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Cultural Effect on Using New Technologies

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***Abstract*—**One of the main concerns in the Information Technology field is adoption with new technologies in organizations which may result in increasing the usage paste of these technologies.This study aims to look at the issue of culture's role in accepting and using new technologies in organizations. The study examines the effect of culture on accepting and intention to use new technology in organizations. Studies show culture is one of the most important barriers in adoption new technologies. The model used for accepting and using new technology is Technology Acceptance Model (TAM), while for culture and dimensions a well-known theory by Hofsted was used. Results of the study show significant effect of culture on intention to use new technologies. All four dimensions of culture were tested to find the strength of relationship with behavioral intention to use new technologies. Findings indicate the important role of culture in the level of intention to use new technologies and different role of each dimension to improve adaptation process. The study suggests that transferring of new technologies efforts are most likely to be successful if the parties are culturally aligned.

***Keywords*—**Human-Computer Interaction, Accepting New Technologies, Culture, Behavioral Intention

I. Introduction

DEVELOPED and developing countries are faced by many differences in terms of social and economical success. This situation is shaped not only significant difference in social and economical success but also a difference in nations' cultures. Many of the primary causes for these dissimilarities were flowered from long history of advanced countries. However, many researchers believed that the significant differences are rooted from two basic causes include the existence of advanced technological infrastructure as well as popularization of new technologies in society. Hence, bridging the wide gap obligated the developing countries to invest on advanced technologies and upgrade the legacy technology's infrastructure.

There are some models of technology transfer which are well-known in this area. The most used theory by Information System academicians and practitioners is TAM (Technology Acceptance Model) designed by Davis [1]. TAM is an information systems theory that models how users come to accept and use new technology. Even with relevant new knowledge about human behavior and all aspects related to successful technology transfer, actually implementing a new program or practice is difficult and may take a long time.

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Reference [2] found that social influences play an important role in determining the acceptance and usage behavior of new adopters of new information technologies.

In addition, individual characteristics like age , qualification , prior experiences in adopting technology, technology suppliers' commitment , compatibility with existing technology and enhanced value can be considered as other important factors. Reviewing earlier literatures indicated that TAM has been replicated and extended by a quite large number of studies. Nevertheless, in their endeavour to better explain and predict IT usage, few researchers have explored and tested the impact of cultural factors on the usage behaviour [3], [4] and [5]. Therefore, given this gap in the literature the present research aims at testing the influence of culture on the adoption and use of IT. By studying IT use; researchers intend to shed light on the effect of cultural context on usage behaviours.

This study will be focused on the Behavioral Intention as dependent variable and Culture as independent variable. Acceptance of the Technology Acceptance Model (TAM) is assumed.

The purpose of this study is to determine the role of the culture in intention to use new technologies in organizations. One of the major challenges inside firms is how to effectively manage the cultural conflicts in the context of managing the acceptance of technological knowledge transferred across the firm's organizational boundaries. This paper aims to explore how cultural barriers in organizations affect the technology transfer process.

The present study addresses below research questions by testing a cultural influence on Technology Transfer through combination of Hofstede questionnaire and TAM (Technology Acceptance Model) questionnaire. Here cultural believes and values are major constructs while a dependent variable is technology transfer's performance or behavioral intention of new technology in Malaysian companies. In this paper, Technology Acceptance Model (TAM) is assumed as accpeted theory and is not going to test again.

The research questions are as bellow:

- Do different culture affect the transfer of technology in organizations?
- How different dimensions of the culture effect using new technologies in organizations?
- Is there any difference in willingness of using new technologies in different cultures?

II. Literature Review

A. Technology and Technology Transfer

Technology is defined not only as process and product, but also as information that firms are using; and technology transfer is defined as the iterative movement of applied knowledge through channels of communication, in the manner of the process school of communication [6]

The transfer of technology includes the purpose, application, and justification of the technology. It is what to employ, how, when, and why [7]. Comments on the survey questionnaires and from field research revealed that many practitioners do not share academia's definition of technology. They view technology transfer as involving only the "hard" (more tangible) forms of technology - not knowledge and other "soft" aspects of the process. Agreement among academicians and practitioners about the definition of technology would improve future research [8]. The literature of information systems and organizational behaviors contain a profusion of material about the barriers to technology transfer. Many people that do have access to technology find the experiences of their interactions difficult, cumbersome and unhappy due to the complexity of such technology. Conversely, even though certain cultures may be somewhat resistant to change, technology can be an overwhelming force under certain sociological and economic conditions [9]. A. Riege [10] mentioned: 'The transfer of knowledge is deep rooted in personal and organisational value systems, norms, and practices. Within corporations these must be embodied and personified by mainly senior and middle managers whom openly support and encourage knowledge transfer initiatives and lead by example on a daily basis. Researchers found that transferring technology to organizations faces some problems if the context and environment were not ready for it.

