The impact of national and organizational culture on information technology (IT)

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Abstract:

During the past decade there has been an increase in the impact of national and organizational culture (NC) (OC) on the development and use of information and communication technologies. Meanwhile many informational technology scholars argue that global organizations need to understand cultural differences if they want to successfully deploy information technology. For this purpose, it is important to know relationships among information technologies and organizational and national culture. This paper has four main objectives: first, to define the national culture, organizational culture, and information technology; second, to describe the famous model on national culture; third, to explain some factors interact during the transfer process, and finally to describe relationships among IT, IS and organizational culture.

Introduction:

During the past decade there has been increasing interest in the impact of culture differences on development and use of information and communication technologies. The world is continuing move toward global markets with interactions between members of different cultures. In fact, global activities are facilitated and supported to a large extent by current communications and information technologies. So it is important to understand the impact of cultural differences on these activities (**12**: 33-49; **27**: 5-14).

With the widespread diffusion of information technology (IT) on a global level, increasingly we are witnessing the same technology being used in many different cultures.

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If we agree that understanding of cultural differences is important, we will believe that attempting to understand these cultural differences can be appear in the terms of "National Culture".

An increasing number of information system applications are implemented across national and cultural boundaries. During this transfer process many of these applications encounter problems which can be attributed to the differences between national cultures of different organizations. (**4**: 6-19)

Trempenaars & Hampden-Turner Stated that "technology do work by the same rules everywhere even on the moon" (**32**: 55). This statement will be true about machine but not about human machine interaction. So it is true that technology is free of culture but some technology such as IT that affected on human behavior may not be free of culture.

This paper has three main objectives: first, to define the National Culture and organizational culture; second, to describe the famous framework and model about culture; and finally to describe the influence of culture on transferring information technology.

The concept of national culture

Notion of culture has multiple and inclusive definitions. Sometimes the description culture is applied exclusively to what is observable or recordable. An alternative conception of culture is : subjective, or implicit. As a whole Culture is a pattern of thinking, felling and acting that is learned throughout a person's life, beginning in early childhood (**32**: 10). Groeschl and Doherty pointed out that culture is more complex and difficult to define. Culture consists of several elements of which some are implicit and others are explicit. Most often these elements are explained by terms such as behavior, values, norms and basic assumptions (**7**: 12).

Several recent studies have suggested that values are important category of culture (**6**: 298; **15**: 23). Values and practices are acquired early in life through childhood socialization and education then stable in nature but they can change over time and these changes can reflect in the culture. Practices develop in life by activities in society and they more likely to change than values (**6**: 298).

Hofstede defined national culture as "the collective programming of the mind which distinguishes the members of one group or people from another" (**9**: 5).He suggested

that people share a collective national character that represents their cultural mental programming. This mental programming shares values, beliefs, assumptions, expectations, perceptions and behavior.

Many researchers include of Hall, Hofstede, Trempenaars, Modern have concentrated on the study of cultural values (**8**; **9**; **32; 17**).

National culture is not theorized as the only culture, or the totality of cultures, within a nation, but by definition it culturally distinguishes the members of one nation from another. The population of a nation can be differentiated on many grounds, but Hofstede claims that regardless of these divisions every national population somehow shares a unique culture.

At the end, result show three categories of national culture models:

* Single dimension models
* Multiple dimension models
* Historical-social models

Although there are many different definitions of national culture, most IS research has tended to rely on Hofstede's definition. So it can be said that Hofstede's model is one of the most popular in many different fields of management. In next section, I will try to illustrate Hofstede's model for better understanding.

The concept of organizational culture:

Schein presented the contemporary definition of organizational culture that defined culture as an objective entity, consisting a set of behavioral and cognitive characteristics. He described dimensions that he used to differentiate between organizational cultures in different organizations as follows:

What is valued; the dominant leadership styles; the language and symbols, the procedures and routines; the definitions of success that characterizes an organization; the habit of thinking; people's mental modes; the climate; the group norms (**26**).

