduced. These reductions were particularly introduced to family policies, as a consequence of hard budget constraints and market reforms (Velluti, 2014).

A growing literature is analysing the relation between diversity among top management teams and the performance of firms. However, the studies that investigate the impact of gender diversity on innovation are scarce. The aim of this paper is to analyse the impact of gender diversity among top managers on innovation performance in firms of CEEC countries. To achieve the aim of the paper we pose the following research questions:

RQ. Does gender diversity among top managers have significant influence on innovation performance in firms of CEE countries?

For this purpose logistic binary regressions is applied to the firm-level data from Business Environment and Enterprise Performance Survey (BEEPS).

The paper is organised as follows: in the next section the existing empirical evidence on the gender diversity in management structure and innovation are presented. Data and sample characteristics are described in third section. Model specification and discussion of findings are presented in the following section of the paper, while section five concludes.

2 Empirical evidence

In the innovation process, the top management of a firm plays a significant role. They make crucial strategic decisions, such as decisions on investment in R&D or the introduction of new products, and thus directly influence innovation (Hoskisson et al., 2002). Within the literature on the gender diversity of management teams, studies frequently indicate that women improve management abilities, decision-making processes, and innovation. In their role as managers, women tend to be more people-oriented, more democratic and consultative, and more inclined to interpersonal relations (Brown et al., 2002). Hence, gender diversity contributes to improving social relationships, developing an open work climate (Nielsen and Huse, 2010), and establishing a much more varied view of problems that generates more diverse ideas (Milliken and Martins, 1996).

Existing empirical literature that examines directly impact of gender diversity on innovation process of the firm suggests the positive relationship between these two variables. Carmen and Triana (2009) investigated mediators that explain how board diversity is related to firm performance. They found a positive relationship between board gender diversity and innovation. Torchia et al. (2011) examined if an increased number of women corporate boards result contributes to firm innovation. The results of their study suggest that attaining critical mass makes it possible to enhance the level of firm innovation. Østergaard et al. (2011) analysed the relationship between employee diversity and innovation in terms of gender, age, ethnicity, and education. The results of their analysis indicate a positive relationship between diversity in education and gender on the likelihood of introducing an innovation.

Teruel et al. (2013) analysed how the effect of gender diversity on innovation output at the firm level is sensitive to team size. Their results showed that gender-diverse teams increase the probability of innovating, and this capacity is positively related team size. According to their analysis gender diversity had a positive impact on organisational innovations. The findings of Díaz-García et al. (2013) support the affirmation that gender diversity within R&D teams induces certain dynamics that foster novel solutions, leading to higher level of innovation.

Ritter-Hayashi et al. (2016) examined how gender diversity interacts with women's economic opportunity, such as prevailing laws, practices and attitudes in a country allowing women to participate in the workforce under similar conditions like men, to explain innovation in developing countries. Their results suggest that gender diversity increases the likelihood to innovate for firms operating in countries with rising levels of women's economic opportunity on the one hand and decreases the innovation likelihood for firms operating in countries that are at the low end of providing women's economic opportunity on the other side. Furthermore, they found a direct

positive effect of gender diversity on firms' likelihood to innovate at all levels in the organisation as well as a positive effect of having a woman as a top manager.

Some researchers have examined the influence of gender diversity separately on product and on process innovations. A product innovation is defined as the introduction of a good or service that is new or has significantly improved characteristics or intended uses, while a process innovation refers to the implementation of a new or significantly improved production or delivery method. Fernandez (2014) researched Spanish firms and found that gender diversity has a more significant effect on product innovations than on process innovations. Both kinds of innovations are related to technical solutions, but product innovations also require solutions emerging from interpersonal relations and market insights to which gender diversity contributes in a large scale (Nielsen and Huse, 2010). The underlining explanation is that gender diversity in the firm improves the understanding of customers, both males and females what could be incorporated into product development (Oh et al., 2004; Reagans et al., 2004).

3 Data and descriptive statistics

In order to examine the relationship between gender diversity and innovations, firm-level dataset drawn from the Business Environment and Enterprise Performance Survey (BEEPS) are used. This survey is undertaken by European Bank for Reconstruction and Development (EBRD) and World Bank (WB). The survey was conducted between 2012 and 2014, and it covered almost 12000 companies in 29 countries. For the purpose of this paper, the data for firms in 11 CEECs have been accessed.¹ In total there are 3519 observations.