Reference [11] determines organization elements and their relationship with technology and knowledge transfer in public sector. In their framework they identified five main independent variables – organizational culture, organizational structure, technology, people/human resource and political directives – which tested against knowledge transfer performance. According to them, sharing culture is one of the most important elements that need to be understood before implementing any new strategies in public organizations. Culture is regarded as the key factor since it determines the effects of other variables such as technology and management techniques on the success of knowledge management.

In exploring the literature of user acceptance and use of technology, the TAM (Technology Acceptance Model) is one of the most cited models, received 424 journal citations in the Social Science Citation Index (SSCI) by the beginning of 2000 and 698 journal citations by 2003. This model developed by Davis [1] to explain computer-usage behaviour. All researchers agreed that TAM had important impact on Information System field. In present research, Technology Acceptance Model assumed as accepted theory. As studies show there are plenty of researches in Information System areas in which worked on factors influence the process of accepting and adopting new technologies. One of the strongest factors recognized by researchers was Culture. The major focus of the study is on investigating the role of different cultures on intention to use new technologies in organizations and predicting the related factors affect on the process of acceptance.

B. Culture

There are many approaches to culture and even more definitions. References [12] in their classic review of culture, reported 156 different definitions, which they arrange under six different generic headings. In the years since they wrote many other definitions have been attempted and still there is no consensus [13]. Cultural dimensions are often identified as a crucial influence on the success or failure of transferring new technology inside firms. Worldwide studies in recent and previous years represented the importance of study of how culture affects the adoption of new technologies in organizations [14]. Culture, a system of shared values and assumptions, is critical to any organizational activity. It dominates how organizations function, how employees interact, and how decisions are made. Culture represents a core set of values governing the attitudes employees adopt toward change and their approaches to the introduction of something new [15]. Reference [16] argued that culture is the single most important factor accounting for success or failure in organizations.

Reference [17] refered to the paradox implicit in linking culture with change. On the surface culture has essentially traditional and stable quality, so how can you have a "Culture of change?" Yet this is exactly what the innovative organization needs.

The most widely cited theory in culture and organizational culture comes from Geert Hofstede's work [18]. In his official website, he describes all steps and works were done by him and his group or others to extend the theory later. Reference [19] classified organizations in different four categories by link different culture to correlations between the power distance and uncertainty avoidance dimensions, based on Mintsberg's classification of organizational structure. As he found there is a high correlation between the Muslim religion and the Hofstede Dimensions of Power Distance (PD) and Uncertainty Avoidance (UA) scores.

As can be seen in his website in Malaysia's page the combination of two high scores (UA) and (PD) create societies that are highly rule-oriented with laws, rules, regulations, and controls in order to reduce the amount of uncertainty, while inequalities of power and wealth have been allowed to grow within the society. These cultures are more likely to follow a caste system that does not allow significant upward mobility of its citizens. When these two dimensions are combined, it creates a situation where leaders have virtually ultimate power and authority, and the rules, laws and regulations developed by those in power, reinforce their own leadership and control. It is not unusual for new leadership to arise from armed insurrection – the ultimate power, rather than from diplomatic or democratic change.

III. Research Methodology

For the sake of data collection, the survey's questionnaires were distributed to meet research objectives. The targeted respondents were those who were working in Malaysian Companies. The respondents were affected by Information systems (i.e., their employers adopted significant ICTs and they personally used Information systems for work-related purposes) to specify different organizational culture and investigate the effect of differences on employees behavior to use internet as one aspect of new technology in organization.Hence, the participants to the survey were employees who were working with Internet in their companies. The respondents were selected using the convenience sampling technique. A total of 180 respondents were collected from 200 distributed questionnaires (90%) whereas 171 out of 180 (95%) met the eligibility criteria. Then the eligible questionnaires were considered for future data analysis. The organizational culture are categorzied to various constructs included power distance, uncertainty avoidance, individualism/ collectivism, masculinity/ femininity, long-term orientation, behavioral intention in technology acceptance model, and perceived quality of working life. These constructs were adopted from Greet Hofstede's cultural theory [18] and TAM (Technology Acceptance Model) from Davis [1].

IV. Hypothesis

H_A: Culture (four dimensions: Power distance, uncertainty avoidance, masculinity/ femininity and individualism/ collectivism) has significant relationship with behavioral intention.

H_O: Culture (four dimensions: Power distance, uncertainty avoidance, masculinity/ femininity and individualism/ collectivism) has no significant relationship with behavioral intention.

V. Research Results

A. Frequency Distribution And Profile Of Respondants

The Table I shows the results of largest group of each variable in the profile of the respondents. The respondents were classified into four classes of age.

The analysis represented that majority of the participants (49.7%) belonged to the age group of 21-30 years, whereas 2.3% of whom had above 50 years old. 38% and 9.9% of all respondents belonged to age groups of 31-40 and 41-50 years old respectively.

TABLE I
PROFILE OF RESPONDENTS (LARGEST GROUPS)

Demographic variable	Largest Group in Each Variable	Frequency	Percent
Age	21-30 years old	85	49.7%
Gender	Female	104	60.8%
Highest Education	Degree/ Professional	93	54.4%
Level			
Marital Status	Single	101	59.1%
Ethnic	Malay = Chinese	79	46.2
Position	Executive and Below	74	43.3%
Working Experience (YEARS)	1-3 years	75	43.9%
Industry	Services	40	23.4%

Further, 39.2% of all respondents were male, while 60.8% of whom belonged to female group.

