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by

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ABSTRACT

Technology adoption is affected by many factors, including culture. The aim of this research in progress paper is to further clarify and explain the role of culture when considering the acceptance of Information and Communication Technologies in emerging economies. A particular cultural dimension – Uncertainty Avoidance – has been identified as a key element moderating technology adoption. Our results indicate that emerging economies generally have a higher level of uncertainty avoidance. Focusing on this angle, we review relevant information communication technology literature, and provide guidelines for emerging economies to accelerate adoption of new information and communication technologies.

Keywords: **technology adoption, cultural dimension, uncertainty avoidance, emerging economies**

INTRODUCTION

For several years economists were sceptical of the role of Information and Communications Technologies (ICT) in accelerating growth (Brynjolfsson, 1993; Jorgenson and Stiroh, 1995). However, since the emergence of novel technologies such as broadband-based advanced Internet related products and services, the view has changed and it is now widely believed that countries possessing more advanced technologies will emerge as the economic powerhouses of the future

(Solomon, 2005; Kurihara, Takaya, Harui and Kamae, 2008). Thus, for emerging economies ICT represents a unique opportunity to catch up more quickly with developed regions and even leapfrog, both in terms of technology and economy (Lee, 2003).

Currently, emerging economies such as India and China are recognised as countries that will experience growth faster than developed economies (Gurria, 2011). A factor leading to growth is technology innovation. As Infosys Technologies Chief operating Officer commented: "…emerging markets are becoming hotbeds of innovation, producing breakthroughs in everything from automotive to telecoms to healthcare" (Segran, 2011).

At the same time, not all ICT approaches and solutions taken from developed regions are applicable to emerging economies without changes and modifications (Sahay and Avgerou, 2002). Some researchers show in case of specific ICT implementations how social structures or cultural differences may affect the adoption and use of new technologies in emerging economies (Walsham and Sahay, 1999; Kumar and Kelly, 2005; Roztocki and Pick, 2005).

From the more general theoretical point of view the adoption of technology occurs within the social context, which may be described as the encoding of values, beliefs and acceptable patterns of behaviour (e.g. communication patterns, sharing private information etc.) (Rogers, 2003). This infringes on the topic of culture and many authors comment on the culture being an important element of information and communication technology (ICT) adoption and diffusion (Wheeler, Dasgupta and Lall, 2001; Kiiski and Pohjola, 2002; Bagchi, Hart and Peterson, 2004; Huang and Chen, 2010).

Thus to provide guidelines for ICT adoption in emerging economies, the following aim and research questions are formulated:

The aim of this research is to further clarify and explain the role of culture when considering the acceptance of information and communication technology in emerging economies.

For this purpose, the following research questions are applied to this research.

Based on cultural frameworks, can we identify a particular distinguishing factor, which is advocated by classic theorists as having an effect on technology adoption and at the same time provides separation for emerging and non-emerging countries?

Using this distinguishing factor, what recommendations can be isolated from ICT literature that are applicable to emerging countries?

To answer the above questions, our paper is organized as follows: In order to operationalize our research, initially the cultural frameworks and key approaches applicable to technology adoption arena are identified and discussed. This is followed by a consideration of cultural frameworks where emerging and non-emerging regions can be separated using quantitative methods. This enables us to further focus our research and review ICT literature from the angle provided by our results. Finally, the key findings and a discussion of their applicability to emerging countries is provided.

CULTURE AND TECHNOLOGY ADOPTION

Culture has been defined in several perspectives. Definitions vary from the most complex and comprehensive to the more practical and operational (e.g. Kluckhohn, 1962; Hofstede, 1991). According to Kluckhohn (1962): "Culture consists of patterns, explicit and implicit, of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including their embodiments in artefacts." (Kluckhohn, 1962:73). A classic view of culture is provided by Hofstede (1991) where culture is defined as "the collective programming of the mind which distinguishes the members of one group or category of people from another" (Hofstede, 1991:5). To operationalize the above definitions, several sets of dimensions have been developed to characterize the concept of national culture (Hofstede, 1991; Trompenaars and Hampden-Turner, 1997; Schwartz, 1999; House, Hanges, Javidan, Dorfman and Gupta, 2004; Inglehart and Welzel, 2005). These approaches generally argue that culture is a viable explanatory variable as it is conceptualized in a multi-dimensional structure (Kitayama and Cohen, 2007).