Brown argued that organizational culture could be divided into three layers, similar to those of Hofstede stated for national culture. In the outer layer, there are values about the strategies, missions and objectives of the organization. In the middle layer, there are beliefs that the issues that the employees of an organization talk about. In the inner layer, there are those aspects of the organizational life that people find it difficult to recall and explain (**2**).

Hofstede also defines six dimensions to differentiate between organizational cultures that have similarities with the dimensions of Schein: process-vs results-oriented; employee-vs job-oriented; parochial-vs professional-dependent; open vs closed systems of communication; loose vs tight control; and normative vs pragmatic organization (**11**: 18-21).

Concept of information technology (IT)

Information technology (IT, also known as Information and Communication Technology (ICT) and Infocom, especially in Asia) is a broad subject concerned with technology and other aspects of managing and processing information, especially in large organization.

In particular, IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and retrieval information. For that reason, computer professionals are often called IT specialists, and the division of a company or university that deals with software technology is often called the IT department. Information Technology (IT) is frequently used as a synonym of information system. This due to the fact that IT concerns the technological component of an IS , as it includes hardware, database, software, and other resources suitable for information processing.

Relationship between organizational and national culture

It is often assumed that organizational culture is a subset of national culture. This view is widespread since most organizations operate within given nation and employ members from the same national culture. Thus, managers and researchers often consider organizational culture as the micro-context and national culture as the macro-context in which employees operate. It is debatable that within the increased prevalence of multinational corporations (MNCs) the firm represents the macro-culture, whereas the various countries in which the firm operates represent the micro-cultures.

Gallivan and Srite believed that popular details of how different cultural layers fit together are misleading, and reveal an underlying misconception with regard to culture (**6**: 298). It means that cultural beliefs and practices are hierarchically ordered.

Literature review

IT is an important component of the organizational decision making. Managers in all levels should rely on It to aid in making decisions. Researches have demonstrated that there are national values that often inhibit the successful implementation of specific practices exported from one culture to another. Many researchers have attempted to examine the evidence that use of IT may influence the behavior of specialists from different cultures. Teng and Calhoun measured two dimensions of IT and defined two types of decisions and demonstrated that IT influences decision making in a study of US managers and professionals. The respondents perceived that use of IT impacted a number of factors associated with decision making and that the impact was often different for computing than communications and also different between the types of decisions (**30**: 700-701).

Hofstede suggested that management by objectives (MBO) is more successful in countries with low power distance than in countries with high power distance precludes the superior- subordinate negotiation necessary in the MBO process. The application of IT in organizations has expanded further with the addition of communication functions such as E-mail, internet, intranet, internet electronic meeting systems, and so on. Straub (1994) also found that culture play a role in determining the kind of communication media selected technologies are developed with assumptions of what they are to accomplish but also how they are to be used (**29**: 35).

. Others have tried to focus on the implementation problems associated with the transfer of technology. These studies have stated some factors, which influence the transfer process. For example kedia and Bhagat suggested four factors, which may influence this process, including characteristic of technology, societal – cultural differences, organizational cultural differences, and absorptive capacity of recipient organization (**13**: 561). Alvin and Joachimsthaler studied the literature on implementation; they suggested three contextual variables, which may influence implementation, include task type, organizational factors, and external factors such as competitive considerations (**1**: 95-96). Hofstede studied on the transfer of information technology across countries, they found several factors

that influence it : market, behavioral and cultural factors, financial factors, government and intangible factors and so on.

In spite of several studies that have focused on the implementation problems associated with transfer of technology the development of a broader and integrative model has been neglected.(**18**: 90; **19**: 4) .Here the author try to introduce readers with a simple and useful model which illustrates how factors interact during the transfer process.

Hofstede's national model

Like all human activities, culture influences on transfer of information technology in different ways. Because of numerous aspects of culture national, culture has received particular attention. Hofstede's main research on national culture is principally described in "culture's consequences. The work of Hofstede stands out for the connection of design activities to national culture and organizational forms (**11**: 4-6).

