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The Impact of National Culture on the Level of Innovation

Abstract:

The purpose of this paper is to ascertain whether national culture has an impact on the level of innovation. The results of the analysis of data by means of statistical tools confirm that cultural factors play a big role in creating innovations. On the basis of the research, it can be assumed that the thesis formulated by Shane (1993) assuming the correlation of low power distance and strong individualism with innovation seems to be correct if we do not refer it to the Far East Asian countries. These countries seem to be very different culturally from the rest of the analyzed cultures. Low power distance and low uncertainty avoidance countries are in most cases more innovative in European countries. Impact of individualism versus collectivism is more debatable but generally in Europe more individualistic countries achieve better innovative results.

Key words:

national culture, innovation

Culture and innovation - introduction

Innovation has been the subject of several studies linking it to economic growth (Fagerberg and Srholec, 2008; Freeman, 2002; Thoenig and Verdier, 2003). On the basis of data from 115 countries Fagerberg and Srholec (2008) proved that innovation systems and governance are of particular importance for economic development. Lundvall (2007) discovered that several national aspects may influence the motivation to innovate on the national level. Lundvall (2007) emphasized the need to give more distribution of power, institution building and to the openness of innovation systems, especially in developing countries. Fagerberg and Srholec (2008) found strong support that several factors linked with National Innovation System such as the quality of governance, the political system, and openness interact with the ability to innovate. These indicators interact with the cultural dimensions identified by Hofstede (2001). The key result of research done by Jones and Davis (2000) is that national culture affects innovation. Herbig and Dunphy (1998) point that existing cultural conditions determine whether, when, how, and in what form a new innovation will be adopted. A society's values provide direction to the process of technological development, which can be fostered or inhibited. Therefore it should be explicitly considered as a factor informing the location decision for foreign innovative capabilities. Also, country-specific differences in managing R&D professionals abroad can be linked to the cultural dimensions identified by Hofstede (Jones and Davis, 2000).

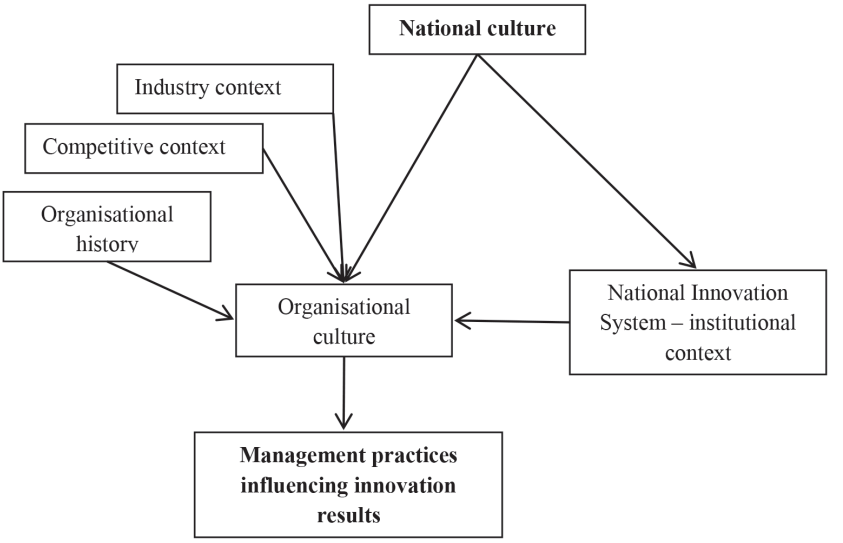
Although numerous attempts have been made to explain why innovation varies considerably among nations (Porter 1990, 2000; Schmoch et al. 2006), generally accepted overall conceptual framework to explain such variations does not exist so far. The dominant view in the literature is that national culture has a strong impact on organizational culture. Hofstede (1983, 2001) argues that national culture constrains organizational culture. Au (1999) observed that multinational corporations usually have special

preference for workers that suit their needs and company culture[1]. Johns (2006) claims that national culture is a major component of the broader ***contextual imperative*** that constrains organizational culture. On the basis of empirical evidence Williams et. al. (2010) argue that culture powerfully shapes the character of national innovation. They supported hypotheses that culture does influence economic creativity, and economic creativity positively influences innovation implementation, which positively influences national prosperity. Newman and Nollen (1996) using data from eighteen countries and Hofstede's national culture dimension, found support for the thesis that business performance is better when management practices are congruent with national culture. Work units that are managed consistently with the values of the external culture are more profitable than work units in which the fit is achieved not so good. Therefore management practices should be adapted to the local culture to be most effective. Another view represents Gerhard (2008) who asked to what degree is national culture likely to act as a key factor in the "contextual imperative". Conceptual analysis and re-analysis of empirical evidence done by Gerhart does not support the hypothesized strong role of national culture as a constraint on organizational culture. In his opinion, organizations may have more discretion in choosing whether to localize or standardize organizational culture and related management practices (influencing innovation) than is suggested by conventional wisdom.