One of the most commonly cited culture constructs (Tung and Verbeke, 2010) is Hofstede's early work on IBM subsidiaries in 40 countries (Hofstede, 1980). Hofstede's study comprised of 116,000 questionnaires, from which over 60,000 people responded from over 50 countries between 1967 and 1973. Hofstede worked with IBM staff over ten years to complete his research. From the data he provided a factor analysis of 32 questions in 40 countries. Hofstede (1980) identified four bipolar dimensions (Power Distance; Individualism/Collectivism; Uncertainty Avoidance; Masculinity/Feminity), which became the basis of characterisations of

culture for various diverse countries. A subsequent study including Asian countries introduced a fifth element, called Long Term Orientation (Hofstede and Bond, 1988). Finally, in the latest survey module, dimensions called Indulgence vs Restraint and Monumentalism vs Self Effacement were added (Hofstede, 2010), but these dimensions are outside the scope of this paper.

An alternative theory associated with culture is Trompenaars and Hampden-Turner (1997), which is based on a 10 years study of 20 countries managers. In Trompenaars and Hampden-Turner's (1997) study culture is viewed to be the way that a group of people solve problems. Trompenaars study consisted of 7 important dimensions for culture: Universalism versus Particularism, Individualism versus Collectivism, Neutral versus Affective, Diffuse versus Specific, Achievement versus Ascription, Attitude to Time, Attitude to Environment. Trompenaars and Hampden-Turner (1997) study is similar to Hofstede but does not consider cultural dimensions linear and dichotomous. Further, this framework is not viewed to proffer a practical approach to culture.

When considering culture, another well cited, diverse framework is Schwartz's (Schwartz, 1992; Schwartz, 1994). In this work, culture is considered in three ways: Conservatism/Autonomy, Hierarchy/Egalitarianism, and Mastery/Harmony. Schwartz framework is preferred to many due to the clear distinction between cultural and individual levels of analysis with a presentation of each level separately. Most valued about this study is the study of content and structure of human values. Since this research consists of fundamental values, it can be applied to diverse subjects such as, marketing, consumer behaviour, human resource management, organisational behaviour, economics and finance. However, the flaw of this research is the absence of an indicator of the value types that are applicable to a greater or lesser degree to each culture.

Finally, an alternative and extension to Hofstede's framework is the GLOBE study (House et al., 2004), which was conducted in several waves from 1995 to 2005. This project considered many of Hofstede's (1980) dimensions but also expanded on areas such as, numbers of dimensions and methodology (House et al., 2004). The surveys were distributed in 62 countries and collected from more than 17,000 middle managers working in over 900 different organizations. The study not only surveyed actual society practices ("As Is") but also aimed at collecting data on society aspirations or values ("Should Be" or "To Be"). Using a rigorous approach (House et al., 2004;

Javidan, House, Dorfman, Hanges and Luque, 2006), the GLOBE study defined nine cultural dimensions: Power Distance, Uncertainty Avoidance, Institutional Collectivism, In-Group Collectivism, Gender Egalitarianism, Assertiveness, Future Orientation, Performance Orientation, and Humane Orientation. Similarly to Hofstede's work (Hofstede, 1980), prominent in this research was the dimension of Uncertainty Avoidance.

Upon reviewing the above frameworks, we found that the Uncertainty Avoidance (UA) dimension, appearing both in Hofstede's work and in the GLOBE study, is considered to be a key element in moderating technology adoption and usage. Hofstede states that technological solutions are more appealing to high UA societies, as they are more formalized and predictable than human approaches (Hofstede, 1991). The GLOBE study also notes that "… in no other realm of human endeavour would we expect uncertainty avoidance, defined in terms of formalization and structure, to be more influential than in the conduct and progress of science and technology" (House et al., 2004:632-633).

Following the identification of the UA dimension with a proposed effect on technology adoption in two prominent cultural studies (Hofstede, 1991; House et al., 2004), now we contrast this cultural factor in emerging and non-emerging countries.