His primary data were extracted from a pre-existing bank of employee attitude surveys undertaken around 1967 and 1973 within IBM subsidiaries in 66 countries is the basis for a significant theoretical explanation of the influence of national culture on information system design. Geerd Hofstede developed four dimensions of national culture such as uncertainty avoidance, masculinity, power distance, and individuality influence in information system design.

Also, he compared the designs of geographic information systems in German and US countries. Because of the wealth of data and deep theoretical interpretation, his work has received much attention in the field than other fields Hofstede tried to examine the role of national culture in information system design. He constructed his model on review of sociological theories and work including Kluckho hn(1952,1961),Parson (1951),Parson and Shils and Weber (**14**; **20**; **21**; **33**). Also, Hofstede's model has been widely used in management research .

Hofstede's four dimensions of national culture including:

- Uncertainty avoidance : the extent to which future possibilities are defended against or accepted
- Power distance : the degree if inequality of power between a person at a higher level and a person at a lower level
- Individualism: the relative importance of individual goals

compared with group or collective goals

- Masculinity: the extent to which the goal of men dominate those of women

Uncertainty avoidance is the focus on information systems in decision support systems. It is considered with power distance because of interaction effects. On the other hand, individualism and masculinity have little importance and relevance to German and US countries. According to Hofstede, in Germany and the USA, both characterized by low power distance, there are two possible ways to keep organizations to gather and reduce uncertainty.

Figure 1 show important organizational characteristics based on uncertainty avoidance. Hofstede made detailed comments about these differences. "The Anglo- American cultures would tend more toward creating implicitly structured organizations. In contrast, German speaking cultures establish "workflow" bureaucracies that prescribe the work process in much greater detail" (**10**: 319).

In subsequent work with Chinese scholars, Hofstede added a fifth dimension: short-term vs. long-term orientation (**11**: 4-21). This construct acknowledges that in many Asian countries a longer time horizon is considered for planning and decision-making.

Hofstede's model has been widely used in management research (**27**: 5-14). Forexample, as mentioned before,

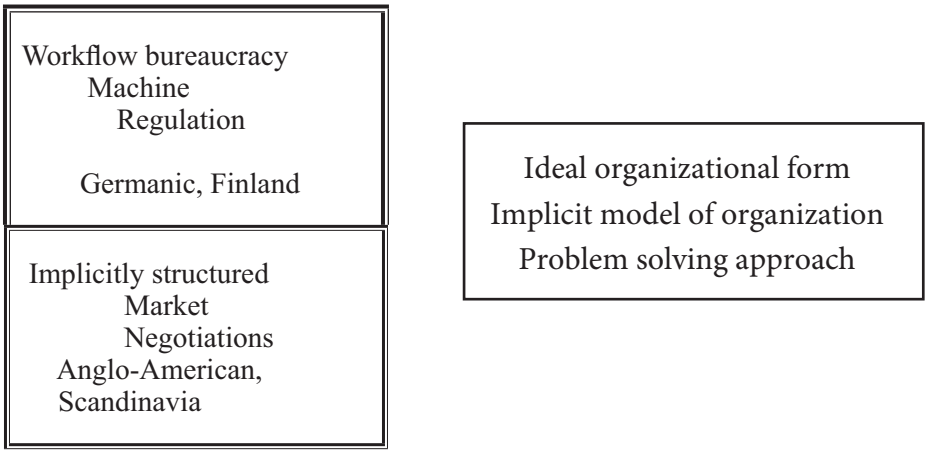

Figure 1.Differenences in national cultural characteristics for Hofstede's cultural dimension of uncertainty avoidance (**10**: 319)

Kedia & Bhagat (**13**: 561). Used these four dimensions in the development of the conceptual model of technology transfer. The popularity of Hofstede's model in management research can be attributed to several factors: its large sample size; codification of cultural attributes; using numerical indicated and emphasis on attitudes in the work place.

Finally Hofstede defined national culture as " the collective programming of the mind which distinguishes the members of one group or category of people from another" (**9**). He also suggested that people share a collective national character that represents their cultural mental programming.