In this article, the main assumption is that national culture affects the National Innovation System and organizational culture in enterprises, which have strong impact on innovation results of the nations (Figure 1).

1. G. Hofstede states that because organizational cultures are rooted in practices, they are to some extent manageable; whereas national cultures, rooted in values, are given facts for organization management, source: http://www.geerthofstede.com/culture, 15.05.2015

Figure 1. The relationship between national culture, organizational culture and innovation results



Source: own work.

Shane (1992), investigating the impact of Hofstede's (1980) cultural dimensions on nations' tendency to innovate, concluded that nations which are already innovative will continue to be innovative because of the national culture's impact. The current paper aims to examine whether in the age of globalization, cultural aspects can still predict a country's level of innovation.

National culture and its dimensions

National culture can be defined as the values, beliefs and assumptions learned in early childhood that distinguish one group of people from another (Beck, Moore, 1985). National culture is embedded deeply in everyday life and is relatively impervious to change (Newman and Nollen, 1996). Similarities in national cultures are derived from common language, histo-

ry, religion (Jones and Davis, 2000). The work of Hofstede (1980) has been the basis for much of the research on most management aspects of national culture. Many other researchers built on his original work. According to Hofstede, culture may be defined as "the interactive aggregate of common characteristics that influences a group's response to its environment." Culture is also the "collective programming of the mind which distinguishes the members of one group from another".

Values, behaviors, and efficacy differ across national cultures. Differences in national cultures call for differences in management practices. There is no one best way to manage a business (Newman and Nollen, 1996). Newman and Nollen (1996) found that work unit financial performance is higher when management practices in the work unit are congruent with the national culture. That is why multinational enterprises need to adapt their management practices to the national cultures in which they operate in order to achieve high business performance.

The best known and probably the most comprehensive study on national culture is the work done by Hofstede (1980). In this study the author initially identified four dimensions of culture: power distance, individualism versus collectivism, masculinity and uncertainty avoidance. Three of the dimensions included in Hofstede's model: power distance, individualism/collectivism, tolerance for uncertainty, have a universal character, whether they concern individuals, organizational cultures or social cultures (Sułkowski, 2012, pp. 103-118). Three out of five dimensions proposed by Hofstede can become a basis for such a multidimensional model and typology (Sułkowski, 2013). Therefore I do not consider other dimensions of national culture identified by Hofstede. In this article I focus on three dimensions of national culture that were originally identified by Hofstede (1980) and further developed in the GLOBE study: collectivism/individualism, power distance, and uncertainty avoidance. These are the three dimensions that are most likely to influence innovation projects (Shane, 1994, Pandey & Sharma, 2009). Masculinity has not been found to influence innovation rates (Shane, 1994).

Power Distance

Power distance (PDI) is the acceptance of social stratification (Jones and Davis, 2000). This dimension expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally. It reflects the degree to which individuals in a society, or its organizations and institutions, accept an unequal distribution of power (http://geert-hofstede.com/national-culture.html; accessed 15.05.2015). The dimension of power distance reflects a universal feature of human nature that can be found in all communities in the form of the attitude towards power in a social structure (Sułkowski, 2013). People in societies exhibiting a large degree of power distance accept a hierarchical order in which everybody has a place and which needs no further justification. In societies with low power distance, people strive to equalize the distribution of power and demand justification for inequalities of power (http://geert-hofstede.com/national-culture.html; accessed 16.05.2015).

