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Cultural Dimensions Origins: Measures for Power Distance and Uncertainty Avoidance

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Abstract

This study seeks to develop a measure method of national culture based on cultural origins. Two cultural dimensions are studied; power distance (POWD) and uncertainty avoidance (UAV). Methodology used is SEM method under LISREL approach. Findings show that environmental factors are able to determine cultural dimensions studied in our sample countries. Nevertheless, we found that cultural dimensions indicators? have evolved and are no longer the same identified in prior researches suggesting that environment evolution? sleeds to the creation of new subsistence means and new cultural needs.

Index terms— power distance, uncertainty avoidance, MES method, environmental factors.

1 Introduction

ulture is widely perceived as the set of values and beliefs shared with in a same community. Existing literature distinguishes several levels of culture ; national culture, gender culture, generation culture, organizational culture, professional culture... Our study concentrates on national culture because it is programmed in individuals' minds since their birth's day and developed through their daily life. It is there fore the deepest level of mental programming **??**Hofstede, 1989). Existing literature documents a variety of determinants used to operationalize national culture in order to easily relate it to different social choices aspects. This is why several researches try to develop methods measuring national culture by giving it attributes or dimensions. In fact, culture has been measured through some proxies like nationality (Daniels and Radebaugh, 2001), language (Nair and Frank, 1980;Pinker, 1995 ; **??**otazzi and Peri, 2003) or religion (Griffin and Pustay, 2003). Some other researchers developed indices to measure cultural dimensions (Hofstede, 1980 ;Schwartz 1994).

Although existing studies give many models to measure national culture, their contributions were limited and criticized because they do not take into account the dynamic nature of culture. National culture in our sample countries is identified by using Hofstede's (1980) cultural Model. Indeed, Sondergaard (1994) and Schwartz and Sagiv (1995) argue that criticisms of Hofstede's (1980) works represent a minority in national culture study researches. Therefore, Hofstede's cultural dimensions can serve as a guide for several studies studying culture influences (Magnini, 2009).

Otherwise, Hofstede (1980) considers that cultural dimensions in a given country have their origins in economic and demographic conditions. Hence, environment and society nature is a resultant of human behavior that follows a dynamic of that environment in order to achieve goals and meet specific needs **??**Bennet, 2005). Consequently, Steward (1955) concludes that cultural diversity is a result of "ecological" diversity, which justifies the fact that different cultures employ different technologies and subsistence practices.

The main purpose of this paper is to develop a measure to two of Hofstede cultural dimensions namely power distance (POWD), uncertainty avoidance (UAV) through ecological indicators. Cultural ecology theory initiated by Steward (1955) and developed by a number of researchers (Bennett, 2005 ;Zimmerer, 2007...) considers a dynamic relationship between individual and his environment. Then, by reference to cultural ecology theory, we measure our sample countries cultural dimensions through their economic and demographic characteristics under structural equations model (SEM).

Studying cultural dimensions determinants is interesting because it has been hypothesized that human behavior is widely influenced by beliefs. In fact, sociological model of human behavior (Jensen and Meckling, 1994)considers that individual's behavior and decision-making are conditioned by their values and beliefs, which are taught by cultural influences of the society in which he has evolved.

This study gives contributions to the existing literature as follows. First, it represents an extension to studies considering cultural relativism to understand human beliefs and behaviors in their contexts. Second, our study proposes a framework in order to measure national culture that can be employed in future researches studying national culture influences. Finally, the framework proposed and based on SEM method includes quantitative measures to cultural dimensions suggesting a more objective and actualized findings.

The remainder of the paper is structured as follows. In the next section we review relevant literature and we develop research hypotheses. In the third section, we describe research methodology and data measurement. Empirical results and their discussions are reported in section 4. The final section provides conclusion of the paper.

2 C

II.

3 Literature Review and Hypotheses Development a) National culture origins: The cultural ecology theory

Cultural ecology theory refers to the ways in which a given society interacts with its environment. The theoretical framework of this relationship has been defended by several researchers in cultural anthropology and human geography such as Steward (1955), Lévis-Strauss (1962), Bennett (2005) and Zimmerer (2007). Thus, Two main approaches have been used to explain the relationship between society and environment; The deterministic or static view which considers society as a component shaped and driven by environmental factors (Davidson-Hunt and Berkes, 2003), and the possibilistic view that considers culture to be from the environment to cause or create a cultural style based on that environment **??**Bennet, 2005).