UNCERTAINTY AVOIDANCE AND EMERGING ECONOMIES

Following our discussion to this point, UA has been considered to be the most influential cultural dimension in determining cross-cultural variation in technology acceptance based on both cultural studies relevant to our work (Hofstede, 1991; House et al., 2004). However, comparisons of the two identically named dimensions have shown differences among the actual values and rankings of countries (House et al., 2004; Venaik and Brewer, 2010). Therefore, comparing these metrics in terms of emerging countries is an important addition to research in this area. In the following sections an overview is provided about the term Uncertainty Avoidance. We also identify differences for emerging economies.

Hofstede defined the Uncertainty Avoidance Index (UAI) (1991) as follows: ''Uncertainty-avoiding cultures shun ambiguous situations. People in such cultures look for structure in their organizations, institutions and relationships, which makes events clearly interpretable and predictable.'' (Hofstede, 1991:148). The Hofstede manual describes UAI as ''the extent to which

the members of institutions and organizations within a society feel threatened by uncertain, unknown, ambiguous or unstructured situations'' (Hofstede, 2010). Hofstede's measure of UAI is a calculated score based on five-point Likert scale survey items. Hofstede varied his UAI survey items several times and different formulas are described in the survey manuals (Hofstede, 2010).

In the GLOBE study, UA is defined as ''the extent to which members of collectives seek orderliness, consistency, structure, formalized procedures and laws to cover situations in their daily lives.'' (House et al., 2004:603). This is a very close meaning to that of Hofstede. The GLOBE UA indexes are based on calculations of the means of corresponding survey responses. Survey items use a seven-point Likert scale: the GLOBE group used four questions to evaluate UA society practices (UAP). UA society values (UAV) are assessed using five questions with ''should be'' phrases rather than ''are'' – as for practices.

The use of UAP and UAV metrics together, i.e. the applicability of society practices in comparison to society values is still an open debate, due to their statistically very significant negative correlation. Authors mostly deal with this issue from the international business point of view: a recent heated debate concerns the theoretical explanation of the negative correlation (Maseland and van Hoorn, 2008; Taras, Steel and Kirkman, 2010; Tung and Verbeke, 2010; Venaik and Brewer, 2010). Some authors approach this issue from the marginal preference point of view, while others refer to the Maslow model (Maslow, Frager and Fadiman, 1987) for explanation. Rather than engaging in the above theoretical debate, this study concentrates on the UAV metrics, which very significantly correlates with UAI and thus provides corroboration on the UAI-based calculations.

Further, it has been shown that UAV is more resistant to systemic changes than UAP in case of an emerging country (Hungary) (Köles and Vörös, 2011), and this also indicates that for this study UAV is a more appropriate metric.

To contrast emerging and non-emerging countries, research data from Hofstede (Hofstede, 1991) and GLOBE (House et al., 2004) were combined. Our approach has multiple aims: (i) as the UA metric appears in both studies, contrasting these measures in this context provides further insights into culture; (ii) using data from both studies provides a more solid support to our

findings; and (iii) considering the time gap between these studies, a longitudinal element may be introduced. The combined research data resulted in a list of 42 countries.

An added part of this research is to examine 'emerging economies'. Various definitions of 'emerging economies' exist, but for the purposes of this research the following is offered. The term 'emerging economy' was introduced in 1981 by Antoine van Agtmael of the World Bank (Agtmael, 2007) and refers to a country that has begun a path of economic growth, together with a process of reforms. Based on the rate of economic growth and the type of envisaged reforms, different countries may be defined under the above umbrella term. A detailed list is available from Hoskisson, et al (2000), who combined two groups of "51 high-growth developing countries in Asia, Latin America, and Africa/Middle East and 13 transition economies in the former Soviet Union" into the category of emerging economies. The authors defined an emerging economy as a country that "satisfies two criteria: a rapid pace of economic development and government policies favoring economic liberalization and the adoption of a free market system".

The integrated list of 42 countries from Hofstede and the GLOBE are illustrated in Table 1, where countries have been separated into classifications as defined by Hoskisson et al (2000).