Table 1. Gender diversity in top management in CEECs

	Is the top manager female?	
	Yes	No
Croatia	23,9%	76,1%
Bulgaria	24,0%	76,0%
Czech Rep.	13,9%	86,1%
Estonia	29,4%	70,6%
Hungary	21,1%	78,9%
Latvia	30,7%	69,3%
Lithuania	25,2%	74,8%
Poland	19,8%	80,2%
Romania	22,2%	77,8%
Slovak Rep.	18,5%	81,5%
Slovenia	20,7%	79,3%
Total	22,6%	77,4%

Source: BEEPS

The literature suggests that the firms could have better innovation performance with balanced gender top management composition (Ruiz-Jimenez and Fuentes-Fuentes, 2016). Table 1 shows female presence in top management of the firms in analysed CEEC's. In all countries women are

¹ CEECs include Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia.

underrepresented in top management. On the average 77.4% of top managers are men in analysed countries. This gender gap is largest in Czech Republic and Slovak Republic, and it is smallest in two Baltic countries Latvia and Estonia.

Table 2. Product and process innovation performance in CEECs

	New or significantly improved product?		Process innovation?	
	Yes	No	Yes	No
Croatia	40,0%	60,0%	30,1%	69,9%
Bulgaria	24,7%	75,3%	17,7%	82,3%
Czech Rep.	50,2%	49,8%	33,9%	66,1%
Estonia	22,3%	77,7%	21,0%	79,0%
Hungary	20,8%	79,2%	19,8%	80,2%
Latvia	20,5%	79,5%	12,5%	87,5%
Lithuania	24,0%	76,0%	19,8%	80,2%
Poland	33,4%	66,6%	21,7%	78,3%
Romania	40,3%	59,7%	36,2%	63,8%
Slovak Rep.	20,2%	79,8%	13,4%	86,6%
Slovenia	34,1%	65,9%	10,3%	89,7%
Total	31,1%	68,9%	22,7%	77,3%

Source: BEEPS

The data on firms' product and process innovations in analysed CEEC countries are given in the table 2. On average, 31,1% of all firms introduce product innovations. The countries with the greatest share of the firms that introduced new or significantly improved product or service are Czech Republic, Romania and Croatia. Contrary, Slovak Republic, Hungary and Baltic countries have the lowest share of the firms that are introducing new or significantly improved product. In the terms of the process innovation, in all analysed countries 22,7% firms on average implement a new or significantly improved production or delivery method, i.e. invest in the process innovation. The greatest share of the firms which introduce the process innovations have Romania and Czech Republic, while this share is the lowest in Slovenia, Latvia and Slovak Republic.

Table 3. Cross tabulation of product and process innovations in CEECs

New or significantly improved product?	Process innovation?		Total
	Yes	No	
Yes	560	535	1095
No	240	2184	2424
Total	800	2719	3519

Source: BEEPS

Cross tabulation of product and process innovation is calculated and given in the table 3 in order to examine were the firms that are investing in product innovation, investing in the process innovations at the same time. According to the results, 1895 firms had some kind of innovation. However, only a third of them had both process and product innovation simultaneously. Also, it can be seen that larger number of firms invests in product rather than in process innovations.

4 Model specification and discussion of findings

In order to explore the linkages between the occupancy of a top manager position by a female and probability of innovation in a firm, two binary logistic regressions are performed. Models could be expressed as:

Product Innovation = $f(\text{female top manager, top manager's experience, firm is a part of a larger firm, country})$

Process Innovation = $f(\text{female top manager, top manager's experience, firm is a part of a larger firm, country})$

Binary logistic regression is used when the dependent variable in question consists of two categories. In this paper, two regressions are estimated for two dependent variables: product innovations and process innovations. Both variables take a value of 0 if there were no innovation activities, and 1 if there were innovation activities in the previous three years. Independent variables included in both regressions are Gender, Experience, Part of a larger firm and Country. Table 4 presents the variable list.

Table 4. Description of the variables included in the model

Dependent variables	Question in the BEEPS	Codes
Product innovations	“During the last three years, has this establishment introduced new or significantly improved products or services?”	0 - No
		1 - Yes
Process innovations	“During the last three years, has this establishment introduced any new or significantly improved methods for the production or supply of products or services?”	0 - No
		1 - Yes
Independent variables	Question in the Survey	Codes
Female top manager	“Is the Top Manager female?”	0 - No
		1 - Yes
Top managers experience	“How many years of experience working in this sector does the Top Manager have?”	Number of years
The firm is a part of a larger firm	“Establishment is part of a larger firm?”	0 - No
		1 - Yes
Country	1- Croatia 2- Bulgaria 3- Czech Republic 4- Estonia 5- Hungary 6- Latvia 7- Lithuania 8- Poland 9- Romania 10- Slovak Republic 11- Slovenia	

Source: BEEPS

Binary logistic regressions could be expressed as:

$$\ln\left(\frac{P(\text{ProductInnovation})}{P(\text{NoInnovation})}\right) = \text{const} + \beta_1\text{Female} + \beta_2\text{Experience} + \beta_3\text{Part} + \beta_4\text{Country}$$

$$\ln\left(\frac{P(\text{ProcessInnovation})}{P(\text{NoInnovation})}\right) = \text{const} + \beta_1\text{Female} + \beta_2\text{Experience} + \beta_3\text{Part} + \beta_4\text{Country}$$

The dependent variable in logistic regression is odds ratio. P(ProductInnovation) and P(ProcessInnovation) are the predicted probabilities of the event which is coded with 1 (there had been innovations in the firm), and P(NoInnovation) is the predicted probability of the event which is coded with 2 (no product innovations in the previous three years). When odds ratio is higher than 1 it means that there is a higher possibility that the firm will innovate than that firm will not innovate. Results are shown in Table 5.

