The Interplay of Socioeconomic Development, Enterpreneurship, National Culture and innovation Performance

Merima Činjarević

School of Economics and Business, University of Sarajevo

merima.cinjarevic@efsa.unsa.ba

Ljiljan Veselinović

School of Economics and Business, University of Sarajevo

ljiljan.veselinovic@efsa.unsa.ba

Abstract: The main purpose of this study is to investigate the relations between national cultural dimensions, socioeconomic development, entrepreneurship, and national innovation performance. Data set for this study was obtained from secondary sources and it included the following measures: (1) the scores of Hofstede's national culture dimensions; (2) UNDP Human Development Index, (3) Total Early-Stage Entrepreneurial Activity rates provided by The Global Entrepreneurship Monitor (GEM); and (4) Global Innovation Index (GII). These measures were gathered for 77 countries across seven regions of the world. Support was found for the positive effect of socioeconomic development on national innovation performance indicating that a long and healthy life (health), the access to knowledge (education), and a decent standard of living (income) are significant predictors of innovation performance. In terms of cultural dimensions findings of the regression analysis indicate that innovation performance are higher in countries that have lower power distance between citizens and those in power and have lower level of uncertainty avoidance. The link between entrepreneurial activity and national innovation performance was found to be negative. This study emphasizes the importance socioeconomic and cultural impacts on national innovation performance and, thus, provides implications for policy-making regarding innovation policies.

Keywords: socioeconomic development, national culture, innovation performance, enttrepreneurship

1 Introduction

Innovation, understood as the production, diffusion and translation of technological knowledge into new products or new processes, is considered to be the main driver of growth in modern capitalistic economies (Watkins, Papaioannou, Mugwagwa and Kale, 2015). Moreover, it has been argued that "successful economic development is linked to a country's capacity to acquire, absorb, disseminate, and apply modern technologies, a capacity embodied in its National Innovation System (NIS)" (Metcalfe and Ramolgan, 2008, p. 436). In other words, innovation does not occur in the vacuum; innovation is the result of the NIS, that combines the efforts of individual firms with the actions of other innovating actors such as universities and government agencies (Crespo and Crespo, 2016; Metcalfe & Ramlogan, 2008; Watkins *et al*., 2015). Based on the literature review in the area of NIS, three basic research streams can be identified: (1) NIS studies in general; (2) NIS studies with a focus on particular aspects of the NIS; and (3) theoretical perspectives on NIS (Marxt and Brunner, 2013). The present study strives to enhance the body of knowledge within the first research NIS stream (NIS studies in general) by exploring the impact of the socioeconomic development, national cultural and entrepreneurship on the national innovation performance. In order to accomplish this aim, we made three basic assumptions. The first assumption is that a large share of variance in the national innovation performance can be explained by the key aspects of socioeconomic development (income, education, health). The second assumption is that the culture, as the set of shared attitudes, values, goals and practices that characterizes institutions, organizations or groups, influences overall national innovation performance. The third assumption is that entrepreneurship activity enhances the national innovation performance.

This paper is organised as follows. Section two provides the theoretical background, while section three describes the methodology and data sources. Section four presents the model used in the analysis followed by the discussion. Final section provides main concluding remarks of the paper.

2 Theoretical background

2.1 National innovation system

The term national innovation system (NIS) emerged in the mid-1980s with the context of debates over innovation policy in Europe (Sharif, 2006). Since them, the concept of NIS has been rapidly embraced by policymakers and academic scholars across the world. According to Lundvall, Joseph, Chaminade and Vang (2009), NSI refers to the „open, complex, and evolving system that encompasses