In high-PDI countries, organizational structure tends to be more centralized and rigid: decision-making information is the preserve of those in authority. The key concepts in such organizations are supervision and rules (Hofstede, 2001). Jones and Davis (2000) claim that characteristics of power distance affecting innovation include the presence and level of social or organizational hierarchy, centralized power, formal vertical communication flows, top down control, formal rules and procedures, and resistance to change. Innovative success will be supported by less formal hierarchy of authority and control, free exchange of information, low power structure, decentralization of knowledge and responsibility, whereas central power, top down control, excessive rules, rigid stratification will hamper innovation (Jones and Davis, 2000). High power distance countries accept a large degree of inequality in the power structure among individuals, more centralized decision making in an autocratic manner. Lower power distance countries have more decentralized decision making and share power more

equally among their members. Shane (1992) claimed, that in low-PDI countries new organizations tend to be smaller and more organic, with high information-processing capabilities and informal communication between superiors and subordinates. Such organizations are further characterized as power-decentralized, with control systems based mainly on trust (Efrat, 2014). High-PDI countries displayed lower per-capita returns on inventions. Chandler et al. (2000) found that employees who perceived the organization reward system as rewarding innovation tended to be more strongly committed to innovation. According to Ahmed [1998], certain cultural norms, such as trust and openness, awards and rewards, and autonomy and flexibility, facilitate an innovative climate in organizations. Hofstede (2001) has shown all these norms to be closely associated with low PDI. Shane ***et al.*** (1995) describe how PDI can impact one's perceptions and hence one's innovativeness. Because participation is not consistent with the national culture, employees in high power distance cultures are likely to view participative management with fear, distrust and even disrespect. Therefore managers who encourage participation in these countries are likely to be seen as weak and incompetent (Newman and Nollen, 1996).

Therefore I formulated the hypothesis ***H1: Low-PDI countries achieve better innovative results.***

Individualism versus collectivism

This dimension of culture describes "the relationship between the individual and the collectivity which prevails in a given society" (Hofstede, 1980). Members in individualistic societies are typically provided a great deal of freedom and autonomy. Collectivist societies are characterized by members identifying with the family, group, or organizations to which they belong, which in turn demands loyalty and emotional dependence. Already in the mid-twentieth century Barnett (1953) postulated a positive correlation

between the individualism of a society and its innovative potential. Characteristics of individualism versus collectivism that impact innovative capabilities include the concepts of freedom, autonomy, and independence (Newman and Nollen, 1996). Individualism (IDV) refers to the degree to which, for each individual in a given group, his or her interests prevail over the groups. In high-IDV countries each individual is expected to take care of himself or herself and his or her immediate family. Such societies emphasize individual initiative and achievements. High IDV countries have a strong entrepreneurial orientation which enables and motivates invention and innovation, both within and without formal organizational borders or existing networks (Hofstede, 2001). Eisenberg (1999) found that organizations in individualistic and collectivist cultures differ on effects of rewards on their innovation efforts. Individualistic societies value freedom more than collectivist societies and freedom is necessary for creativity (Herbig and Dunphy, 1998). Efrat (2014) emphasize that IDV and PDI share many similar characteristics in terms of facilitating innovation. Elements such as structural flexibility and employees freedom, which translate into autonomy, empowerment, freedom, trust, awards, rewards and decision making, are all determinants of innovation (Ahmed, 1998, Martins and Terblanche, 2003).

Therefore I formulated the hypothesis ***H2: High-IDV countries achieve better innovative results.***

Uncertainty Avoidance

The Uncertainty Avoidance (UAI) dimension expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. The fundamental issue here is how a society deals with the fact that the future can never be known. Weak UAI societies maintain a more relaxed attitude in which practice counts more than principles (http://geert-hofstede.com/national-culture.html; accessed 30.06.2015). This dimension of

culture reflects the desire to avoid risks associated with uncertainty by emphasizing technology, laws, rules and procedures, religion and other constructs that serve to dampen ambiguity (Hofstede, 1980). Strong uncertainty avoiding countries typically feel threatened by ambiguous situations, and design ways to reduce their stress and fear of the unknown (Jones and Davis, 2000). Countries which accept uncertainty reveal a higher level of tolerance for change and ambiguity. The risks associated with an uncertain future are often accepted. Countries with strong uncertainty avoidance can be more intolerant, active or even aggressive (Brown 2000, p. 190). Characteristics of uncertainty avoidance relating to innovation include conflict handling and attitude to formal rules consensus and competition. Characteristics associated with strong uncertainty avoidance, such as the need for consensus, formal rules and procedures, are believed to inhibit innovation and an acceptance of competition and colleague dissent relate positively to innovative capabilities (Jones and Davis, 2000). In high-UAI countries, organizational culture favors a highly formalized conception of management and a hierarchical organizational structure, both contributing to the feeling of a sense of order and control (Hofstede, 2001). The findings of Shane (1995) and Martins and Terblanche (2003) indicate a possible linkage between low UAI and innovation. However, studies on UAI are unambiguous because of ambivalent perception of technology (Shane, 1993, Nakata and Sivakumar, 1996).