The concept of cultural ecology (Steward, 1955) means studying the ways in which culture is used by individuals to adapt to their environments (Sutton and Anderson, 2004). This discipline seeks to understand cultural responses that result from individual's adaptation to changing environmental conditions (Steward, 1955). It is therefore about comparing subsistence patterns related to environmental processes and their role in changing culture. Steward (1955) shows a multilinear evolution which envisages the recurring regularity of forms and functions in different cultural areas but which come under comparable ecological conditions. The author suggests therefore the hypothesis of "cultural core" which is defined as the set of cultural characteristics that are able to link people more directly to their environments and which are necessary for their livelihood and their basic economic activities. These cultural characteristics include technologies and tools that are determined by environmental conditions and are developed to adapt to the ecological conditions and to exploit the surrounding environment. Steward concludes that cultural diversity is due to ecological diversity, which justifies the fact that different cultures employ different technologies and livelihood practices. He also demonstrates that societies sharing the same cultural core may be very different from each other due to the secondary cultural traits that stem from the cultural core and are caused by historical factors. The cultural ecology theory was later developed to lead to the ecological anthropology approach that places the human being as a culturally driven actor within ecosystems (Vayda and **??**cCay, 1975, Davidson-Hunt andBerkes, 2003). This approach considers that people interact with their environment affected by rituals, social institutions, communities and economies and will affect them in return.

Later, adaptive dynamics extended the field of cultural ecology research by including system and feedback concepts **??**Bennet, 2005). This vision follows a microsocial perspective focused on the individual's role. It assumes that the balance is not due to the automatic and unconscious process of social or cultural processes, but rather to individuals' choices and decisions. Therefore, the nature of society and the environment is a consequence of human behavior that follows a dynamic of that environment and aims to achieve goals and meet specific needs. Based on these theoretical frameworks, we expect that: H0: There is a significant relationship between cultural dimensions and environmental factors.

Applied to our study, the cultural ecology theory supposes to decode cultural dimensions through the environmental factors of a given country. Indeed, Hofstede (1980) considers that ecological factors are a consequence of the human nature and forces, and are at the origin of societal norms which determine the institution's structure and functions (see figure **??**).

4 Consequences :

Institution fonctions and structure b) POWD determinants POWD means the extent to which subordinates accept that power in institutions to beunequally distributed. It is measured by the subordinate's perception of the chief's power. Hofstede (1980) emphasizes the historical heritage notion of culture. He linked POWD to several characteristics such as the country geographical position, the population size, inequality in the sharing

wealth and the weight of history. In the same way, the author establishes that the social organization is likely to guide the culture of a given country. That is why Hofstede (1980) states that POWD can be determined by the country's wealth. The author concludes that the wealthier the country, the lower the POWD. In addition, Hofstede (1980) links POWD degree of a given country to its population size. He argues that the larger the size of the population, the higher the degree of POWD. Indeed, the author argues that people in populous countries accept less accessible political power more than that in less populated countries. Hence the following hypothesis:

5 H1: POWD is negatively related to country wealth and positively related to population size. c) UAV determinants

UAV means extent to which individuals feel threatened by uncertainty and unstructured situations. It deals with the way that society approach risk. UAV is expressed by need for formalities, predictability and security measures.Therefore, Hofstede (1980) considers three components of UAV degree: the need for rules, the desired stability of employment and stress in everyday life. Hofstede (1994) argues that technology, education, laws and rules help to mitigate uncertainties caused by nature. Thus, he considers that UAV can be identified by the extent of adoption of new technologies.Indeed, the greater the degree of UAV, the more the society adopts new technologies to overcome uncertainties. Hofstede (1980) also links UAV to attention attributed to education. He argues that the greater the degree of UAV, the more the society is interested to education. In addition, Noravesh and al. (2007) link security measures to economic stability. They argue that countries characterized by a high UAV do not have economic stability and do not prefer investment in financial markets. Hence the following hypothesis: H2: UAV is positively related to new technologies adoption degree and attention given to education and, UAV is negatively related to investment in financial markets and economic stability degree.

