MANAGING THE IMPACT OF CULTURAL FACTORS IN THE DEVELOPMENT OF GLOBAL DECISION SUPPORT SYSTEMS

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ABSTRACT

This paper presents some relevant issues pertaining to development and use of decision support systems that are global in nature. Some design considerations along with intricacies of the global dimension are considered. Cultural aspects of such systems are examined, including fallacies that lead to development problems of such systems. The role of outsourcing and the role of Internet are briefly examined. Finally some recommendations and applications of such global decision support systems are discussed.

Keywords: Global decision support systems, cultural factors, cultural differences, global outsourcing, cultural myths, Internet and emerging technologies.

INTRODUCTION

In this paper, we argue for the increasing need to proactively manage the impact of cultural factors in the development of global information systems. We present evidence that cultural biases influence individual information processing and decision-making. Clearly, the cultural impact on decision-making can impact both managerial and technical dimensions. On the managerial side, companies need to ensure their business processes, relationship and personnel are sensitive to cultural factors. On the technical side companies need to explore user interfaces alternatives and the cultural neutrality between options, the need for multiple interfaces and adaptable interfaces to suit individuals preferences. Creating cross-cultural development teams, or even outsourcing to groups with experienced in the cultural needs of user interfaces, will help with these issues. Current trends in most IT departments reveal more users, more requests, more complex requests, more teams, fewer managers and more technology (9).

THE RISE OF GLOBAL DECISION SUPPORT SYSTEMS

In the last decade, there has been a clear growth of a global customer base. Organizations have invested valuable resources in developing global information technologies to support this global business. These information systems play a critical role in the organization's success or failure. So how important is culture in this development process? We argue it is absolutely critical.

Geert Hofstede (8), talks about country level differences and associates certain key words with each nation. For example Americans are viewed as believing that the USA is the world, while the Dutch focus on consensus, Nordic countries lean toward equality, Japanese focus on country or the benefit to Japan. Would it not be interesting to watch a decision-making process between an American and a Japanese, one focusing on the market and the other on the good of Japan?

Multinational firms, which have invested heavily in developing global information systems, will naturally try to leverage their investments by using the system everywhere. For example, GM has developed over 80 major applications within PLANETS, which is an Internet based modeling system for business planning (5).

FACTORS IMPACTING DECISION MAKING

The rapid growth in the field of information technology has resulted in a high rate of adoption by organizations. It is estimated that more than 40% of business people are currently using computers in some aspect of their work (4). This number has increased at a phenomenal rate in the last 4 to 5 years. While much information technology use is to automate existing business processes, it is also used to facilitate better-informed management decisions. However, it is a difficult to develop information systems that play a substantial role in the decision making process. This is only partially a technology issue. A major factor in the problem is found in differences amongst managers in how they make decisions, how they process information, and their biases.

The existence of information processing biases in decision-making has been known for decades. Gordon and Olson (1985) included the concepts in their seminal book "Management Information Systems: Conceptual Foundations, Structure, and Development." These finding have led to certain general design principles. An example would be to minimize the amount of information in one screen to avoid information overload and each individual window should put information together in meaningful groups or chunks. However, cognitive anthropology has learned that the way individuals categorize or chunk information is influenced by their culture (15). Hence, a cultural sensitivity to screen design exists.

The existence of decision-making biases between different groups has been reported. For example Baron et. al.(2) found a decision making bias between gifted and underprivileged students. While the gifted group had better performance on some items, their performance on the omission bias item was worse. Rutte et al. (12) found that the format and amount of information presented influences how fair salaries were judged to be. They also found a gender difference that they interpreted as a possible information processing biases. Many researchers have documented the existence of cross-cultural differences in decision-making. (10, 11, 14)

The resulting interaction of the factors found in the literature can be summarized in Figure 1. A poor match between the culture and the user interface can result in the user being dissatisfied with the system or poor decision-making.
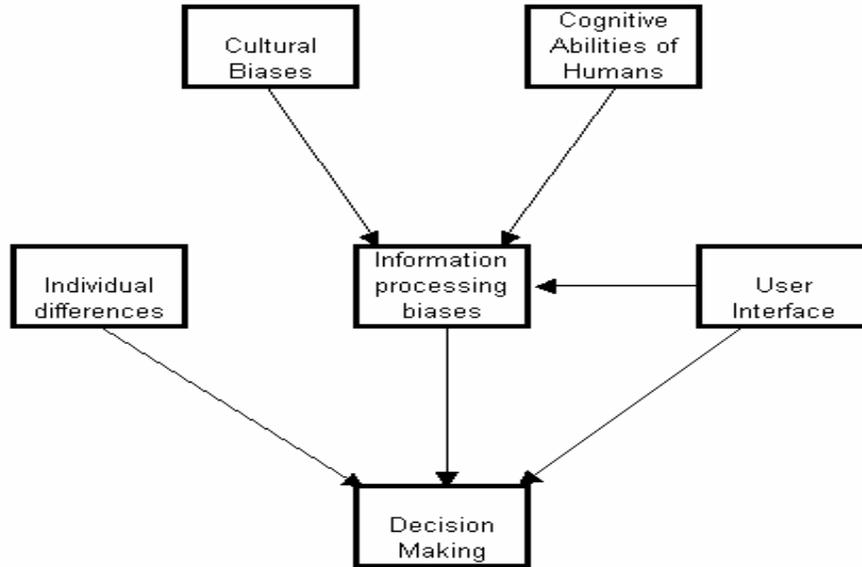
Figure 1: Factors impacting decision making