In this paper the hypothesis ***H3: Low-UAI countries achieve better innovative results*** is taken.

Table 1 shows the evolution of research concerning linkages between national culture and innovation.

Table 1. Research concerning national culture and innovation

Barnett	1953	Cultural change and innovation
Wilkins, Ouchi	1983	The relationship between culture and organizational performance
Jaeger, Alfred M.	1986	National culture and organization development
Schneider, DeMeyer	1991	The impact of national culture on strategic issues
Shane	1993	National culture and national rates of innovation
Morris et al.	1994	Individualism versus collectivism and entrepreneurship
Shane	1995	Uncertainty avoidance and innovation championing roles
Shane et al.	1995	Cultural differences in innovation championing strategies
Nakata, Sivakumar,	1996	National culture and new product development
Newman and Nollen	1996	Management practices and national culture
Eisenberg	1999	Individualism - collectivism on creativity and innovation
Steensma et. al.	2000	The influence of national culture on the formation of technology alliances
Jones and Davis	2000	National culture and locating global R&D operations
Yaveroglu, & Donthu	2002	Cultural influences on the diffusion of new products
Yeniyurt & Townsend	2003	Cultural influences on the acceptance of new products in a country
Dwyer et al.	2005	The influence of national culture on cross-national product diffusion
Waarts, Everdingen,	2005	The influence of national culture on the adoption status of innovations
Gerhart	2009	The influence of national culture on organizational culture
Kreiser et al.	2010	The influence of national culture on risk-taking and proactiveness in SME's
Kalanit Efrat	2014	The impact of national culture on innovation

Source: own work.

The Rate of Innovation in European Countries

The Innovation Union Scoreboard uses the most recent statistics from Eurostat and other internationally recognized sources such as the OECD and the United Nations. Average innovation performance is measured by summarizing performance over equally-weighted 25 indicators in one composite indicator: the Summary Innovation Index. The main drivers of innovation performance external to the firm cover three innovation dimensions: Human resources, Open, excellent and attractive research systems and Finance and support. Firm activities capture the innovation efforts at the level of the firm, grouped in three innovation dimensions: Firm investments, Linkages & entrepreneurship and Intellectual assets. Outputs cover the effects of firms' innovation activities in two innovation dimensions: Innovators and Economic effects. Summary Innovation Index reflects both National Innovation System and innovative results of the countries. Summary Innovation Index was used because it is a very good comprehensive measure although the data refer only to European countries.

The Member States are classified into four performance groups based on their average innovation performance. Based on the average innovation performance, the Member States fall into four different performance groups:

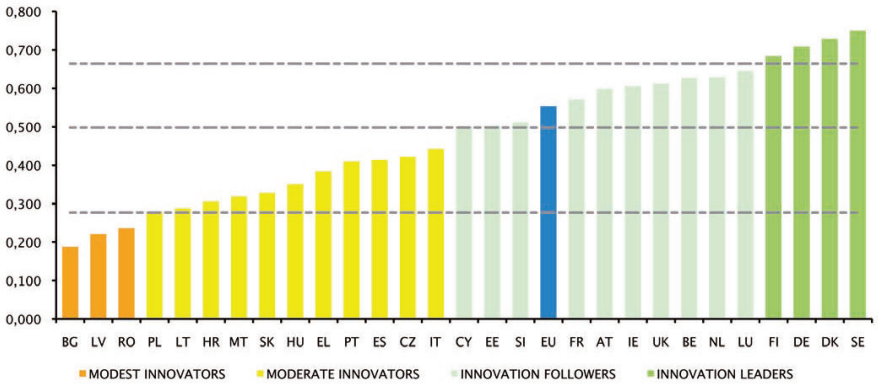
- Innovation Leaders: Denmark (DK), Finland (FI), Germany (DE) and Sweden (SE) are with innovation performance well above that of the EU average.
- Innovation followers: Austria (AT), Belgium (BE), Cyprus (CY), Estonia (EE), France (FR), Ireland (IE), Luxembourg (LU), Netherlands (NL), Slovenia (SI) and the United Kingdom (UK) are with innovation performance above or close to that of the EU average.
- Moderate innovators: Croatia (HR), Czech Republic (CZ), Greece (EL), Hungary (HU), Italy (IT), Lithuania (LT), Malta (MT), Poland (PL), Portugal (PT), Slovakia (SK) and Spain (ES) is below that of the EU average.
- Modest innovators: Bulgaria (BG), Latvia (LV) and Romania (RO) are with innovation performance well below that of the EU average (http://

ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014_en.pdf; accessed 05.06.2015).