Table 5. Gender diversity influence on goods and services innovation

	B	S.E.	Sig.	Odds Ratio
Top manager female	-.153	.093	.099	.858
Top managers experience (years)	-.003	.004	.383	1.003
Part of larger firm	.307	.147	.037	1.359
Country (Croatia – reference cat.)			.000	
Bulgaria	-.695	.175	.000	.499
Czech republic	.375	.169	.026	1.455
Estonia	-.834	.192	.000	.434
Hungary	-.947	.180	.000	.388
Latvia	-.942	.183	.000	.390
Lithuania	-.732	.188	.000	.481
Poland	-.265	.147	.072	.767
Romania	.019	.140	.894	1.019
Slovak Republic	-.966	.195	.000	.380
Slovenia	-.254	.172	.139	.776
Constant	-.458	.140	.001	.632
Dependent variable: Product/Service Innovations				
Number of observations = 3420				
Hosmer and Lemeshow Test Chi-square =4.422 Sig. = 0.817				
Cox & Snell R Square .042				
Nagelkerke R Square .060				

Source: Research findings

Results of previous analysis suggest that likelihood that establishment introduced new or significantly improved product or service is the highest in Czech Republic, Romania and Croatia. Furthermore, possibility of innovating is higher when establishment is a part of larger firm. Findings also indicate that, on average, there is a lower possibility that a firm innovates when it is governed by a female manager. This finding is not in accordance with existing empirical literature, with the

exception of Czech Republic where probability that a firm governed by female innovates amounts 55%. However, it can be explained by different gender distribution by industries. Women in top management are underrepresented in all the industries but this is specially the case in highly innovative sectors such as IT industry. For comparison the share of female top managers is the highest in retail industry.

Table 6. Gender diversity influence on process innovation

	B	S.E.	Sig.	Exp(B)
Is the Top Manager Female	-.111	.102	.280	.895
Top managers Experience (years)	.004	.004	.345	1.004
Part of larger firm	.434	.153	.005	1,544
country			.000	
Bulgaria	-,697	,195	,000	,498
Czech republic	,130	,179	,467	1,139
Estonia	-,447	,199	,025	,640
Hungary	-,602	,187	,001	,548
Latvia	-1,060	,212	,000	,346
Lithuania	-,536	,201	,008	,585
Poland	-,431	,163	,008	,650
Romania	,278	,148	,060	1,320
Slovak Republic	-1,009	,223	,000	,364
Slovenia	-1,312	,238	,000	,269
Constant	-,931	,151	,000	,394
Dependent variable: Process Innovations				
Number of observations = 3420				
Hosmer and Lemeshow Test	Chi-square =8,298		Sig. = 0.405	
Cox & Snell R Square	.043			
Nagelkerke R Square	.065			

Source: Research findings

From the previous table it is evident that concerning process innovation gender is not statistically significant. This can be explained by deeper analysis of the data. Analysis shows that majority of process innovations are made in manufacturing industry where traditionally females make a negligible share in top management. Correspondingly to product innovation, likelihood that establishment introduced new or significantly improved method for production or supply of products or services is the highest in Czech Republic, Romania and Croatia.

5 Conclusion

Innovation activities are one of the most important engines behind the firm growth. The diversity of top management is a source of creativity and innovation that can provide a basis for comparative advantage and therefore could improve management capabilities and innovation performance. Furthermore, managers make crucial strategic decisions, such as decisions on investment in R&D or the introduction of new products, and thus directly influence innovation. Contributions of a number of academic disciplines that examines impact of gender diversity on innovation process point out positive relationship between these two variables because gender diversity in the firm

improves the understanding of customers, both males and females what could be incorporated into product development.

In this paper logistic binary regressions are applied to analyse the impact of gender diversity among top managers on innovation performance in firms of CEEC countries. The analysis indicates that, on average, there is a lower possibility that a firm innovates in goods and services when it is governed by a female manager. The only exception is Czech Republic. This finding can be explained by the fact that women in top management are underrepresented in all the industries but this is specially the case in highly innovative sectors such as IT industry. The analysis also indicates that concerning process innovation gender is not statistically significant. However, majority of process innovations are made in manufacturing industry where traditionally females make a negligible share in top management.

Research results highlight the necessity of expanding the analysis of this issue in order to broaden findings of the impact of gender structure among top managers on innovation performance in each country separately.

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