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An Assessment of the Impact of National Culture On Organizational Knowledge Maturity

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ABSTRACT

Most often the efforts to leverage organizational competencies are directed towards use of data and technology, overlooking the human and organizational structural capital parts of knowledge within the organization. This paper adopts a holistic approach to understanding and realizing the value within the human, data and processual capital in the organization via the Intellectual Bandwidth (IB) Maturity Model. Rise in corporate globalization could lead to the increased importance of national culture and how it affects collaboration, processes documentation and data usage in companies. This study looks at how differences in national culture (as defined by Hofstede's dimensions) impact the different components of data, collaboration and processual organizational knowledge as defined by the IB maturity model. The results indicate that some differences do exist among individuals from variant cultures resulting in distinctions in the way organizational knowledge is used and should be of interest to researchers and practitioners alike.

Keywords (Required)

Knowledge Management, National Culture, Intellectual Bandwidth Maturity

INTRODUCTION

The increased emphasis companies place on management of organizational competencies to gain competitive advantage has led many organizations to strive to more effectively manage and use their available resources. Use of this organizational knowledge and its application to the task at hand within the organization is to realize the value from that knowledge. Nunamaker et al. (2001) introduced the concept of Intellectual Bandwidth (IB) as a measure of the organization's capacity to transform its Intellectual Capital (IC) and organizational resources to generate value. The original IB model was refined to include the knowledge and capital that may reside within the processes of any organization. This refined model, known as the IB maturity model (Ray and Romano, 2005), measures the knowledge and capital within the organization with a more holistic approach.

In the following sections we review previous literature that has guided development of the IB maturity model and its components, explain different dimensions of culture and describe the results from a study that examined the effect of national culture on IB maturity and its dimensions. The results have implications for managers as well as researchers interested in examining the cross cultural impacts on knowledge utilization within the company.

LITERATURE REVIEW

Intellectual Capital (IC)

IC refers to knowledge that exists within the different facets of an organization. IC can be captured through the different ways an organization works and can also be accumulated through use of technology to collect data relevant to organizations functions. Petrash (1996) defines IC as the sum of human capital, organizational capital and customer capital. Stewart (1997) defines IC as "*the intellectual material- knowledge, information, intellectual property, experience that can be put to use to create wealth.*" We simplify these two definitions to conceptualize IC as the value residing in organizations' knowledge (both tacit and explicit). Thus, understanding what IC is helps us assess the extent and effectiveness to which knowledge or capital within the organization is being leveraged to gain competitive advantage.

Original Intellectual Bandwidth (IB) Model

IB has been defined as the ability of the organization to effectively use its members' IC to generate value from the data collected to help make better decisions and improve performance on tasks at hand (Nunamaker et al., 2001). The IB model proposed by Nunamaker (Nunamaker et al., 2001) consists of two dimensions:

1. Level of Understanding, which consists of levels of Data, Information, Knowledge and Wisdom.
2. Level of Collaborative Capability, which consists of Individual, Collected, Coordinated and Concerted

The IB of any organization, or organizational subunit, is defined as the product of these levels; however, the original model fails to account for the capital that resides in an organization's structure. An important part of the organization's structural capital resides in the organization's best practices as well as processes. We therefore propose a refinement to the original IB model that overcomes this limitation by the addition of a process maturity dimension to account for this process based capital within the organization.

Intellectual Bandwidth Maturity Model

The refined model is named the IB Maturity Model and consists of the process maturity dimension in addition to the two original levels of understanding and collaborative capability. We renamed the original IB model dimensions to Data and Collaborative maturity to reflect the fact that the new model expresses the effectiveness with which a particular source of knowledge and capital is used and is a sign of organizational maturity on the use of that knowledge resource. The three levels are defined as follows:

1. **Data Maturity:** Indicates the level of maturity at which organizations currently use the data collected (same as the level of understanding in the original IB model).
2. **Collaborative Maturity:** Indicates the level of maturity at which organizations currently use collaboration as a tool to leverage human capital (same as the level of collaborative capability in the original IB model).
3. **Process Maturity:** Indicates the level of maturity at which processes are currently defined and optimized to incorporate best practices. The measures of process maturity are derived from the Software Engineering Institutes - Capability Maturity Model (SEI-CMM) (Paulk, Curtis, Chrissis and Weber, 1993.)

