CULTURES AS DETERMINANTS OF INNOVATION - AN EVIDENCE FROM EUROPEAN CONTEXT

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Abstract

Cultural studies have played a major role for a better understanding of innovation. In particular, cultural variables have always been integrated in innovation studies at different levels. Referring to Hofstede´s alytical framework, we thereby analyze how different cultural factors may concretely impact innovation at national levels. Data of Hofstede´s cultural dimension and innovation are derived from secondary data sources. 34 European countries with comprehensive scores of cultural dimensions and innovation indexes are finally applied in this study. The data are analysed through correlation test and multiple regression analysis. The correlation test highlighted the importance of low power distance, individualism and low uncertainty avoidance, and the multiple regression analysis revealed the importance of power distance and long-term orientation that foster innovation in Europe. Finally, limitations of the proposed theoretical architecture are discussed and potential consequences for further research are formulated.

Keywords: Culture, Innovation, Hofstede´s theory

1. INTRODUCTION

Innovation is a crucial factor in contemporary societies (Abernathy and Clark 1985, Hennessey and Amabile 2010, Glaveanu 2011). In general, innovation implies the improvement of existing products or services, or an introduction of something novel to industries and markets (Hochgerner 2009). The significance of innovation has been manifested through different angles. Innovation is a key factor for business success. According to McKinsey (2010), 84 percent of entrepreneurs indicated the importance of

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innovation for business long-term growth. Correspondingly, the study of innovation receives increasing attention in academia (Henderson and Clark 1990, O'Sullivan and Dooley 2009, Narayanan and O'Connor 2010). In general, system innovation and technical innovation bring forward economic growth and social welfare. Content wise, with a growing awareness that economic growth should not be achieved at the expense of the natural environment, sustainability becomes an essential factor for the reorientation of technology and innovation (Nidumolu 2009, Capozucca and Sarni 2012).

From a broader economic perspective, however, the analysis of innovation should not become an isolated intellectual operation. Rather, innovation is noteworthy precisely because it is embedded in a respective culture (Hochgerner 2009). Culture can foster an innovative spirit, shapes the scale of innovative development and influences the direction of innovation. In other words, culture has a deep impact on the innovation capacity of a particular society (Herbig and Dunphy 1998). Therefore, the process and capacity of innovation at a national level is deeply embedded in a context of socio-culture and politics (Furman, Porter et al. 2002, Mytelka and Smith 2002) . As a result, adiscussion of innovation should be contextual and localized. For that purpose, we apply Hofstede's cultural study to investigate the relationship between culture and innovation in the European context.

Obviously Hofstede's categories represent widely used (and often copied) indicators, and an exploration of them in relation to innovation in general; one additional advantage is also that Hofstede helps to introduce quantitative methods into innovation studies, which seems to be a necessary step to sharpen their analytical value. Therefore, our underlying research question is: "How do national cultural dimensions foster innovation"?

The paper is structured as follows: The second section discloses relevant studies of Hofstede's cultural dimensions and innovation. The third section introduces the conceptual model and the research methodology. The fourth section presents research findings. Then, research results are discussed, followed by conclusions and limitations.

2. LITERATURE REVIEW

From a social science perspective, Kluckhohn (1951) defined culture as shared values, norms, and expected behaviours. Society, groups or communities are influenced by a particular pattern of behaviour, and each actor adopts this pattern in an accepted way in order to solve certain problems. Hofstede (1991) pointed out that the members of a particular group, category or community can be distinguished from one another by culture. In addition, Hofstede (2001) highlights the importance of culture at a national level. A national culture contains particular beliefs and values that can differentiate one nationality from other nationalities. These beliefs and values are relatively stable and unique for each nationality. Therefore, national culture is a critical, important and accurate factor. Our research studies the phenomenon of innovation in the context of European culture. The European context is chosen here because it hosts a wide variety of cultures over a relatively limited space. In this study, culture is the independent variable. For that purpose, the five cultural dimensions defined by Hofstede, Hofstede et al. (2010) are applied. Brief illustrations of the five dimensions are as follows:

1) Power distance (PDI): This dimension expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally. The power distance index presents how a society handles inequalities among people. In societies with a high power distance, a hierarchical order is acceptable whilst in societies with a low power distance, people strive to equalize the distribution of power and demand justification for inequalities of power.
2) Uncertainty avoidance (UAI): The uncertainty avoidance dimension presents the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity. It presents how a society deals with the fact that the future can never be known, raising the questions: Should we try to control the future or just let it happen?
3) Individualism/Collectivism (IDV/COL): It is the degree to which individuals are integrated into groups. Individualism means that everyone is expected to look after herself/himself, whilst collectivism means that people are integrated into strong and longer lasting groups that protect them in exchange for unquestioning loyalty.
4) Masculinity / Femininity (MAS/FEM): It is the distribution of emotional roles between the genders. Masculine cultures are more assertive and value achievement and materialism. Feminine culture means that the values of human relationships and concern for others are high. Assertiveness, performance, success, and competition are key factors in a masculine culture; quality of life, service, and care for the weak are the hallmarks of a feminine culture.
5) Long-term / Short-term orientation (LTO/STO): Long-term oriented society fosters pragmatic virtues oriented towards future rewards, in particular saving, persistence and adapting to changing circumstances. A short-term oriented society fosters virtues related to the past and present such as national pride, respect for tradition, the preservation of "face", and fulfilling social obligations.