6 III. Research Methodology and Data Measurement a) Data measurement

For Hofstede (1980), the wealth of a given country can be identified through a more modern technology, a less traditional agriculture, a development of urbanism, a better education system that favors an increase of the middle class. Development in technology is linked to those of information and communication. Hence, these can reflect the extent of modernization of technology in a given country. The number of Internet users, the number of fixed broadband Internet subscriptions per 100 people and the number of mobile subscriptions per 100 people are used to measure the degree of adoption of new technologies. Moreover, Sudarwan and Fogarty (1996) argue that the transition from technology to industry was a necessity for countries seeking to gain more wealth. Hence, the contribution of the agriculture sector to the wealth of the countries in our sample is measured by the value added of the agriculture sector in relation to GDP. The degree of urbanization and interest attributed to education are measured respectively by the urbanization rate, the gross enrollment rate and the average duration of schooling. The population size is measured by the logarithm of the total number of inhabitants of our sample countries.

The level of economic stability can be determined through the exchange rate and GDP fluctuation. Noravesh and al. (2007) also argue that the importance of equity portfolio investment can reflect the extent of the interest allocated to investment in financial markets.

We summarize these indicators as well as the means of their measurements as following:

7 INVEST

Volume of investment in stock market -

The study measurment model is the following : Vi = ?i * Fa + ?i Where; Vi= obvious variables i whichare ecological determinants; Fa= latent variables a which are cutural dimensions; ? i = factor contributions of manifestvariables in the determination of latent variablesand ? i = Measurement error of i. Conceptual framework is represented as following: The study aims to construct a conceptual model for identifying cultural dimensions based on cultural ecology theory. This objective has been achieved by using SEM method under LISREL (Linear Structural Relationship) approach. This methodology was preferred to others because in the first hand, cultural dimensions have an unobservable character. In the second hand, these dimensions have been measured approximately by observable variables. Obviously, these constructs measure may contain measurement errors. That is why, it is more appropriate to use a method taking these measurement errors into account. Finally LISREL approach is chosen because it reduces the arbitrariness of selecting items determining latent variables. Moreover, it provides confirmatory factor analysis aiming to test the theoretical constructs validity.

Our study has been conducted on a sample of socioeconomically different backgrounds (France, Canada and Tunisia) over the period going from 2003 to 2009.

Using LISREL approach requires the reliability and the validity of the structural equations model (Churchill, 1979). These tests are conducted through principal component analysis (PCA) and confirmatory factor analysis (CFA) also called principal axis factoring. PCA and CFA methods aim to identify structure within a set of items which are difficult to interpret by finding interrelations between them in order to find a smaller number of unifying factors. PCA is a part of multivariate descriptive analyzes and aims to reduce information while minimizing losses. It consists of the transition from a large number to a smaller number of items measuring the

same phenomenon and, consequently, to condensing the information related to a construct that these items aim to define. CFA supports the PCA in order to validate its analysis. Validity means that a given measure is able to describe studied phenomenon (Hair et al., 1998). CFA is conducted to confirm the psychometric quality of the PCA findings **??**Evrard et al., 2003). The confirmatory phase is therefore aiming at testing the assessments of fit of the global model and the constructs' content validity. In the confirmatory analysis, the measurement scales are known a priori. In addition, this analysis takes into account measurement errors. The model takes the following form: Data = Model + measurement error. Hence, the smaller the measurement error, the more the model adjusts to the data. The meaning of PCA and CFA analysis depends on the meeting of some requirements which we are going to examine by several tests.