Factors interact during the transfer process

National culture

National culture has been defined in many ways. Hofstede defined culture as the collective programming of the mind that distinguishes one group from another(**10**). According to Lachman and Triandis, national culture reflects the core values and beliefs of individuals formed during childhood and reinforced throughout life (**16**: 565; **31**). Hofstede stated that national culture is an important issue in management theory and also it has been identified as an important variable in many global studies (**10**).

2. Competitive environment

There are several linkages between the competitive environment and IT performance. The competitive environment influences the firm's competitive strategy and structure. Porter suggested that the forces driving industry competition include: the competition among firms, treat of substituted products, the bargaining power of customers, the threat of new entrants, and the bargaining power of suppliers. Competitive environment can be classified into two categories as high and low. For example in high situation, pressure is exerted through all five forces that mentioned above (**23**).

3. Task congruency

Several researchers have established the role of tasks in information systems and the role these tasks play in transfer of applications levels in the information hierarchy such as operational planning, management planning , and strategic planning. They contend that tasks in each level differ by such dimension as

structure, time horizon, frequency with which they are undertaken, and level of management involvement.

Ein-Dor et al (1993) suggested the importance of IT process in their framework of global IT researches. Since IT process also embodies tasks, as a global IT issue (**5**: 35). In other words, we can say that the nature of the task is an important variable in the IT and global IT processes. Tasks change as the applications migrate up the information hierarchy; tasks affect the risk of a project; and tasks are implicated in the transfer of information technology across culture. High task congruency occurs when the old and new systems are similar. Consider on old general accounting system about to be replaced by one using similar methods and procedures but differing only in the introduction of similar but improved technology. In this situation the task congruency factor would be high but if the introductions of a new accounting system substantially changes the methods and procedures previously used and introduces more complex technology, the congruency factor would be low.

So it can be suggested an inverse relationship. It means that if congruency decrease national culture's role will increase.

Relationship between IT, IS and organizational culture

Claver and et al presented a model for influence among IT, IS, and organizational culture(**3**). This model is a good starting point to understand how information (whether suitable or not) is generated so that a firm may make decision. Regarding the data, If we bear in mind that IS is responsible for transformation them into information, It follows that the amount and quality of this data will be a key factor. Southem and Murray use the term "information-based culture" to express the need for all those involved in data collection to share the idea that an IS must be supported by a good data system. In addition to these It should be said that when these data are processed, ethical principles must be considered, which are in turn a result of the general culture existing in the firm (**28**: 33).

Although Claver and et al focused on the qualitative and human side of the process, they admitted that a necessary prerequisite for a suitable implementation of an IS is the financial and technical feasibility of the acquisition or innovation of this IT. However strong the organizational

culture and its positive approach to the usage of an IS will not entail a satisfactory profit for the firm and it is not technically mastered, so it will not lead to generate useful information(**3**).

The last component that directly conditions a successful implementation of an IS is the corporate culture. In fact due to the versatility of IS, its specific interpretation within the culture may not be as visible as it might be initially expected.

In many studies about information technology and national culture, the technology under investigation is assumed to be a fixed artifact or a fixed form as deployed in a given setting. Many of these studies have neglected