Next, we briefly discuss these dimensions in detail.

Data Maturity

Data maturity represents the degree to which data collected by the organization is being used as a strategic tool to make more-informed decisions. It derives its four levels from the IB model discussed in the previous section.

- 1) **Data:** the organization collects data relevant to its business requirements. An example of this would be collection of data about sales of a particular product.
- 2) **Information:** the data collected is now put into context as to when and why it was collected and used to generate information that increases an organizations understanding of its business. This would mean using the information to answer questions like average sales for the last 2 weeks.
- 3) **Knowledge:** data and information collected over a period of time when analyzed reveal some kind of recurring patterns in the organization's business processes. This would mean discovering that the sale for the company's product is highest in areas that have population belonging to the 16-22 age groups. This helps give more confidence in using this knowledge to make decisions.
- 4) **Wisdom:** achieved only through years of experience in the particular field. In this case wisdom would be in understanding that the age group has nothing to do with the product but is the influence of advertising of that particular product.

Collaborative Maturity

Collaborative Maturity represents an organization's ability to effectively make decisions and solve problems through intra-organizational collaboration. This means effective utilization of the human IC by sharing it with others and increasing it as a result of interactions with other members of the organization. Collaborative maturity depends on group work but is not completely defined by the amount of group work carried out within an organization. It also depends on how effectively the

group can use its member's knowledge to solve the problem at hand. Collaborative maturity depends on both the amount of group work and the degree of collaboration among the members. The four levels of this dimension are:

- 1) **Individual:** work is primarily achieved by individuals who have been assigned the task. There is no communication with others (formal) for the purpose of performing the task at hand.
- 2) **Collected:** characterized by a large task being divided into individual tasks. All subtask outputs are aggregated to produce the final deliverable.
- 3) **Coordinated:** A great deal of interdependency exists between different tasks done by various group members. Some members have to wait for a deliverable from another member before they can begin their task. This level is characterized by clearly marked hand-offs between group members.
- 4) **Concerted:** This is the highest level of collaboration in an organization. It consists of all members of the group working towards the group task simultaneously. Thus there is no division of work; every individual in the group is working towards the project goal simultaneously.

Process Maturity

The concept of process maturity has been used in the software development field for several years. We derive the five levels of process maturity from the Software Engineering Institute's Capability Maturity Model (SEI-CMM) (Paulk et al., 1993). The five levels are:

- 1) **Initial:** characterized by ad-hoc processes. There is no well defined structure and process success depends on individual efforts.
- 2) **Repeatable:** some company processes are repeated mainly due to the fact that success has been found by using the process on previous occasions.
- 3) **Defined:** efforts are made to define and document processes, such that a standard can be applied and used by all units in the organization.
- 4) **Managed:** metrics are collected to understand how well documented processes are followed.
- 5) **Optimized:** the organization is mature enough to understand that processes need to be checked constantly for modification to optimize them for company use. Innovation and feedback from the processes are used to help optimize other processes.

The effectiveness with which organizations use the capital in data, processes and collaborative efforts is what we define as the IB maturity of an organization. Organizations operate within the context of specific cultures and this could affect how they utilize knowledge and IC; therefore we now turn our attention to how national culture might impact this usage.

Importance of National Culture

Work groups and teams are now expected to be more culturally diverse and less homogeneous due to the recent increase in virtual work place scenarios (Tung and Quaddus, 2002). Researchers and practitioners now need to know how individuals from different cultures and nationalities can be encouraged to work together more effectively, efficiently and satisfactorily than in the past (Tung et al., 2002). Previous research in the cross cultural area has found that national culture can help to explain the differences among groups from different nationalities on several constructs including: consensus level achieved in groups, participation equity, team dynamics etc. (Mejias, Vogel and Shepherd, 1997; Mejias, Vogel, Shepherd and Lazaneo, 1996-1997; Vogel, Lou, Eekhout, Verveen and Adams, 2000).