The most innovative countries perform best on all dimensions: from research and innovation inputs, through business innovation activities up to innovation outputs and economic effects, which reflects a balanced national research and innovation system. The differences in performance across all Member States are smallest in Human resources, where the best performing country - Sweden is performing more than three times as well as the least performing country Malta. However, particularly large differences are in the international competitiveness of the science base (Open, excellent and attractive research systems), and business innovation cooperation as measured by Linkages & entrepreneurship. In both dimensions the best performing country (Denmark) is performing more than nine and seven times better than the least performing countries, Latvia and Romania respectively (http://ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014_en.pdf; accessed 06.06.2015).

When looking at the performance of innovation systems in a global context, South Korea, the US and Japan have a performance lead over the EU. The Unites States and South Korea outperform the EU both by 17% and Japan by 13%. While the gap between the US and Japan is decreasing, it widens with South Korea. China's current innovation performance is at 44% of the EU level, and continues to reduce the gap by improving faster and at a higher rate than the EU.

Figure 2. Innovation performance in EU



Source: European Innovation Scoreboard, available on: http://ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014_en.pdf

Poland is performing below the average of the EU for most indicators (Table 2).

Table 2. Relative strengths and weaknesses of Poland

Relative weaknesses	Relative strengths
Non-EU doctorate students, PCT patent applications in societal challenges License and patent revenues from abroad.	Non-R&D innovation expenditures Youth with upper secondary level education
Strong declines in growth	**High growth**
Innovative SMEs collaborating with others New doctorate graduates SMEs innovating in-house Sales share of new innovations	Community designs Community trademarks R&D expenditures in the business sector

Source: own study based on Innovation Union Scoreboard

Methodical assumptions

The aim of the research was to ascertain whether national culture has an impact on the level of innovation. The first stage of the research was to analyze the relationship between three basic cultural dimensions of Hofstede: power distance (PDI), individualism (IDV), uncertainty avoidance (UAI) and the results on the Summary Innovation Index score in European countries. It was done by using Pearson correlation coefficient. Also to determine the magnitude of the relationship between a culture dimension (independent variable) and Summary Innovation Score (dependent variable) linear regression analysis was used, which was also presented graphically showing a linear trend. In order to access the combined impact of cultural dimensions (PDI, IDV, UAI) on Summary Innovation Index multiple regression analysis was used.

The second stage of the research was the analysis of the cultural dimensions' impact on innovation indicators in all countries. As innovation variables the following were taken into account: exports of high technology products, expenditures on research and development activities and the number of patents. Data on national innovative variables were retrieved form World Bank database. For the analysis the data from these countries in the world for which all data were available were classified, both on innovation as well as the cultural dimensions.

Results and discussion

The biggest differences, when analyzed three cultural dimensions in European countries, refer to the uncertainty avoidance dimension (UAI) and innovative components such as research systems, intellectual assets and linkages and entrepreneurship. Poland achieved the best results in the assessment of the following indicators: human resources, firms' investment, finance and support and economic effects (Table 3).

Table 3. Dimension of culture and innovation indicators – descriptive statistics

Dimension of culture/ innovation indicator	Poland	Average	Standard deviation
PDI	68	51,125	21,147
IDV	60	57,563	17,99
UAI	93	70,594	22,29
Human resources	0,567	0,568	0,171
Finance and support	0,418	0,492	0,204
Firm investments	0,343	0,377	0,193
Linkages & entrepreneurship	0,126	0,507	0,245
Intellectual assets	0,274	0,428	0,247
Innovators	0,127	0,490	0,220
Economic effects	0,305	0,490	0,220
Open, excellent and attractive research systems	0,128	0,458	0,284

Source: own compilation, based on Innovation Union Scoreboard and the Hofstede Centre

Pearson correlation between the variables was the strongest between power distance and the Summary Innovation Index (SII), the weakest in the case of individualism. A correlation coefficient above 0.5 indicates strong correlation between the two variables, which is statistically significant.