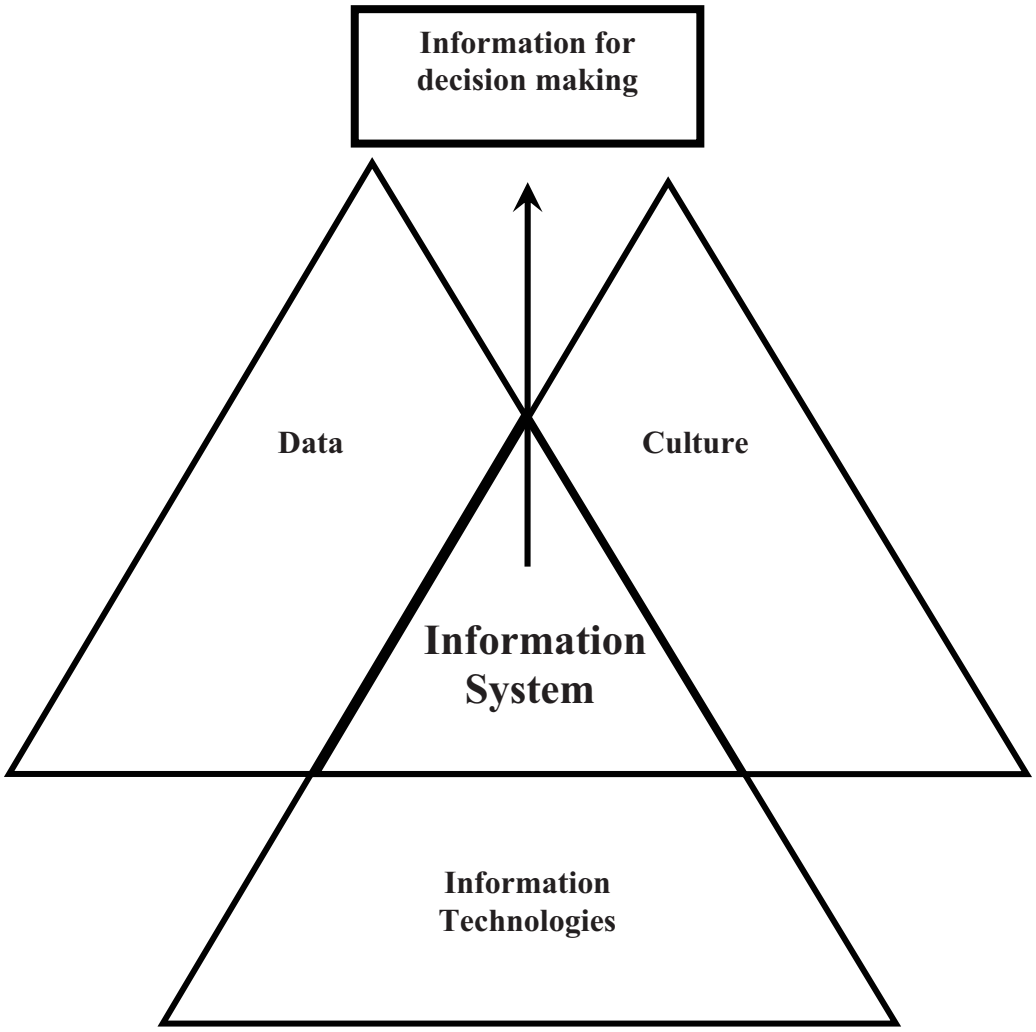

Figure 2. Relationship among IT,IS, and organizational culture

to consider the possibility that the IT may be modified and changed during the process of use. As a consequence, if some cultured beliefs or norms are regarded as being incongruent with technology, then such a misfit is assumed to be a permanent problem, rather than a temporary problem that is amenable to change through users' application, modification, or selective use of the IT. In the organizational culture tradition of research, such changes to the technology or social system have been alternate labeled as mutual adoption, reinvention, improvisation or drift. Although one explicit goal of many researchers who study IT and national culture (NC) is to provide normative guidelines for IT managers, The assumptions underlying these studies means that the range of options available to managers is fairly narrow. Forexample, when a misfit exists between IT and a given culture, the only options available to managers are: (a) reject the IT instead to seek one that is more compatible with the culture;(b) to redesign the technology before implementing it or (c) to proceed with adoption , but accept the fact that problems will occur (**6**: 295-338).

The possibility for the culture or IT to adapt in order to yield a better fit is rarely acknowledged.

Early studies suggested that IT exerts specific impacts on organizations, thus causing changes in Organizational cultures, norms, structure, performance, and other business attributes in deterministic manner. Although this view is now largely rejected by most IS scholars. Forexample, in resent studies of GroupWare adoption, some authors have employed deterministic logic to explain how GroupWare impacts employee communication, collaboration, and productivity. Gallivan and Srite regarded these studies as deterministic, since they assume that certain outcomes will necessarily follow IT adoption, without considering managers' or employees' motives or their actions in shaping how the IT is used(**6**: 330). Like earlier determinist studies, these authors assume that IT not only will have a pre-determined effect on the people and organizations adopting it, but largely independent of the context in which it is adopted how it is used or the specific intentions and actions of its users.