Table 1. Emerging and Non-emerging Countries

Emerging Country	Non-Emerging Country
China	Singapore
Malaysia	Denmark
India	Sweden
Indonesia	Hong Kong
South Africa	Ireland
Thailand	United Kingdom
Ecuador	Philippines
Morocco	United States
Brazil	Canada

Emerging Country	Non-Emerging Country
Colombia	New Zealand
Israel	Australia
Hungary	Netherlands
Mexico	Switzerland
Turkey	Finland
South Korea	Germany
Argentina	Austria
Poland	Italy
Russia	Costa Rica
Portugal	France
Greece	Spain
	Japan
	Guatemala

Source: Hoskisson et al (2000)

Hoskisson et al's (2000) list is limited as it does not provide a marked difference between the diverse economies. To compare the averages of the emerging and non-emerging countries for UAI we employed SPSS for statistical approaches (t-tests) with the data provided by Hofstede (1991), Hoskisson et al (2000) and House et al (2004) in Table 2.

Table 2. T-test Results for UAI and UAV

	MEAN Non-emerging countries	STANDARD DEVIATION Non-emerging countries	MEAN Emerging countries	STANDARD DEVIATION Emerging countries	Significance (2-tailed)
UAI Mean	55.81	24.68	73.15	22.66	0.02
UAV Mean	4.10	0.61	4.93	0.38	5.60E-07

When examining the means of UAI for the emerging and non-emerging countries, there is a statistically significant difference (see UAI Mean row in Table 2). An even stronger effect is observed for the means of UAV (statistically very significant difference between the UAV mean scores), suggesting that emerging economies such as, currently India, Brazil or Mexico, in general, have a higher level of UA (see UAV Mean row in Table 2).

Many of the emerging economies are also viewed to consist of societies that have a preference for order and structure, whether within their societies, organisations or institutions – which is a key representation of high UA values. Various regression-based studies also uncovered relationships between UA values and economic variables, e.g. Gross National Income per capita correlates with UAI (Dodor and Rana, 2007). Noting the above and aiming to keep a distance from the causality debate, we state that *on average, emerging countries exhibit an artifact of higher uncertainty avoidance than other countries*.

The above statements leads us to focus our research further on findings of ICT researchers in terms of ICT adoption in high UA countries. However, before moving forward to the ICT literature, we look at comparative box-and-whisker diagrams of the UA metrics (see Figure 1 and Figure 2). These diagrams accentuate two important facts.

First, we are talking about *means* of UA scores – there are emerging countries with lower UA scores and non-emerging ones with comparatively higher UA scores. Different countries have different cultural heritage and the overlap of these categories is expected. However, in average our statement holds true.

Second, we note the more explicit separation of emerging and non-emerging countries on Figure 2. This leads us back to our proposition of reviewing possible longitudinal effects between UAI and UAV. While we are aware of the differences between UAI and UAV (Venaik and Brewer, 2010), we have found that there is a very significant correlation between these scores ($r=0.4$, $p<0.01$) and we contrast ranks of individual countries between the two metrics.