Recently, some scholars (Smith, Dugan et al. 1996, McSweeney 2000, Shenkar 2001) criticized Hofstede's approach of cultural categorization. They argue that the data of the study have not been updated and there is a lack of generalisability (Ng, Lee et al. 2007). In addition, alternative frameworks have been developed such as the World Value Survey (Inglehart and Baker 2000) or the study of Schwartz (Schwartz 1992, 2006), which seems to provide more consistent results in the context of foreign trade and product preferences. However, the researchers nevertheless stick to Hofstede's original approach, which has already been more widely applied in a broad array of studies. Furthermore, the researchers argue that in the context of Hofstede's study the interest lies more in an analysis of the institutional base of rather than in the interrelationship between/among parties or trends at individual value level (Schwartz, 2006).

In the literature, culture is already perceived as a key factor that fosters innovation (Ulijin and Weggeman 2001, Kaasa 2013). With globalization, cultural diversity is increasing rapidly. Hence, some scholars doubt that Hofstede's cultural dimensions – already developed some 20 years ago - are still useful and valid for this new context. However, more than 1,500 researchers have already cited or applied Hofstede's categories in different fields

(Hofstede 2001, Bagchi, Cerveny et al. 2003), and Hofstede's studies have provided a "theoretical framework" for these researches (S□ndergaard 1994). Moreover, especially in the field of innovation many previous studies have proved the validity and significance of Hofstede's framework (shown in Table 1)

Even if the studies collected in Table 1 already examined the relationship between culture and innovation, most of the researchers did not provide a detailed analysis of the underlying practices and organizational routines of their results. If an empirical analysis provides evidence about the correlation between cultural variables and innovation, there have to be operational routines and social practices, which are related with these quantitative measurable relationships. However, it is not the abstract individual actor in his/ her interaction with other individual actors that brings about these routines and practices. Rather, innovation takes place in a certain structural and organizational environment. For example, in order to explain the empirically measurable differences in innovativeness between a high PDI/ low LTO and a low PDI/ high LTO cultural context, one has to formulate assumptions about corresponding differences in the operational procedures within the

Table 1. Correlations of cultural dimensions with innovation

Authors	Correlation with Innovation
Barnett (1953)	IDV+
Hofstede (1980), Hofstede and Bond (1984)	PDI-, IDV+, UAI-
Shane (1992), Shane (1993)	PDI-, IDV+, UAI-
Herbig and Dunphy (1998)	PDI-, IDV+,
Williams and McGuire (2005)	PDI-, IDV+, UAI-
Waarts and van Everdingen (2005)	UAI-
Williams (2007)	PDI-, IDV+, MAS+, UAI-, LTO+
Kaasa and Vadi (2008)	PDI-, MAS-, UAI-
Vecchi and Brennan (2009)	PDI+, IDV-
Kaasa (2013)	PDI-, IDV+, MAS-, UAI- (R&D Expenditures)
	PDI-, IDV+, MAS-, UAI- (Innovation)
	PDI-, IDV+, MAS-, UAI- (Patent Application)

Source: based on Laznjak (2011), Herbig and Dunphy (1998)

respective structural and organizational environments. In order to provide these explications in a methodically controlled and coherent way, theoretical assumptions are needed concerning the relevant socio-economic context of innovation.