A second set of beliefs about the relationship between IT and OC is that IT is a tool that can be leveraged to achieve whatever changes in organizational practice managers'

desire. Other terms for organizational imperative are strategic choice and managerial imperative. In such studies, the authors assume that managers and system designers have broad latitude to determine the changes to OC, structure, processes, and performance. Interaction researchers have argued that IT and OC may interact to produce various outcomes. Among such outcomes may be acceptance and effective use of IT or user resistance, rejection or sabotage. Beginning in the 1980's, IS researchers increasingly focused on understanding how users' values, assumptions, and other aspects of OC interact with IT features and functionality to produce either effective or problematic IT implementation. Among these, Romm, Pliskin, and Weber argued that most forms of IT have cultural assumptions embedded in them that may conflict with a given firm's values, beliefs and norms. They claimed that such embedded assumptions render technologies as culture bound (**25**: 58) and that it is necessary to perform a cultural analysis to anticipate the likelihood of fit or misfit between a prospective IT and an organization's culture(**25**: 51-63). Where such misfit occurs, the likely outcome will be user resistance, rejection, or outright sabotage. The interaction perspective assumes that both the IT and the OC are fixed in the short run. Researchers have cautioned managers to consider OC as a binding constrain when implementing IT. (**24:** 23-34). The binding constrain view is illustrated by advice offered by Pliskin et al (**22**: 150). who warned managers against trying to change a firm's culture:

Cultures, in the short run, are constant. Therefore systems

Must be designed and adjusted to fit the OC. It I virtually

Impossible to improve the fit by altering the culture, since,

In the short run, culture is binding constraint in IT imple-

mentation. Cultures are not built overnight, nor can they

Be changed overnight.

Pliskin et al. advised managers to conduct a cultural analysis, and offered their options: anticipated, their options are:

1) To withdraw the technology altogether

2) To take "corrective action" altering the technology's design and functionality before it is implemented

3) To change ahead, acknowledging

the likely problems that will occur

Result

This study suggested that culture's role is dependent on several factors and it is an important topic of research for global information system. Results show that the competitive environment as well as the nature of itself affects the impact that culture values will have over the transfer process. Finally, according to findings it can be said that when culture is in agreement with the IT, the consequences may be as follows:

- It allows us to know if the implementation of IT will be satisfactorily accepted
- It lays down the patterns for the usage of information. Thus, it helps identify which information is important, where it may be obtained and above all, to whom it must be supplied
- It is an important means of communication, both inside and outside the firm (**26**) and it allows us to assess the effectiveness of IT applied to telecommunications.
- It creates cohesion among the members of a firm, as it explains the way things are done in a firm
- It allows the creation of a social control within a firm. For instance, the implementation of IT, and the correct predisposition of corporate members towards such IT, is hardly controlled merely by means of formal measures. Cultural roles are also very important in this respect.
- It may help increase the satisfaction of all internal collaborators of the firm, for it facilitates environmental adaptation and internal integration, thus reducing the anxiety created by IT.

References

1. Alvin, M;Joachimsthaler, E.R. "Revisiting DSS implementation research: a meta analysis of the literature and suggestions for researches".***MIS quarterly***, (March 1992) : 95-116.

2. Brown, A. ***Organizational culture and leadership***. London: Pitman publishing, 1995.

3. Claver, E. …[et al]. "The informance of information systems through organizational culture". 2001. [on-line]. Available: http://www.emerald-library.com/fd

4 .Deans, P.C.; Ricks, M. "An agenda for research linking information systems and international business: theory, methodology and application".

***Journal of Global Information Management*,** No.1 (1993): 6-19.

5. Ein-Dor,P; Segev, E; Orgad, M. "The effect of national culture on IS…". ***Journal of Global Information Management*,** Vol.1, No.1 (1993): 33-44.