In the next section we review different dimensions of national culture as defined by Hofstede (Hofstede, 2001; Hofstede, 1980) and try to understand how these may affect the three components of organizational knowledge and IC in the IB Maturity Model.

National Culture

Hofstede (Hofstede, 2001; Hofstede, 1980) defines four dimensions of culture:

- **Collectivism/Individualism:** Collectivism refers to the tendency of a society to place greater emphasis on groups and maintenance of group stability over individual opinion or expression.

- **Masculinity/Femininity:** Masculine societies tend to emphasize achievement, assertiveness and heroism while feminine societies place more importance on relationships and caring.
- **Uncertainty Avoidance:** High Uncertainty Avoidance cultures tend to feel more threatened by uncertain and ambiguous situations as compared to cultures low in uncertainty avoidance.
- **Power Distance:** High Power Distance cultures tend to accept differences in power distribution in society more easily than do Low Power Distance cultures.

EFFECT OF CULTURE ON IB MATURITY

In this study we examined the effect of national culture on the three dimensions of IB maturity to determine whether national culture has an effect on IC usage.

The dimension of Masculinity/Femininity taps into the extent to which individuals in a particular culture emphasize goals more popular to men (advancement, earnings, achievement etc.) versus goals more popular to women (service, interpersonal relationships, physical work environment etc.) (Hofstede, 1980). This dimension basically refers to the dominant gender role patterns (patterns of male assertiveness as well as female nurturance) and hence is also a measure of gender role differentiation (Hofstede, 2001). To test this dimension a plethora of issues would have to be considered (namely proportion of male/female population in an organization, equality of gender with respect to salary etc.) and would require much tighter control, it was dropped from the design of the current study.

In this section we specifically look at how the three dimensions of individualism, power distance and uncertainty avoidance may impact the use of organizational knowledge and capital as defined by the IB maturity model and develop a theoretical model and hypotheses to test the model.

Individualism

This dimension describes the relationship between an individual and the collectivity that prevails in a given society. Individualistic cultures believe that employees perform best as individuals (Hofstede, 2001). Those from more individualistic cultures believe that decisions made by individuals are of higher quality than decisions made by groups (Hofstede, 1980). We assert that based on these definitions people from an individualistic culture will have lower collaborative maturity than those from a collectivistic culture. Logically it follows that groups from cultures high in individualism should show lower collaborative maturity. This leads us to the proposition that collaborative maturity is a negative function of individualism and to our first hypothesis.

H1: Individuals from a high individualistic culture will have lower collaborative maturity than individuals from a low individualistic (collectivistic) culture.

Uncertainty Avoidance (UA)

The main underlying dimension of uncertainty avoidance (UA) is tolerance for ambiguity (uncertainty) that can be found in individuals leading some to need action to reduce this uncertainty (Hofstede, 1980). UA refers to the tendency of people to avoid undefined situations or problems. Individuals with high UA will believe more in specialists and expertise to reduce their uncertainty (Hofstede, 2001). Individuals from a culture with high UA will tend to ask for more specific directions or well-defined processes to reduce uncertainty. Logically it follows that individuals from cultures high in UA will have higher process maturity and higher data maturity. This leads us to the propositions that Process maturity and Data Maturity are a positive function of Uncertainty Avoidance and our second and third hypotheses.

H2: Individuals from cultures high in uncertainty avoidance will have higher process maturity than individuals from cultures low in uncertainty avoidance.

H3: Individuals from cultures high in uncertainty avoidance will have higher data maturity than individuals from cultures low in uncertainty avoidance.

Power Distance

Power distance (PD) refers to the perceptions of a superiors' style of decision making and of subordinates' fear to disagree with superiors (Hofstede, 1980). PD is defined as the extent to which less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally. For organizations this means that data and information are hierarchically constrained, and that subordinates expect to be told what to do and are influenced by formal

authority and sanctions (Hofstede, 2001). If influential individuals are unwilling to share data equally with others in lower level positions, this will lead to lower data maturity. Collaborative maturity will also be lower; because if two persons at unequal levels are members of the same group, they might not interact freely and this might inhibit group productivity due to evaluation apprehension and other process losses. Groups from cultures high in PD will have lower process maturity and lower collaborative maturity than those from cultures with lower PD. This leads us to the proposition that data maturity and collaborative maturity are both negative functions of power distance and our fourth and fifth hypotheses.