Table 4. Pearson correlation between culture dimensions and the Summary Innovation Index (SII)

	PDI	IDV	UAI
Summary Innovation Index (SII)	-0,648	0,531	-0,560
	p<0,000	p<,01	p<0,001

Source: own compilation

The high positive correlation (Pearson's correlation coefficient above 0.5) was found in the case of:

- individualism and open, excellent and efficient research systems;
- individualism and intellectual assets.

High statistically significant negative correlation (Pearson's correlation coefficient < - 0.5) was found in the case of:

- power distance (PDI) and elements: open, excellent and efficient research systems;intellectualassets;linkagesandentrepreneurship;financialsupport;
- dimension of uncertainty avoidance (UAI) and elements: open, excellent and efficient research systems; linkages and entrepreneurship; human resources; financial support.

The magnitude of the relationship between a set of independent variables and the dependent variable was determined using linear regression. A linear trend was predicted with one predictor variable.

Table 5. Regression analysis with one predictor

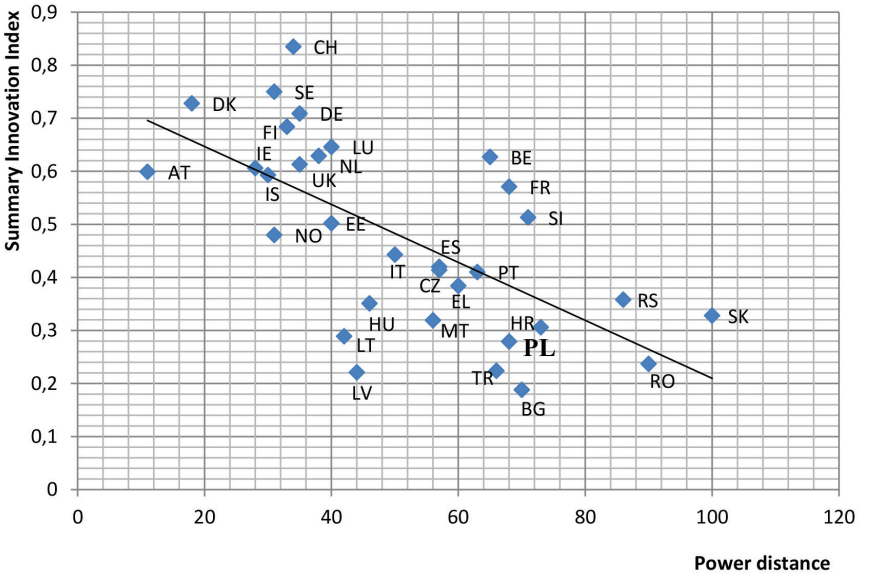
	PDI		IDV		UAI	
	R^2	standardized regression coefficients beta	R^2	standardized regression coefficients beta	R^2	standardized regression coefficients beta
Summary Innovation Index	0,420	-0,648	0,282	0,531	0,314	-0,560

p<0,01

Source: own compilation

Figure 3 graphically depicts the relationship between Summary Innovation Index score and power distance. Two groups of countries are visible. The first group of countries is in the upper left quadrant containing the most economically developed European countries. The second group of countries, which includes Poland, occupies the right lower quadrant of the graph. France, Belgium and Slovenia differ from these groups due to higher power distance in relation to the rate of innovation.

Figure 3. The relationship between the dimension of power distance PDI and Summary Innovation Index for European countries



Source: own compilation

Results on individualism IDV, and a Summary Innovation Index situate Poland very close to Lithuania, Malta, Slovakia, the Czech Republic, Spain and Latvia. Significantly higher levels of collectivism characterize southern European countries: Bulgaria, Turkey, Romania, Croatia, Serbia, Portugal, Greece and Slovenia. Above the regression curve in the upper right quadrant, are the most developed European countries.

The strongest uncertainty avoidance among the surveyed European countries is in Greece and Portugal, the weakest – in Denmark and Sweden. Poland, like Romania, Malta, Bulgaria, Turkey, Serbia, Hungary, Croatia, Greece, Portugal, Spain, Czech Republic, Italy, Lithuania, Latvia, is located on the lower right quadrant among countries with a relatively low rate of innovation index and strong uncertainty avoidance (Figure 5).