6. Gallivan, M.; Srite, M. "Information technology and culture: identifying fragmentary and holistic perspectives of culture". ***Information and Organization*,** Vol.15,No.4 (2005): 295-338.

7. Groeschl, S.; Doherty, L. "Conceptualizing culture". ***Cross Cultural Management-An International Journal*,** Vol.7, No. 4 (2000) :12-17.

8. Hall, E.T. ***Beyond culture.*** Garden City, Anchor press, 1976.

9. Hofstede, G. ***Cultures and organizations: software of the mind.*** New York: McGraw- Hill, 1991.

10. Ibid, G. ***Culture's consequence*** .New York: Sage publications, 1980.

11. Hofstede, G.; Bond, M. "The confusion connection: from cultural roots to economic growth". ***Organizational Dynamic***, Vol.16 (1988): 4-21.

12. Ives, B.; Jarvenpaa, S.L. "Applications of global information technology: key issues for management" .***MIS Quarterly***, (March 1991): 33-49.

13. Kedia, B.L.; Bhagat, R.S. "Cultural constrains on transfer of tecgnology across nations". ***Academy of Management Review***, Vol.13, No.4 (1988): 559-571.

14. Kluckhohn, C. ***Variations in value orientations.*** Westport: Greenwood press, 1961.

15. Krumbholz, M.; Maidne, N. "The implemenation of enterprise resourses planning Packages in different organizational and national cultures". ***Information Systems***, Vol.26, No.3 (2001): 12-23.

16. Lachman, R. "Modernity change of core and peripheral values of faculty workers". ***Journal of Human Relations***, No.36 (2003) : 563-580.

17. Modern, T. "Models of national culture: a manahement review". ***An International Journal***, Vol.6, No.1 (1999):19-44.

18. Nasif, E.G.; Al-Daeaj, H; Ebrahim, B; and Thibodeaux, M.S. "Methodological problems in cross cultural research". ***Mangement Information Review*** , No.13 (1991):79-91.

19. Palvia, P. "Preface". ***Journal of Global Information Mangement***, Vol.1, No.2 (1993): 3-5

20. Parson, T. ***The social system.*** London: Routledge & kegan paul, 1951.

21. Parson, T; Shils, E.A. ***Toward a general theory of action.*** Cambridge: Harward University press, 1951.

22. Pliskin, N.;Romm,T.; Lee, A. S. "Presumed versus actual organizational Culture". ***Computer Journal*** , Vol.36, No.3 (1993): 143-152.

23. Porter, M.E.***Competitive strategy.*** New York: Free press, 1986.

24. Roby, D; Azervedo, A. "Culture analysis of organizational consequences of information technology". ***Accounting, Management, and Information Technology,*** Vol,4, No.1 (1994):23-34.

25. Romm, T; Pliskin, N.; Weber, Y. "The relevance of organizational culture to the implementation of human resources information systems". ***Asia Pacific Journal of Human Resources***, Vol.33, No.2 (1995): 51-63.

26. Schein, E.H. ***Organizational culture and leadership.*** Sanfrancisco: Jossey-Bass, 1992.

27. Shore, B.; Venkatachalam, V. "The role of national culture in systems analysis design". ***Journal of Global Information Management***, No.7 (1995) :5-14.

28. Southern, G.;Murray, A.U. "A quality information management: The Way to a better company culture". ***Information Mangement & Computer Security***, Vol.2, No.2 (1994):32-35.

29. Straub, D. "The effect of culture on IT diffusion: E-mail and fax in Japan and US". ***Information Systems Research***, No.27 (1994):23-47.

30. Teng, J; Calhoun, K. "Organizational computing as a facilitator or operational and Managerial decision making". ***Decision Sciences***, No.27 (1996):673-710.

31. Triandis, H.C. ***Individualism and collectiveism***. Colorado: Westview press, 1995.

32. Trempenaars, F.; Hampden –Turner, C .***Riding the waves of culture.*** 2nd Ed. New York: McGraw-Hill, 1998.

33. Weber, M. ***Bureaucracy***. New York: Oxford University press, 1946.

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