H4: Individuals from cultures high in power distance will have lower data maturity than individuals from cultures low in power distance.

H5: Individuals from cultures high on power distance will have lower collaborative maturity than individuals from cultures low on power distance.

Figure one depicts the theoretical model.

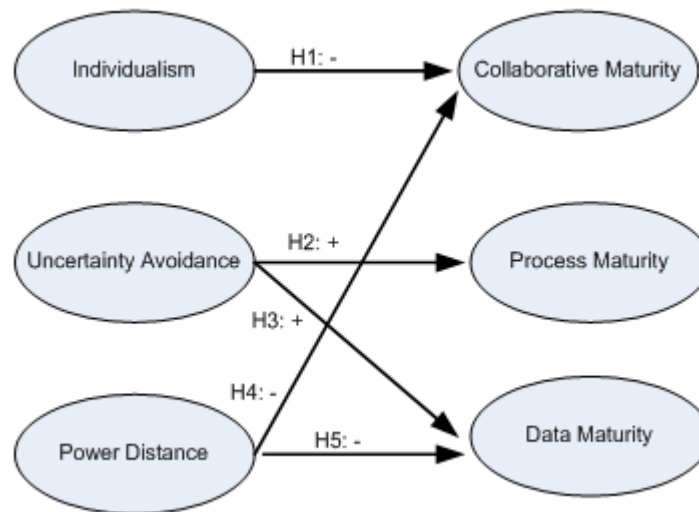


Figure 1: Theoretical Model of the Impact of National Culture dimensions on IB Maturity dimensions

METHODS

Questionnaire Development

IB maturity is a relatively new concept and there exists no scale to tap into its dimensions. An entirely new scale was developed where the first section of the questionnaire contained questions to ascertain collaborative maturity based on the degree of group work, interdependency of work within the group and group communication. The next section tried to determine the level of process maturity in terms of how well the organization's process are defined and documented. The third section focused on the data maturity dimension by asking questions regarding whether or not data is collected for company use and if such data is used as an aid to make major company decisions. All questions were answered on a 5 point likert-scale (1: Never 2: Rarely 3: About half of the time 4: Often 5: Always). The fourth section of the questionnaire had 9 questions on the cultural traits of power distance, uncertainty avoidance and individualism. The first three questions measured individualism, the next four power distance and the final two uncertainty avoidance. Demographic information on the respondent's age, gender, citizenship, the country in which they received the major part of their education, job title, years of experience at the current job and the size of the company were also collected.

The questionnaire had items to ascertain individual's perceptions on individualism, power distance and uncertainty avoidance. The individualism questions were taken from one of the dimensions on the individual/collectivism questionnaire developed by Wagner (Wagner, 1995). Wagner performed factor analysis of the original questionnaire and five factors emerged. The factor loading for the three questions belonging to one dimension, included in this questionnaire were 0.799, 0.805 and 0.804. We chose this particular dimension because it addressed value attached to working alone for individuals and were more relevant to our study than others. Questions on power distance and uncertainty avoidance as formulated by the

authors were based on Hofstede’s explanation and the value survey module that taps into the above two dimensions. The mean scores of the two countries were compared to see if Hofstede’s values were valid for this sample.

Sample and Survey Administration

The actual sample for the study consisted of 121 individuals from organizations in the United States of America (USA) and India. We used convenience sampling. This sample was comprised of 41% females and 59% males. The average age was 30 years, with a minimum of 18 and maximum of 57. The majority had an average of from 1 to 3 years experience with their company. Majority of the respondents from both the countries belonged to a service industry. The most predominant age category was between 35-45 years. The average experience was 3 years in the same job for Indians, while for Americans it was 1.5 years. There were 56 respondents from the USA and 65 from India. To take into account the possibility of people from other countries working in India or the USA, we selected only those respondents, who received the major part of their education in one of the two countries. All surveys were administered in English.