relationships within and between organizations, institutions and socio-economic structures which determine the rate and direction of innovation and competence-building emanating from processes of science-based and experience-based learning" (p.6). Similarly, Patel and Pavitt (1994) defined NSI as „the national institutions, their incentive structures and their competencies, that determine the rate and direction of technological learning (or the volume and composition of change-generating activities) in a country" (p. 79). Thus, NSI can be perceived as the sub-system of the national economy in which various organizations and institutions interact and influence each other in the carrying out of innovative activity. Although the NIS approach is not the theory, it can be used as the research framework intended to capture the processes of innovation, their antecedents and some of the outcomes. (Edquist, 1997). Furthermore, the NSI approach is in the line with the Nelson and Winter's (1982) evolutionary theory of economic growth which postulates that governments and collective activities can and do play a central orchestrating role in the generation and diffusion of innovation in a national economy (Watkins *et al.,* 2015). Recently, a number of scholars placed emphasis on the role of functions or building blocks of the NIS. These scholars argue that additional academic efforts are needed to better understand the ways in which institutions (innovating actors) interact and how the structure of the innovation system and its functions can foster innovation (e.g. Liu and White, 2001). Furthermore, some scholar examined the effectiveness of government intervention regarding the innovation policies and tried to compare the position of countries regarding innovation policies and performance (Crespo and Crespo, 2016; Mahroum and Al-Saleh, 2013). Preliminary work in this research stream placed focus mainly on the analysis of different countries' innovation systems and/or on their comparative results (Lin, Shen and Chou, 2010). However, since late 1990s several international institutions developed a range of innovation indices (European Innovation Scoreboard, the National Innovative Capacity Index from the World Economic Forum, the UNCTAD's indices, the Innovation Index of the World Bank, the Nordic Innovation Monitor, the OECD Science, Technology and Industry scoreboard, the Bloomberg Innovation Index, and the Global Innovation Index). Since then, the most common way to evaluate the performances of different innovation systems is the use of indices (Crespo and Crespo, 2016). Therefore, the present study uses the Global Innovation Index (GII) as a proxy measure of national innovation performance.

2.2 Entrepreneurship

The concepts of innovation and entrepreneurship were linked for the first time by Schumpeter (1934), who argued that entrepreneurship leads to innovation, which in turn induces economic growth. Although the literature suggests that entrepreneurship and national innovation system (i.e. national innovation performance) are enablers of economic growth, there is a lack of research on the role of entrepreneurship in reinforcing the national innovation performance

(Albulescu and Draghici, 2016). Moreover, the findings of empirical studies exploring the effect of entrepreneurship on economic growth are ambiguous. Therefore, researchers have embraced two-way causality in modelling the link between entrepreneurship and economic growth. These studies posit that there is both a ‘‘Schumpeter’’ effect (i.e. new firms enhance economic growth by stimulating economic activity and creating new hobs) and a ‘‘refugee’’ effect (i.e. unemployment stimulated entrepreneurial activity). It is suggested that the ‘‘Schumpeter’’ effect would be most likely observed in advanced countries while the ‘‘refugee’’ effect is likely to be found in lower-income nations with less-developed social security systems. Furthermore, it has been found that entrepreneurship activity does not affect the national innovation performance (Albulescu and Draghici, 2016) or economic growth (Wong, Ho and Autio, 2005). These findings indicate that national innovation performance and economic growth are driven by large and fast growing new firms, not new firms in general. Based on the above discussion, we expect that entrepreneurship will not be significantly related to the national innovation performance.

2.3 National culture

In order to capture national culture in the present study, we applied Hofstede’s (1980) cultural dimensions. We chose to integrate the particular Hofstede scores for the primary dimensions of national culture - power distance, individualism, masculinity, and uncertainty avoidance. Power distance refers to “the extent to which the members of a society accept that power in institutions and organizations is distributed unequally” (Hofstede, 1985, p. 347). The ability to monitor innovation activities and to implement innovation policies can be hindered by a high level of power distance. In high power distance countries, power-less people are less likely to defend their rights of equal access to opportunities, and they are more likely to accept the behaviour of those in power. Individualism, as opposed to collectivism, captures whether individuals primarily cater to their own needs instead of acting in the interest of their group (Hofstede and Bond, 1984). People in individualistic national culture tend to express their opinions freely, even in situations when their opinions do not match with the opinions of others (members of family, friends, colleagues, etc.) However, in collective culture people are more prone to hold their opinions for the sake of creating and maintaining good relations with others. Thus, we can expect that individualism enhances national innovation performance, while collectiveness hampers the national innovation performance. Masculinity is defined as “a situation in which the dominant values of society are success, money, and things” (Hofstede, 1980) In a masculine culture, values like achievement, advancement, gathering of money and power are more important than the values like building relationships, empathy, modesty, whch are considered to be more important in a feminine culture. In a culture where people value more quantity of life (i.e. high masculinity) than the quality of life (i.e. high femininity, we expect the higher level of national innovation performance. The fourth cultural dimension, uncertainty avoidance, assesses “the