Respondents were classified into three groups based on their position in the company. The analysis revealed that 43.3% of all respondents held position of executives and below whereas 17.5% of respondents were supervisor and 39.2% worked as managers.

B. Measures of Central Tendencies, Dispersion and Reliability

Descriptive statistics were used for data analysis. The mean, variance and standard deviation for all variables permit comprehensive examination of the data and evaluate the normality of data distribution. Descriptive outputs provide information related to distribution of scores on variables using Kurtosis and Skewness statistics. All variables in this survey fulfilled the Kurtosis and Skewness requirements. Hence, the data were normal.

According to Table II, The values of Cronbach's Alpha are above 0.6. The results indicated the acceptable internal consistency (reliability) for each construct.

TABLE II
CRONBACH'S ALPHA FOR EACH VARIABLE

Variables	***No of measurement items***	***Cronbach's Alpha***
Culture	*12*	*.607*
Behavioral Intention	*4*	*.771*
Overall TAM	*23*	*.907*

C. Testing The Hypothesis

According to Table III, there is a significant positive relationship between Power Distance and Behavioral Intention ($r = 0.204$, p-value=0.004<0.05). In addition, there is a significant positive relationship between Uncertainty Avoidance and Behavioral Intention ($r = 0.173$, p-value=0.012<0.05). The results of Table IV showed the positive significant relationship between Collectivism/Individualism and Behavioral Intention ($r = 0.133$, p-value=0.042<0.05). The positive r-value indicates that with increasing in each of these dimensions the Behavioral Intention will be increased. However, There is no significant relationship between Behavioral Intention and Masculinity/Femininity ($r = 0.070$, p-value=0.182>0.05). This may interpret neither masculine culture nor feminine culture has effect on intention to use new technologies.

TABLE III
THE RELATIONSHIP BETWEEN BEHAVIORAL INTENTION AND FOUR DIMENTIONS OF CULTURE

Variables		BI	Mas/ Fem	Col/ Ind	UA	PD
BI	Pearson Correlation	1	.070	.133*	.173*	.204*
	Sig. (1-tailed)		.182	.042	.012	.004
	N	171	171	171	171	171

*. Correlation is significant at the 0.05 level (1-tailed).

VI. DISCUSSION AND CONCLUSION

This study attempted to investigate the effects of culture on intention to use new technology.

With doing Pearson's correlation analysis, researchers found that there is a positive but not strong relationship between culture's dimensions and intention to use new technologies. Strength of relationships may be affected by medium sample size and can be increased by choosing larger sample sizes for future studies. The three Culture dimensions included Power Distance, Uncertainty Avoidance, and Collectivism/Individualism have positive significant correlation with Behavioral Intention to use new technologies. However, the correlation analysis indicated that there is no significant relationship between Masculinity/Femininity and Behavioral Intention.

There are several studies to investigate the role of the age and gender on different dimensions of culture [20] and [19]. According to Hofstede's study [19] masculinity was seen to decrease with age. In a recent study which were studied two Asian and western countries, namely China and Canada, Reference [20] conducted a study between China and Canada. The results indicated that older and male are tend to be more collectivist. They also found that PDI will increase with increasing in age and level of masculinity. According to their study, Uncertainty avoidance also will increase with increasing in age. This may be because of older respondents are more cautious and risk averse. Future researches can be organized to complete the present study.

According to Zakour [21], in high power distance cultures; the individuals are not supposed to disagree with their superiors. In terms of IT assessment, their reliance upon the opinions of superiors will be more marked than individuals who come from low power distance cultures.

"In feminine cultures individuals are expected to pay more attention to the opinions of the others in behaving since they are more people-oriented than in masculine cultures where the most important thing is the goal achievement. Also people in individualist cultures are more concerned by their selves than by the group. Therefore, opinions of the members of the group will not have weight in their decision to adopt the IT. Conversely, people holding collectivist values will be more concerned about the maintenance of the group cohesiveness. This is why they will be expected to show more interest in other's opinions about the IT." [21]

In this research, the researchers were interested to highlight the degree of importance of building a suitable organizational culture to make acceptance of new technologies easier. In researchers' point of view, the importance of culture did not receive as much emphasis as other factors.

Researchers are expected to contribute to the body of knowledge in terms of providing an insight to adapting new technologies process specially in Malaysian organziations. The developed framework bridged the gap on studies, which conducted investigations on adapting new technologies. This is important in implementation of the new technologies. Our study also emphsized on lack of studies that were carried out among Malaysian organziations.

The results of this study can be used by businesses as a useful resource. The developed framework on cultural effects, will help businesses to understand what they need to be an effective organization in terms of implementation new technologies. It goes on to suggest that businesses should compare their organizational culture with successful organizations.

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