ANALYSIS

First, a reliability analysis was done for the items that measure the three dimensions of national culture. Two of the three dimensions, individualism and uncertainty avoidance, had reliabilities (Cronbach’s alpha) above 0.7 (Individualism: 0.8318 and UA: 0.7311). The Power distance score items had lower reliability (0.6115); therefore power distance was dropped from the analysis. For items measuring collaborative maturity, data maturity and process maturity, reliability analysis was done and the Cronbach’s alpha for the three constructs were found to be above the recommended 0.7 level. Factor analysis was then done and factor scores were calculated for each individual on the three dimensions of IB maturity.

Then the data were analyzed for differences among individuals from the two countries using pre-determined t-tests. Although use of the multiple regression technique would have given us the direct impact of the cultural dimensions on individual dimensions of IB maturity, we chose the t-test because it is very robust to potential violations of assumptions (especially normality) to which other tests are more susceptible. The significance level used in this analysis was the standard 0.05. Also, to make ensure that the two groups were culturally different, the mean values of individuals across the two countries of the USA and India were compared to see if they differed significantly on the two cultural dimensions.

RESULTS AND DISCUSSION

The results of the t-tests for differences in data maturity, collaborative maturity and process maturity are as shown in Table 1.

IB maturity Dimension	t	df	Sig. (2-tailed)	Std. Error mean	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
PROCMAT	-1.891	119	.061	-.4382	.23168	-.89693	.02056	-1.891
DATAMAT	-2.520	119	.013*	-.3676	.14588	-.65645	-.07872	-2.520
COLMAT	-.553	119	.581	-.0705	.12745	-.32285	.18187	-.553

Table 1. T-test results for differences in dimensions of IB Maturity between India and USA.

** Statistically Significant*

Data Maturity

An independent groups t-test compared the mean data maturity for the group from India (M=3.88, S.D. = 0.72) with that for the group from the USA (M=3.51, S.D. = 0.88.) This test was found to be statistically significant at an alpha level of 0.05, t(119) =-2.520, p < 0.013, indicating that the group from the India were higher on data maturity than the group from the USA. The strength of the relationship as indexed by Eta², was 0.051, indicating a small effect size.

Collaborative Maturity

An independent groups t-test compared the mean collaborative maturity for the group from India (M=3.36, S.D. = 0.58) with that for the group from the USA (M=3.29, S.D.= 0.81.) This test was found to be NOT statistically significant at an alpha level of 0.05, $t(120) = -0.533$, $p < 0.581$, indicating no statistically significant difference between the two groups.

Process Maturity

An independent groups t-test compared the mean Process Maturity for the group from India (M=2.98, S.D. = 1.31) with that for the group from the USA (M=2.55, S.D. = 1.22.) This test was found to be NOT statistically significant at an alpha level of 0.05, $t(120) = -1.891$, $p < 0.061$, indicating no statistically significant difference between the two groups

To make sure that the two groups differed on the dimensions of national culture, independent groups t-tests compared the mean individualism score and the uncertainty avoidance scores for the two countries. Table 2 gives the values from the t-tests.

Cultural Dimension	t	df	Sig. (2-tailed)	N culture mean (SD) Std. Error mean	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
							Lower	Upper
Individualism	-4.214	119	.000*	56 USA 3.41 (1.49) .200	-1.17	.272	-1.71	-.632
				65 India 4.58 (1.50) .184				
Uncertainty Avoidance	-3.675	118	.000*	56 USA 5.13 (1.36) .182	-.819	.21	-1.25	-.388
				64 India 5.98 (1.02) .126				

Table 2. T-test results for differences in dimensions of national culture between India and USA.

** Statistically Significant*

Individualism

An independent groups t-test compared the mean individualism for the group from USA (M=3.41, S.D.= 1.49) with that for the group from the India (M=4.58, S.D.= 1.50) . This test was found to be statistically significant at an alpha level of 0.05, $t(119) = -4.214$, $p < 0.000$, indicating that the group from the India was more individualistic than the group from USA; and the group from USA was more collectivistic than the group from the India. The strength of the relationship between collectivism/individualism and national culture, as indexed by η^2 , was 0.1289, indicating a small effect size.