extent to which the members of a society feel uncomfortable with uncertainty and ambiguity and leads them to support beliefs promising certainty and to maintain institutions protecting conformity" (Hofstede, 1985, p. 347). In cultures characterized by a high level of uncertainty avoidance, people are not optimistic about their ability to influence decisions made by those in power. As high uncertainty avoidance indicates low willingness to introduce the change, people are less willing to engage in activities that might lead to the innovation.

2.3 Human development

One potential explanatory factor related to national innovation performance may be found in a country's level of socioeconomic development. Socioeconomic development is measured by the United Nations and refers to the ability of a nation's people to be able to lead full and productive lives. This includes not only education and their ability to earn a living wage, but more importantly the personal choices they have available as citizens that impact their lives (Sims, Gong and Ruppel, 2012). Since higher level of education and better conditions of living are pillars of innovation activity, we expect that a country with high level of socioeconomic development is likely to have better national innovation performance.

3 Methodology

3.1 Measures and sample

In our analysis, national innovation performance (dependent variable) is measured using Global Innovation Index (GII) released by Cornell University, INSEAD and the World Intellectual Property Organization (WIPO). The GII depends on two sub-indices, the innovation input sub index and the innovation output sub index, each one built on several enablers (or pillars). Over the years, this index has improved and, in 2016 included 82 indicators divided into five input enablers (institutions, human capital and research, infrastructure, market sophistication, and business sophistication) and two output enablers (knowledge and technology outputs and creative outputs). Based on the GII framework, four measures can be calculated, namely innovation input sub-index (i.e. average of the five input scores), output sub-index (i.e. average of the two output scores), the overall global innovation index (i.e. average of the innovation input sub-index and innovation output sub-index), and the innovation efficiency ratio (i.e. ratio of the output sub-index and input sub-index). For the purpose of this study, we applied all four measures.

Socioeconomic development, as independent variable in our analysis, is measured by Human Development Index (HDI) Human development scores for the year 2013 were gathered for each of the countries included in the sample from the United Nations Development Programme. This index is a composite measure of health, education, and income designed to assess well-being.

Entrepreneurship, as independent variable, is assessed through the TEA which represents the percentage of individuals in the nation, aged between 18 and 64, that are actively engaged in starting or managing a new business.

National culture is measured in terms of Hofstede's five dimensions of national culture: power distance, individualism, masculinity, uncertainty avoidance, and long-term orientation. Values for each of the scores of the five dimensions of national culture were obtained from Hofstede (2011).

The sample for this study included data gathered for 77 countries, located in seven regions of the world. The inclusion of countries was limited by the secondary data available for GII, HDI, TEA, and national culture dimension scores. Most countries (40.3%) belong to Europe & Central Asia region, while 20.8% are from Latin America & Caribbean. Approximate equal number of countries comes from "East Asia and the Pacific "and Sub-Saharan Africa (11.7% and 13.0% respectively). Most countries belong to high income group (46.8%), while the rest are either in upper middle income (29.9%) or lower middle income group (23.4%). As the data were collected from different sources, this procedure limited the total number of countries in each category. No data for country in low income category were collected. Table 1 show number of countries included in the analysis classified according to income group and region.

Income group	Lower middle income		Upper middle income		High income		Subtotal	
Region	Count	Table N %	Count	Table N %	Count	Table N %	Count	Table N %
South Asia	3	3.9%	0	.0%	0	.0%	3	3.9%
East Asia and the Pacific	3	3.9%	3	3.9%	3	3.9%	9	11.7%
Sub-Saharan Africa	7	9.1%	3	3.9%	0	.0%	10	13.0%
Latin America & Caribbean	2	2.6%	11	14.3%	3	3.9%	16	20.8%
North America	0	.0%	0	.0%	2	2.6%	2	2.6%
Europe & Central Asia	1	1.3%	4	5.2%	26	33.8%	31	40.3%
Middle East & North Africa	2	2.6%	2	2.6%	2	2.6%	6	7.8%
Subtotal	18	23.4%	23	29.9%	36	46.8%	77	100.0%