8 IV.

9 Results and Discussion

a) The PCA results PCA phase consists in analyzing dimensionality, reliability and internal consistency of measuring instruments. PCA results for POWD are reported in table 2. This table shows that the data relating to the measurement of this dimension are factorizable. Indeed, as shown in table 2, most of the inter-item correlations of the dimension POWD are greater than 0.5. In addition, this table shows a KMO index of 0.590 with significant Bartlett sphericity. In addition, the community indices found vary from 0.602 for the GSM item to 0.984 for the POPU item. These findings show the importance of the inclusion of these variables in POWD dimension's determination. The Cronbach's alpha of POWD dimension is 0.819, which gives information on the internal consistency of measurement scale and proves that the data retained reflect the studied phenomenon. Table **??** provides correlations between items determining UAV dimension. These correlation coefficients vary between 0.007 and 0.935. This table also shows KMO indices of 0.511 and a significant Bartlett sphericity, which shows that the data relating to the determination of UAV dimension are factorizable. The table also shows the community indices relating to the determination of UAV dimension. These indices provide information on the representation quality of the items. Indeed, these are all greater than 0.7 exception for GSM item. However, we decide to retain this indicator given the importance of its inclusion in our study. This will be taken into account when interpreting results. UAV dimension shows a Cronbach's alpha of 0.751, which gives information on the internal consistency of the items determining UAV dimension and proves that the data retained reflect the studied phenomenon.

10 Table 3: PCA for UAV scale b) Confirmatory factor analysis (CFA)

CFA is conducted to confirm the psychometric quality of PCA results. Our confirmatory phase is there fore aimed at testing the Goodness of fit of the global model and the validity of the constructs content. Validity means that a given measure is able to describe the studied phenomenon. CFA takes into account measurement errors.

11 i. Goodness of fit results

The model degree of fit s verified through absolute fit indexes, incremental fit indexes and parsimony fit indexes. Goodness of indexes of cultural model are summarized in Table 4. CFA results are adequate:

Chi-square/degree of freedom=2.49, GFI=0.99, RMSEA=0.05 and CFI=0.98. This means that unobservable variables are adequate to the theoretical model and assumes that POWD and UAV in the sample study can be measured through economic and demographic indicators. Hence, our H0 is confirmed.

12 Table 5: Constructs validity c) Hypothesis Tests

Table **??** shows that all unobservable variables significantly contribute to the determination of POWD dimension. The absolute values of these factor contributions vary between 0.0446 and 1.703 with significant absolute values of t Student's and measurement errors close to 0.

Findings show that country wealth positively influences the POWD degree. In fact, POWD is negatively related to AGRI (? = -0.0664, T = -51.962, ? = 0.00128) and positively related to URBA (? = 0.0498; = 48.215, ? = 0.00103), GSM (? = 0.0446, T = 12.180, ? = 0.00366), INTE (? = 0.181, T = 38.817, ? = 0.00468), BROAD (? = 0.145, T = 41.613, ? = 0.00349), SCHO (? = 1.703, T = 48.382, ? = 0.0352) and LITER (? = 0.127, T = 41.373, ? = 0.00306). This means that the wealthier the country, the greater the POWD. This canbe explained by the fact that wealth favors superiority behavior and thus, promotes power distance. Moreover, results show that POPU positively influences POWD degree (? = 0.224, T = 55.326, ? = 0.00405), which implies that the more the country is populated, the fewer individuals achieve power.

In addition, we found that the most influential factor in determining the POWD extent is the degree of attention attributed to education followed by the population size and the degree of technological development. Never the less, findings show a negligible effect of urbanization rate and the agriculture contribution to the wealth

of the sample countries. This maybe explained by the fact that these two indicators showed weak correlations with some items at the level of PCA.

13 Table 6: POWD indicators

Findings reveal significant factor contributions for all indicators of the UAV degree (contributions whose absolute values vary between 0.00519 and 0.420) with measurement errors significantly close to zero.

Obviously, we found that UAV is negatively related to the GSM (? = -0,113, T = -34,600, ? = 0,00434), BROAD (? = -0,0927, T = -52.969, ? = 0.00175) and INTE (?= -0.0936, T=-40.231, ?= 0.00233). This canbe explained by the fact that new technologies help to overcome uncertainty. In addition, results show that this cultural dimension is negatively related to LITER (? = -0.0166, T = -23.052, ? = 0.00072) to reducing the ambiguity and leads to UAV moderation in our sample countries. These last two results canbe explained by the cultural ecology theory under its adaptive dynamic perspective. Indeed, this theory indicates, on the one hand, that technologies and strategic actions are voluntarily implemented by individuals following the identification of their cultural needs. On the other hand, the cultural ecology theory suggests that, following the creation of the means necessary for subsistence, new cultural needs arise according to the new environment . We also found that UAV is positively related to CURR (? = 0.0425, T = 34.559, ? = 0.00123), FGDP(? = 0.0459, T = 21.214, ? = 0.00216) and SAVING (? = 0.420, T = 14.175, ? = 0.0296). This means that countries that do not have economicst ability are more vulner able to uncertainty.