Uncertainty Avoidance

An independent groups t-test compared then mean uncertainty avoidance for the group from India (M=5.13, S.D.= 1.36) with that for the group from the USA (M=5.98, S.D.= 1.02.) This test was found to be statistically significant at an alpha level of 0.05, $t(118) = -3.675$, $p < 0.000$, indicating that the group from the USA had lower uncertainty avoidance than the group from India; and the group from India had higher uncertainty avoidance than the group from the USA. The strength of the relationship between collectivism/individualism and national culture, as indexed by η^2 , was 0.1011, indicating a small effect size.

Individuals from the two countries were statistically-significantly different on individualism and uncertainty avoidance. Although Hofstede’s dimensions are used by most researchers to develop propositions and hypotheses, very few researchers actually validate whether or not these differences still exist, especially in their study sample (for example: (Watson, Ho and Raman, 1994) report indices from Hofstede’s study). Hofstede’s dimensions assign India as a low uncertainty avoidance country, while the USA is assigned as a high uncertainly avoidance country. However, our results found exactly the opposite. In our sample, individuals from India ranked higher on uncertainty avoidance than those from the USA, and these differences were statistically-significantly different.

The two countries differed only on the data maturity dimension of the IB Maturity Model. In the literature review section, we reviewed impacts of the different cultural dimensions and concluded that individuals from countries high on uncertainty avoidance would follow more defined processes and use more data (exhibit higher data maturity) to make decisions. Subsequently, individuals from India had statistically-significantly higher scores on data maturity than those from the USA and consequently are more mature in their use of data. We did not find statistically-significant differences on collaborative maturity or process maturity.

LIMITATIONS

The first limitation of this study is that it does not take into consideration organizational culture which could have an impact on the different dimensions of IB maturity. Thus the effects observed might be due to organizational culture rather than national culture. The IB maturity scale is exploratory in nature and therefore does not have any precedent scale, so there is no basis for comparison of this scale with respect to other scales to ascertain discriminant or convergent validity. IB maturity is a relatively new concept and the collaborative dimension measured in this scale has a low reliability. This could have impacted the results. Another limitation is that individualism, power distance and uncertainty avoidance were measured using self reported measures. Although two of the three cultural dimensions had reliabilities above 0.7; however the findings might not be generalizable beyond this sample. Also, the current research study does not explain the interactions between the three different dimensions of IB maturity. An important dimension of Masculinity/Femininity could not be incorporated into the study. The study has taken into account only two countries as a result of which replication of this study to other countries may be needed to discern whether the findings across other countries are similar.

IMPLICATIONS AND FUTURE RESEARCH

The results reveal that national culture indeed has an impact on IC usage at least on the data maturity dimension between India and the USA. Managers of individuals from different cultures need to understand how these differences play out when individuals do their work within the organization. This result has important implications for managers, because data maturity looks at the effectiveness with which individuals within the company use data to make decisions. The study found that individuals high on uncertainty avoidance used data to a higher extent and more effectively, while individuals lower on uncertainty avoidance were less effective in their use of data. Managers in low uncertainty avoidance cultures need to place more emphasis on the effective use of data within the organization. They need to provide the impetus to raise the maturity level of the organization to use the data collected more effectively. These findings have implications for KM practices within the organization, especially with respect to the kind of data collected as well as its usage at the higher levels of information and knowledge.

These results should also be of interest to cross-cultural IS researchers. First and foremost, the findings contradict the assumption regarding the validity of Hofstede's dimensions for all samples used in cross-cultural research. Hence, it might be important for researchers to measure whether or not adequate differences in national culture exist within their samples, rather than assuming they do. Although the measures in this study did not find statistically-significant differences in process or collaborative maturity among individuals from the two cultures, it will be important for future researchers to understand why no significant differences were found and if there are other factors that play an important role in IB maturity.

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