Figure 4. The relationship between the dimension of individualism/collectivism and Summary Innovation Index for European countries

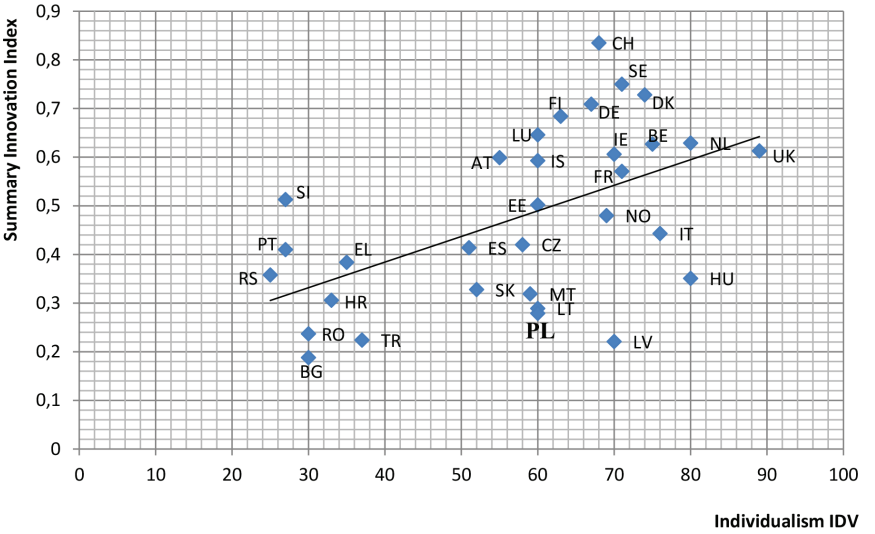


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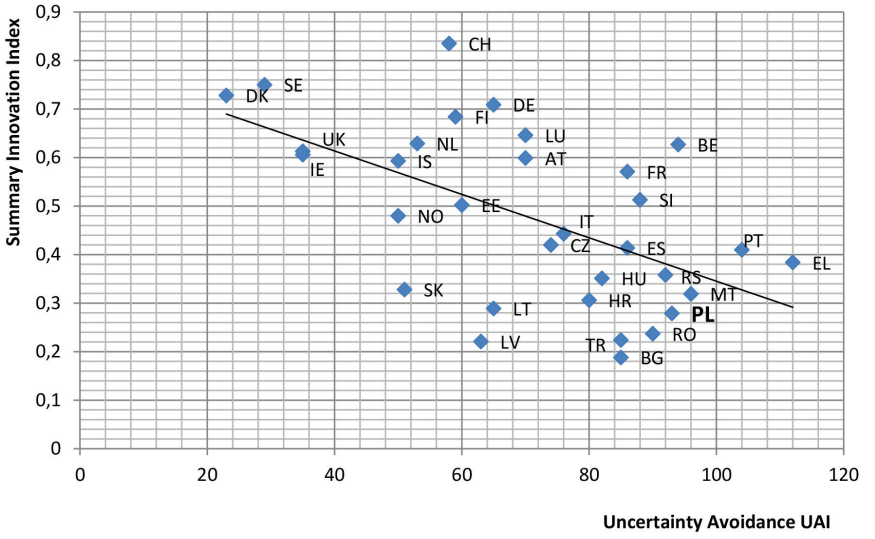
Figure 5. The relationship between the dimension of Uncertainty Avoidance and



Source: own compilation

In order to clarify the combined impact of cultural dimensions (PDI, IDV, UAI) on Summary Innovation Index multiple regression analysis was used. The model is statistically significant ($p < 0.001$), well suited to the data. Nearly 55% (R^2 0 =, 549) fluctuations in the innovation index is explained by examined cultural variables. Predictors do not correlate with each other so strongly that they could not be separated in order to determine the impact of predictors. Power distance and uncertainty avoidance have the greatest impact on the innovation index (standardized regression coefficients beta is showing the impact of predictors). However, p (indicating the statistical significance of predictors) is less than 0.05 only in PDI dimension. The Summary Innovation Index can therefore provide only a single predictor which is the power distance. In the case of individualism and uncertainty avoidance, anticipation may be subject to greater error.

Table 6. Beta coefficient and collinearity statistics in multiple regression

Culture dimension	Beta coefficient	Collinearity statistics	
		Tolerance	VIF
Power distance PDI	-0,435	0,524	1,907
Individualism IDV	0,195	0,540	1,851
Uncertainty avoidance UAI	-0,220	0,544	1,839

Source: own compilation

The impact of cultural dimensions on innovation indicators in all countries

To assess the impact of cultural dimensions on innovation as innovation variables the following were taken into account: exports of high technology products, expenditures on research and development activities and the number of patents. Data on national innovative variables were retrieved

form World Bank database. For the analysis data from these countries in the world for which all data were available were classified, both on innovation as well as the cultural dimensions.