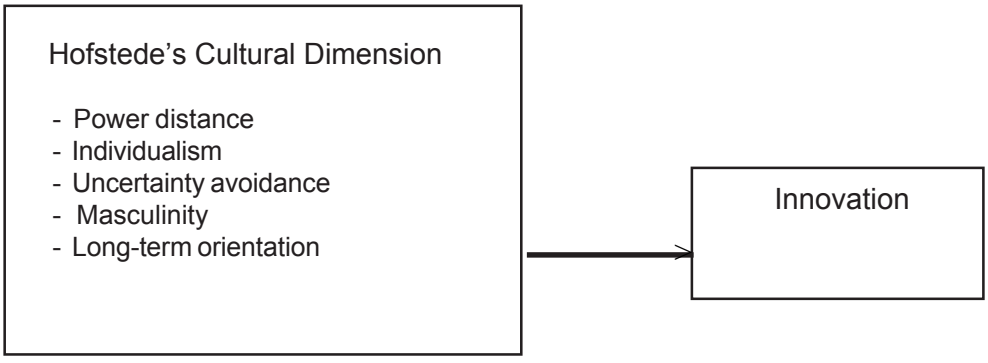
3. MATERIAL AND METHODS

For the execution of the methodical program as described above, our study refers to secondary data on cultural dimensions and innovation. Among 50 European countries and regions, there are 34 countries with completion of the Hofstede's cultural dimension index. As a result, we study the relationships between the 34 European countries' cultural dimensions and their innovation performances as reflected in statistics on the innovation index. The data about five cultural dimensions were chosen based on Hofstede (2010), and data of the innovation index stem from the Global Innovation Index (GII 2014). The data are analysed at the aggregate level, and 34 European countries are treated as an entirety. By doing so, we believed that the aggregated results would reflect a macro phenomenon of how cultural priorities foster innovation performance.

Inferential analysis is also applied to test the association between culture and innovation in European cultural contexts (shown in Figure 1), which is treated as a basis of the analysis of the research question in this study. For that reason, a correlation test is applied to describe the correlation between a cultural dimension and the impacted innovation indicators, and a multiple regression analysis is employed to find out which cultural dimension could be identified as an important correlating factor with innovation indicators.

4. RESULTS

As expected based on previous studies, a country's innovation performance is strongly related to low power distance, high individualism and low uncertainty avoidance. These findings mostly reflect how important freedom, open-mindedness and independence are for a stimulation of innovation in society. Again, this finding is in line with the previous studies such as Shane (1993), Williams and McGuire (2005). The results are shown in Table 2.



Source: developed by researchers (2015)

Figure 1. Conceptual framework

Table 2: Bivariate correlations (Pearson's *r*) between EU countries' innovation performance and Hofstede's cultural dimensions, N = 27

	Innovation
Power Distance	-.772***
Individualism	.644***
Masculinity	-.069
Uncertainty Avoidance	-.577***
Long-term Orientation	.055

*Note: ***correlations are statistically significant, p < .01.*

A backward method was applied in the regression analysis in this study in order to eliminate statistically insignificant variable(s). The results are shown in Table 3 below. Overall, the p-value of F-statistic of innovation was significant at the level of 0.05. Hence, the researchers determine that predictors of cultural dimensions were related to innovation. Power distance and long-term orientation are the two significant factors influencing innovation, which is in line with previous studies such as Steenkamp, ter Hofstede et al. (1999) and Png, Tan et al (2001).

Table 3. Multiple Regression Analysis (backward)

Cultural dimension	Innovation
PDI	-.332**
IDV	.406
MAS	.632
UAI	.196
LTO	.128*
F-Statistic	14.572**
Adjusted-R square	.541

*Note: ** significant at 0.05 level; * significant at 0.10 level*

5. DISCUSSION

Based on our conceptual integration of Hofstede's cultural variables as a factor within the innovation context (shown in Figure 1) on the one hand and the empirical results of the correlation and regression analysis on the other (shown in Table 2 and Table 3), we can now discuss the following results.

In general, the development of new technology and novelty requires tolerance, patience and freedom of thoughts. Societies with a low power distance have a greater tendency to innovate (Hofstede 2001) due to decentralization. In societies with low power distance, creative activity is encouraged as people feel equal, involved and free to talk and to think. The free flow of information or ideas is not hindered by many obstacles. On the contrary, in societies with a high power distance, centralization dominates the management, which hinders the innovativeness and technological development. As low power distance is a more prevailing cultural priority, a horizontal interaction typically will be more suitable for the emergence of an innovation culture. People tend to be more proactive to contribute their opinions and ideas, and they are motivated to keep on doing so. A creative cultural environment will finally foster innovation.

In addition, in societies where individualism is prevailing, people have more freedom and independence to develop new technology or propose innovative ideas than employees of organizations in collectivistic countries (Lynn and Gelb 1996, Van Everdingen and Waarts 2003, Waarts and van Everdingen 2005). This corresponds with the fact that patents are more often granted to researchers in individualistic than in collectivistic countries (Waarts and van Everdingen 2005).

Individualistic societies tend to be more inventive in their products and processes (Shane 1992) since personal achievement and meritocratic orientation are main characteristics of an individualistic society, which eventually stimulates innovation to a great extent.

Besides, lower uncertainty avoidance indicated that users in society are open to the new and unknown, accept changes and persist in repetitive and long-work processes. Furthermore, a society presenting long-term orientation manifests a vision of long-run development. Referring to innovation, longer time horizons are necessary (Nakata and Sivakumar 1996, Ulijin and Weggeman 2001, Fayolle and Kyrö 2008), because successful innovation usually takes a longer time to develop, to absorb in the market and to yield (Rosenberg 1996).