Dealing with cultural differences

For companies with global information systems or plans for them in the future, the cultural sensitivity factor is more than an academic issue. The potential for bad decisions and/or bad relations with either their employees or customers should not be dismissed. These organizations should address cultural factors on their information systems from both a managerial perspective and from a technical perspective.

From a managerial side, organizations need to ensure that their business processes related to decision support systems are sensitive to cultural factors. This may include a cost versus benefit analysis on handling cultural differences. Such analysis may lead to withholding the system from some cultures. An additional tactic may be to use training to overcome cultural bias.

While training may help the effectiveness of the system, it alone will not solve the entire cultural difference problem. For example, a decision support system may be constrained by the value systems of the user's culture. In some situations, a decision making bias may be explained in training but may not be perceived as a problem by the people being trained. In addition, the training is usually application specific and may not transfer to other systems. Bornstein et. al.(3) found the ability of medical residents to avoid a specific type of decision-making bias (sunk cost) through training did not carry over to other domains (non medical decision making).

It is important to note the degree to which the global nature was planned for in the development of a system. The three possibilities are: **Global by design** – a system developed to be global from the beginning; **Global by controlled evolution** -- a system originally developed in one country modified for use in other countries; and **Global by accident** – a system originally developed in one country and used in others with little change

Cultural differences problems in information systems will be affected by the degree to which global use is planned at the start. As figure 2 points out the risk of cultural misunderstanding will also vary by whether the user is internal to the organization.

Figure 2:Degree of risk of problems due to cultural differences

	Global by design	Global by Controlled Evolution	Global by accident
Internal user	Least risk	Some risk of users feeling slighted if a specific cultural group sees the system addressing cultures other then theirs.	Moderate risk - can be moderated by training and management practices
External users	Some risk but can be reduced by design process. The degree of reduction will be constrained by willing to commit resources to address issue	Some risk can be reduced by retro fitting needed adaptations into the existing system. However the cost will be greater than if global use originally planned. In addition, an anchoring bias will exist based on the existing system.	Most ris k

From a technology perspective, information systems people need to increase their knowledge of cultural factors in the design of global decision support systems. Developers need to more aware of user interface issues. The designer of the user interfaces will need to consider the degree of cultural neutrality between user interface options. Unfortunately there is little research yet to guide them in this area. Until the research is done some options may simply be chosen based on what is considered 'common' sense. For example consider the two interfaces below that allow a user to choose what items to include in their analysis. If the system was going to be used by cultures that read right to left the second format may be argued to be preferred and more neutral.
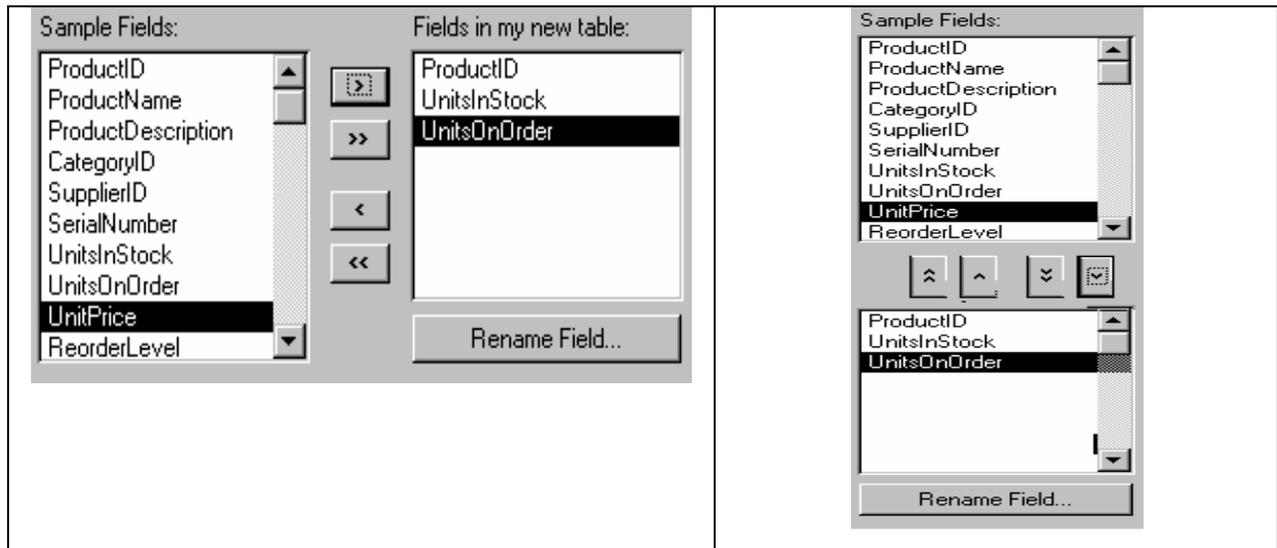
Figure 3   **Figure 4**