Export of high-tech products is strongly negatively correlated with uncertainty avoidance for all countries (Table 7). Due to the strong collectivism and a large power distance in many fast-developing Asian countries there was no correlation between PDI, IDV and export of high-tech products. Such a correlation exists if we exclude Asian countries from the analysis. A similar correlation was observed for 'all countries' and excluding Asian countries in the case of UAI.

Power distance is strongly negatively correlated with expenditure on R&D, both for 'all countries' and excluding Asian countries. Negative correlation with the dimension of uncertainty avoidance is also visible.

The number of patents is strongly negatively correlated with power distance, but only if we do not take into account Asian countries. A strong positive correlation between patents also occurs in case of individualism, even without Asian countries. When we take into account strong cultural collectivism and a large number of patents in Asian countries, Pearson correlation coefficient tends to reverse the sign.

The smallest differences between the group defined as "all countries" and the group of countries without Asian countries are in the case of uncertainty avoidance dimension. This dimension is correlated negatively with all the indicators that affect innovation. The largest differences were observed in the correlation results between the number of patents and export of high-tech products and the dimension of individualism in the analyzed groups of countries as well as the results of the correlation between patents and distance power. Power distance is relatively high in Asian countries, while individualism is relatively low. Moreover, Far East Asian countries have the largest number of patents.

Table 7. The Pearson correlation coefficient between the cultural dimensions and innovation indicators

	dimension					
	PDI		IDV		UAI	
	All countries	Without Asian countries	All countries	Without Asian countries	All countries	Without Asian countries
Export of high technology products	-0,17	-0,48*	0,008	0,55**	-0,52**	-0,53*
R&D investments	-0,54**	-0,66**	0,18	0,36''	-0,31''	-0,51*
Patents	-0,06	-0,5*	-0,20	0,47*	-0,22	-0,42*

'' statistically significant at the significance level p =0,05
*statistically significant at the significance level p=0,01
**statistically significant at the significance level p=0,001

Therefore the hypothesis ***H1: Low-PDI countries achieve better innovative results*** can be confirmed for European countries and countries without Far East Asian ones. The second hypothesis ***H2: High-IDV countries achieve better innovative results*** cannot be confirmed for 'all countries' whereas in European and English-speaking countries, more individualistic countries are more innovative. The third hypothesis ***H3: Low-UAI countries achieve better innovative results*** can be considered true, however, there is a greater risk of error in explaining innovation through this dimension.

Conclusion

The present paper examines whether national culture influences innovation. The results confirm that cultural factors do play a major role, which largely verifies Shane's thesis [1993] showing the correlation of low power distance and strong individualism with innovation. However, this does not include Far East Asian countries, which appear culturally very different from

the rest of those analyzed. Countries of low power distance and low uncertainty avoidance are more innovative in most European cases. Impact of individualism versus collectivism is more debatable but generally, in Europe, better results are achieved in more individualistic countries. Therefore, PDI is not a strong indicator of innovation if we take into account Asian countries. Therefore, Shane's hypothesis does not apply to Far East countries.

The impact of cultural dimensions on the innovation index in European countries seems to be fairly clear. It appears that countries of lower power distance and uncertainty avoidance are more innovative in most cases. Impact of individualism/collectivism is more debatable. Highly individualistic countries are very innovative. Also, some countries (Hungary, Latvia, Lithuania, Poland), which received a relatively low innovation index (a ratio below 0.4) are characterized by fairly strong individualistic attitudes. This may be due to the proximity of highly individualistic countries and the adaptation of cultural patterns by these countries. There is probably the impact of a warmer climate on the values of collectivism in countries such as Serbia, Portugal, Bulgaria, Romania, Slovenia, Greece, and Croatia.

These findings are of high practical relevance due to increasing globalization. Firms should consider national culture when establishing innovation units and organizing their management. Particularly care should be taken in assessing the cultural values and management practices in Asian countries because of their great cultural differences.

It is possible that the cultural characteristics of highly innovative European countries will predict the path of cultural changes in Poland in the future. There is a need in Poland to give more distribution of power to reduce power distance and to accept tolerance for change and ambiguity to reduce uncertainty avoidance.

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