Table 1
Sample characteristics

3.2 Statistical procedure

Regression analysis was used to test the direct link between socioeconomic development, entrepreneurship, national culture dimensions and national innovation performance. As the national innovation performance includes both input innovation performance and output innovation performance, as well as the ratio of these two indicators, four regression models were tested. Model A tests the effect of socioeconomic development, entrepreneurship and national culture dimensions on the overall national innovation performance (NIP) and it is depicted by the following equation:

$$NIP2016_{i,t} = a\ HDI2013_{i,t-1} + b\ TEA2013_{i,t-1} + c\ PD + d\ IND + e\ MAS + f\ UNA + g\ LTO + \varepsilon_{i,t} \quad (1)$$

where NIP is National Innovation Performance, HDI Human Development Index, TEA Total Early-Stage Entrepreneurial Activity, PD Power Distance, IND Individualism, MAS Masculinity, UNA Uncertainty Avoidance and LTO is Long Term Orientation.

Model B tests the effect of independent variables (socioeconomic development, entrepreneurship, and national culture dimensions) on the innovation efficiency

ratio (i.e. ratio of the output sub-index and input sub-index). The regression model B is described by the following equation:

$$IER_{i,t} = a\ HDI2013_{i,t-1} + b\ TEA2013_{i,t-1} + c\ PD + d\ IND + e\ MAS + f\ UNA + g\ LTO + \varepsilon_{i,t} \quad (2)$$

where IER is innovation efficiency ratio, HDI Human Development Index, TEA Total Early-Stage Entrepreneurial Activity, PD Power Distance, IND individualism, MAS Masculinity, UNA Uncertainty Avoidance and LTO is Long Term Orientation.

Model C and Model D examine the effect of independent variables (socioeconomic development, entrepreneurship and national culture dimensions) on the input innovation performance (IIP) and output innovation performance (OIP) respectively. Model C and Model D are described by the following equations:

$$IIP_{i,t} = a\ HDI2013_{i,t-1} + b\ TEA2013_{i,t-1} + c\ PD + d\ IND + e\ MAS + f\ UNA + g\ LTO + \varepsilon_{i,t} \quad (3)$$

$$OIP_{i,t} = a\ HDI2013_{i,t-1} + b\ TEA2013_{i,t-1} + c\ PD + d\ IND + e\ MAS + f\ UNA + g\ LTO + \varepsilon_{i,t} \quad (4)$$

4 Results and discussion

The regression results for all four models (Model A, B, C and D) are given in Table 2.

	Model A	**Model B**	**Model C**	**Model D**
	DV NIP2016	DV IER2016	DV IIP2016	DV OIP2016
Constant	13.282 (1.076)	.307 (.839)	-21.797 (-1.022)	-3.217 (-.176)
HDI2013	**55.269 (5.158***)**	.238 (.744)	**78.894 (4.243***)**	**49.994 (3.143***)**
TEA2013	**-.285 (-2.129**)**	.000 (.109)	-.084 (-.349)	-.171 (-.832)
PD	**-.133 (-2.507**)**	.000 (-.135)	.038 (.407)	-.090 (-1.116)
IND	.025 (-.519)	.002 (1.493)	.158 (1.849*)	.134 (.1840*)
MAS	.047 (1.331)	.000 (.463)	.022 (.352)	.031 (0.579)
UNA	**-.137 (-4.362***)**	-.001 (-.585)	-.093 (-1.618)	**-.122 (-2.493**)**
LTO	.068 (1.896*)	**.002 (2.172**)**	.091 (1.400)	**.147 (-2.653**)**
R^2	.854	.363	.701	.750
Adjusted R^2	.830	.266	.656	.711

Table 2:
Results of regression analysis (Model A, B, C and D)

* Significant at 0.1 level **Significant at 0.05 level *** Significant at 0.01 level
NIP2016: National Innovation Performance
IER2016: Innovation Efficiency Ratio
IIP2016: Input Innovation Performance
OIP2016: Output Innovation Performance
HDI: Human Development Index
TEA: Total Early-Stage Entrepreneurial Activity,
PD: Power Distance

IND: Individualism
MAS: Masculinity
UNA: Uncertainty Avoidance
LTO: Long Term Orientation.