The Potential to Outsource

We will likely see consulting companies that specialize in addressing cultural issues. Professor Mohanbir Sawhney (13) from Northwestern University argues that this is evolving on the Internet. He identifies a new forms of market intermediaries which he terms a metamediary. These metamediators will assemble products and services, that are now fragmented among different companies, into a more complementary presentation based upon the customer way of connecting things.

Some Fallacies About Cultural Differences Having Little Impact
A few arguments have been raised as to whether firms should be concerned at all about the impact of cultural differences. We feel it important to address the major arguments that we have heard.

Fallacy #1: The Growth of the Internet Shows Cultural Differences Don't Matter
Hofstede (6, 7) identifies several dimensions of national culture that can be related to consumers and employees. He observes that the basic nature of management i.e. to "getting things done through other people" does not basically change. In other words it deals with human nature and this creates a huge problem when cultural differences exist (8). However, the rapid rise of the Internet and the fact that global issues for the majority of web pages that exist were not even considered one might argue that the cultural issues are not a critical issue. The recent cooling of the technology area has shown among other things that much of the growth in the Internet was not well planned or thought out. While the cultural issues were ignored to a great degree by many firms at the beginning so were several other fundamentals like making a profit. As the Internet has matured and the growth of new users on the Internet has been faster outside the United States the cultural issue is becoming more relevant.

The Internet has provided a standard set of technical protocols resulting in it becoming the fastest area of growth of global systems. This has been fostered as a result of two trends converging. The trends to provide consumers with decision support systems to help them in selecting a company's product, and the trend of moving computer systems to use the Internet as a front end interface. At times however this has also created a lot of global by accident systems.

Fallacy #2: People Don't Expect Computing to be Like Their Culture: Hence Cultural Differences Don't Matter

Lets look at the possibility that people approach computing as its own unique culture and that people of all cultures will approach the technology as a different culture and adapt there thinking too it. It needs to be pointed out that the computer technology in general and the web in particular has been described as having its own culture. However some researchers have pointed out that this culture has been influenced strongly by those who created it and the original users. Bardini st. al. (1) have argued that the personal computer technology can be viewed as a culture and that this culture has been socially constructed. Cushing argues that web norms have a decidedly male orientation because they were the vast majority among the original users as the norms were being developed. Hence even if one accepts

the argument that the Internet norms have created their own cultural norms they have been heavily influenced by the United States culture.

What is significant is that new users often approach computing with an expectation that it is going to be different then their normal activities. That is people come to the web with the expectation that the norms will be different. That is why when people first use the computer they may approach the Internet as something detached from their normal environment. In many ways then it would be natural for them to expect it to be different, similar to expectations they would have in visiting a foreign land with its own set of values, language and rules. For new computer users the cultural difference that they experienced may be expected and taken into account.

This argument breaks down on several bases. First, the expectation will not exist for users who have used computers with software interfaces that are geared toward their culture. Software that is not adapted for their culture may end up being viewed as ignorance or arrogance on the part of the developer.   as viewing it as justifiably its own culture. Second new technology does not remain foreign for long; it is soon made to fit in its particular culture. An example of a technology that this has happened to is television. It started off as something novel and different from peoples everyday life but has long since become part of the normal culture, yet due to cultural differences the standards of what is acceptable material to be broadcast on television vary around the world. The final argument is the fact that some researcher are already complaining about the existence of certain biases on the Internet demonstrate that some people are sensitive the issue. Managers can make the extra effort and conduct a series of cultural analysis to identify problems at the human level. While this is a complicated process the managers do not have to examine this at the depth a social scientist would. Butterfield and Pendecraft (4), recommend using the following steps: identify the stakeholders, determine the interactions, relationships between stakeholders, categorize each party according to cultural model (worksheet is provided), identify the interactions/dependencies between persons with cultural differences and finally develop contingency plans to deal with problems.

RECOMMENDATIONS AND CONCLUSIONS

We have raised the issue that cultural factors affect the effectiveness of global decision support systems. While the information processing theory has pointed out the existence of decision-making biases, little work has been done on the cultural relationship to these biases. The literature does however indicate that the there are cultural biases in decision-making. While much research remains to be done in this area, we have proposed some recommendations including the need to address them from both the managerial and technical perspectives.

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