Specifically, low power distance and long-term orientation have a great impact on policy making, market and user, technological development and industry, which are essential to innovation when innovative ideas come into being.

- *Policy*: In the context of an institutional environment of low PDI, citizens expect that the power used by authorities (e.g. government) should follow criteria of good governance, meaning that the authorities should focus on the creation of social benefits (Hofstede, Hofstede et al. 2010). Citizens believe that they have the right and freedom to raise their voices publicly (Hofstede 1991). For example, a fierce debate over the effects of commercializing genetically modified plants (e.g. soy, maize, cotton, and rapeseed) has received great attention, which was one of the reasons why the European Union then stopped approving new genetically modified crops in 1998.

- *Market and user*: Consumers are free to establish their networks or innovation communities based on similar consumption patterns, preferences and interests. Within the communities, members exchange information of new technology and discuss innovative ideas (Frank and Shah 2003, Tiety, Herstatt et al. 2005). The firms normally cannot ignore these consumer communities, because through this horizontal interaction structure, the firms interact frequently and in an open spirit with the innovative consumers and communities. Since innovative consumers and communities are perceived as niches, the firms believe that a better understanding and an appreciation of the niches will accelerate their effectiveness in developing, testing and diffusing innovations (von Hippel and von Krogh 2003).

- *Industry*: In the societies of low PDI and LTO, the industry tends to be more future-oriented (Hofstede, Hofstede et al. 2010). When a new technology is successfully introduced into the market, the industry needs to adjust itself (e.g. by improving its standards and procedures). In that sense, radical innovation does not mean that the industry necessarily needs to destroy the existing technological infrastructure; rather incumbents will react by protecting their markets and improving their standards accordingly.

Firms which are future-oriented seek a chance for alternatives in order to become pioneers of their industries. For example, Hewlett-Packard invented solders that are made from tin, silver and copper. This innovation represented an improvement of the solder production in the IT industry, because lead solders were toxic and thus a hazard to health and the environment. In addition, Hewlett-Packard developed chemical agents to cope with the issues of oxidization and

tarnishing during the soldering process by 2006 (Nidumolu 2009). The long-term orientation induced the HP Management to anticipate increasing environmental problems and corresponding stricter regulations. Therefore, the HP management had to be tolerant toward risky investment in the new technology as they accepted a certain degree of uncertainty because low market demand and/or technical performance sometimes accompany an early innovation.

Also, within firms that advocate openness and equality, employees are respected and encouraged to innovate, and thus creativity emerges. Within a decentralized organization, innovative employees have a channel to deliver ideas. For example, the employees at an assembly line observe problems and feel comfortable to come up with different solutions. They may propose new ideas to partially replace the existing production system. At this point, they are "encouraged" to be free to deviate from the rules / systems prevailing in the regime.

- *Technological development:* Those firms that focus on research–driven innovation not only invest in research but also create a sustainable environment in the working place (Nidumolu 2009). In an environment where low PDI and LTO hold dominating positions, free thought, tolerance, and persistence are vital to the success of research-drivien innovation when the freedom of thought collisions is granted.

6. CONCLUSION TOWARDS LIMITATIONS AND IMPLICATIONS

6.1. Limitations

The main purpose of this study is to understand the effect of Hofstede's dimensions of national culture to innovation. It contributes to a general understanding of the role of national culture in innovation transition. However, some limitations should not be neglected:

First, as the study did not include all six of Hofstede's dimensions but only limits itself to five, the research findings lack a comprehensive representation of the cultural phenomenon in the context of innovation. Second, the effects of national culture and organizational culture on innovation should be differentiated, because regional or even organizational culture may lead to a stronger impact on innovation than national culture (Nakata and Sivakumar 1996). Hofstede's cultural study (Hofstede 1980) was conducted at the organizational level, which investigated IBM employees. The study revealed a strong organizational culture rather than national culture. Consequently, the differentiation between national culture and organizational culture should be clear when analyzing the role of culture in innovation.

6.2. Implications

In response to the above-mentioned limitations, researchers provide some implications for further study.

First, clear and appropriate measurements should be applied to evaluate the effectiveness of cultural dimensions in innovation. In this context, conducting surveys with Liker scales may allow us to gain more updated and empirical data. Second, cultural studies should be carried out at micro level such as the organizational and the regional levels. As a result, we will be able to differentiate the effectiveness of the cultural dimension under different circumstances. Third, we may apply another cultural study such as Schwartz'

cultural study or global model, which might provide different scenarios, as another contribution to existing innovation studies. Fourth, a complementary qualitative analysis such as interviews (e.g. with users and entrepreneurs) would be useful for us to obtain reliable and updated data, meaning that face-to-face communication will produce more recent evidences- given the fact that Hofstede's original interviews already took place in the late 1980s.

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