In line with our expectations, the results of regression analysis (Model A) confirm that socioeconomic development is positively related to the national innovation performance. Moreover, the results of model C and D indicate that socioeconomic development positively contributes to the input innovation performance and output innovation performance, indicating that income, health and decent standard of living are triggers of the national innovation capacity and national innovation performance. The link between entrepreneurship and national innovation performance was found to significant only for Model A ($B = -0.285$; $p<0.05$). More precisely, findings suggest that entrepreneurship measured as percentage of individuals in the nation aged between 18 and 64 that are actively engaged in starting or managing a new business, hampers the national innovation performance. This finding is in the line with the view that the new, small entrepreneurial companies do not have the capacity to innovate and that national innovation performance is driven by large firms (Moche and Morse, 1977; Albulescu and Draghici, 2016). Moreover, the negative relation between entrepreneurship and national innovation performance can be explained by "refugee effect" indicating that entrepreneurial efforts, motivated only by the current unemployment status, can reduce the national innovation performance if these efforts are not accompanied with adequate level of education of people who are engaging in entrepreneurial activities.

Only two cultural dimensions have negative and statistically significant effect on the national innovation performance: power distance ($p<0.05$) and uncertainty avoidance ($p<0.01$). These findings suggest that countries with higher distance between citizens and those in power (hierarchy, required privileges for superiors, inaccessible superiors, and formal attitudes towards managers) will have lower level of national innovation performance. Regarding the uncertainty avoidance, our findings suggest that higher degree of uncertainty avoidance leads to the lower level of national innovation performance. Thus, countries characterized by people who are motivated by rules, norm and who are intolerant to different behaviour and ideas, are like to have lower level of national innovation performance. In addition, our findings suggest that uncertainty avoidance is negatively related to the output innovation performance, indicating that countries with high level of uncertainty avoidance are likely to have lower level of output innovation performance (knowledge and technology outputs and creative outputs). Analysing the effect of national cultural dimensions on the innovation efficiency ratio (Model B), input innovation performance (Model C), and output innovation performance (Model D), it was found that long-term orientation has significant and positive effect on innovation efficiency ratio and output innovation performance. As this cultural dimension explains whether the country can be described as country with normative societies (low score on this dimension) or

pragmatic (high score on this dimension), our findings suggest that pragmatic countries (i.e. people show ability to adapt traditions easily to change conditions) are more likely to have higher levels of output innovation performance, including (1) knowledge and technology outputs, and (2) creative outputs.

5 Conclusion

The results of this study indicate that as socioeconomic development increases national innovation performance increases accordingly. Thus, countries with the capacity to meet the human needs of their citizens, to sustain and enhance the quality of their lives, and to create the conditions for all citizens to reach their full potential, are more likely to experience increased levels of innovation. However, socioeconomic development does not not fully explain the variation in nation's level of innovation performance. As indicated by the findings of this study, two national culture dimensions (power distance and uncertainty avoidance) are related to the national innovation performance. More precisely, the results of the present study show that countries with lower level of power distance and lower level of uncertainty avoidance are likely to exhibit higher levels of national innovation performance. Furthermore, findings of the present study suggest that entrepreneurship reduces the level of national innovation performance. This finding is not in the line with so-called "Schumpeter'' effect according to which entrepreneurship motives innovation and economic growth. The findings of the present study have important implications for policy makers. Since socioecnomic development is significant predictor of national innovation performance, we suggest that innovation policies should be formulated with the understanding that national innovation performance can be increased by the improvement of the capacity of society to meet human needs of their citizens, to sustain and enhance the quality of their lives, and to create the conditions for citizens to reach their full potential. When citizens are poorly educated, when they do not have opportunity to satisfy their basic needs and/or reach their full potential, they are less likely to engage in innovation activities. Thus, by placing focus on the development issues, like education, health, employment, and poverty, governments might be effective in their efforts to increase national innovation performance.

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