Finally, findings show that INVEST is positively related to the UAV degree of (? = 0.00519, T = 16.079, ? = 0.000323), however, this effect remains very weak. This implies that attention given to investing in financial markets is no longer just culture-related. Indeed, with financial markets, companies became increasingly interested in it. This is due to the increasing flexibility of the rules governing access to foreign markets and the reduction of barriers to trade in financial services.

Results show that the most important determinants of the UAV degree are the degree of attention attributed to education and the level of economic stability. They also reveal that new technologies adoption has a weaker role in determining this cultural dimension. Although the holding rate of GSM shows a greater correlation, this indicator is not taken into account because of its low community index at the level of PCA.

14 Conclusion

The study proposes a conceptual framework measuring cultural dimensions through ecological indicators and informes about items that are able to determine these dimensions.

Cultural dimensions considered in our study are power distance and uncertainty avoidance. Findings show that cultural dimensions indicators' have evolved and are no longer the same identified by Hofstede (1980). This change in culture origins is justified by environment evolution's. Indeed, referring to the cultural ecology theory under its adaptive dynamics, technologies and strategic actions are voluntarily implemented by individuals following the identification of their cultural needs. However, after the creation of the means necessary for subsistence, new cultural needs arise according to the new environment. Some indicators impact is no longer the same as identified in Hofstede studies'. For example, new technologies development and adoption, and education systems development may reduce perplexity. This study was limited in development indicators identifiyed in prior researches. Regarding future research, the impact of other development indicators canbe studied in order to enrich the conceptual framework developed by our research. Indeed, due to the unobservable character of cultural dimension, we assume that SEM is a relevant method in determining items related to these dimensions.

15 46

Year

1

Proxies	Variables	Measures	Expected signs
POWD indicators			
Wealth	AGRI	Ratio agriculture sector to GDP	+
	URBA	Urbanization rate	-
	INTE	Internet users per 100 persons	-
	BROAD	Broadband Internet subscriptions per 100 persons	-
	GSM	GSM subscriptions per 100 persons	-
	LITER	Literacy rate	-
	SCHO	Averageyears of schooling	-
Population size	POPU	Naperianlogarithm of total population	+
UAV indicators			
Modern technologies	INTE	Internet users per 100 persons	+
	BROAD	Broadband Internet subscriptions per 100 persons	+
	GSM	GSM subscriptions per 100 persons	+
Educational system	LITER	Literacy rate	+
	SCHO	Averageyears of schooling	+
Economic stability	CURR	Fluctuations of foreigncurrency rate	+
	FGDP	Fluctuation in GDP	+
	SAVING	Gross DomesticSaving	+
Investment in financial markets			

Figure 1: Table 1 :

2

Year 2018
43

Figure 2: Table 2 :

4

Year 2018
44

[Note: SAVINGii.]

Figure 3: Table 4 :

7

Figure 4: Table 7 :

	Indicators	Items	Expected signs	t-Test	Factor contributions	Error
Volume XVIII Issue VIII Version I	New technologies adoption Attention given to education Economic stability Investment in financial	GSM	+ +	-34,600	-0,113 -	0,00434
		BROAD	+ +	-52,969	0,0927	0,00175
		INTE	+ +	-40,231	-0,0936	0,00233
		SCHO	+ +	-34,621	-0,170 -	0,00490
		LITER	-	-23,052	0,0166	0,00072
		CURR		34,559	0,0425	0,00123
		FGDP		21,214	0,0459 0,420	0,00216
		SAV-ING		14,175	0,00519	0,0296
		IN-VEST		16,079		0,000323
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[Note: C]

Figure 5:

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