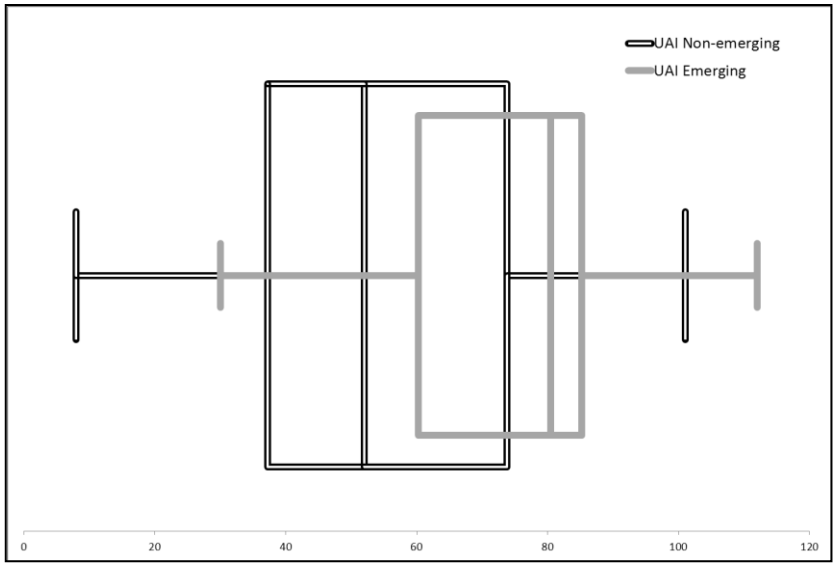

Figure 1. UAI Boxplot for Emerging and Non-emerging Countries

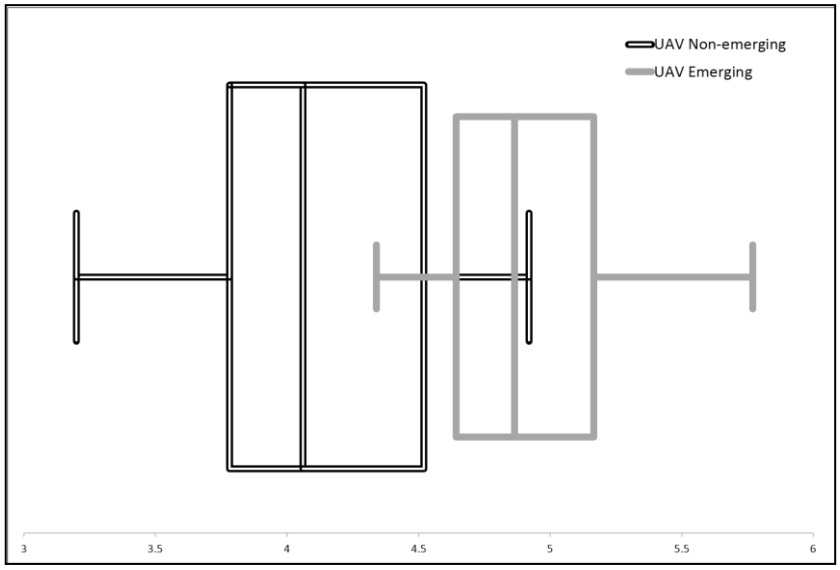

Figure 2. UAV Boxplot for Emerging and Non-emerging Countries

With the above aim in mind, we conducted a statistical test to compare the change in the rankings of countries from Hofstede to the GLOBE study. We completed an independent-samples t-test to compare the changes of UA ranks for emerging and non-emerging countries from Hofstede to GLOBE. Our calculations indicated that there is a statistically significant difference in the average UA rank changes between emerging countries (M=4.65, SD=3.37) and non-emerging countries (M=-4.2, SD=2.44), p=0.04. Based on this analysis, on average emerging countries move higher by almost 5 ranks in the GLOBE study in comparison to their

ranks in Hofstede's research. Comparatively, non-emerging countries decrease on average by more than 4 ranks in comparison to Hofstede's research.

There are various possible explanations for this phenomenon.

As noted UAV and UAI, while statistically very significantly correlated, are different metrics. Despite their common title, different survey items are employed; hence measure different underlying values. Additionally, UAI was based on a respondent group from a single organization (IBM) in the 1980s, while UAV was measured on mid-level managers of local organizations in the late 1990s. The difference displayed in the case of emerging and non-emerging countries are due to the different underlying measured values and may not be a consequence of emerging countries becoming more, and possibly non-emerging countries becoming less, uncertainty avoiding.

An alternative explanation may be that in fact the uncovered difference shows a relative increase of uncertainty avoidance in emerging countries vis-à-vis non-emerging countries. The cause of this deepening divide may be attributed to the environmental uncertainty. The safer environment in developed countries results in members being less and less uncertainty avoiding. On the other hand, in emerging economies, generally the risky environment, political instability and systemic changes may increase uncertainty avoidance.

Based on these results, we now turn to reviewing the consequences of a higher UA in terms of ICT. We note that the deepening divide between UA ranks over time further emphasizes the need to understand the effects of UA on ICT adoption and a future consideration for this research.

UNCERTAINTY AVOIDANCE AND TECHNOLOGY ACCEPTANCE

Following the statement of emerging economies and their higher UA characteristics, we now refer to the extant ICT literature and review it in light of our UA findings.

One approach on this area hypothesises that uncertainty may decrease in an ICT supported environment; thus high UA countries would use ICT more extensively (Hofstede, 1991). At the same time, the adoption of ICT is associated with a heightened sense of initial risk and it is also a reasonable assumption to expect low UAI countries to accept ICT innovations quicker (Bagchi et al., 2004). This is also related to the fact that low uncertainty avoiding societies tend to have a

high rate of innovation and accept uncertainties more easily (Hofstede, 1991; Bagchi et al., 2004).

These approaches have been revisited in several papers, using various methodologies. What was also learnt in the ICT literature is that there are two major streams of research when considering the relationship of technology adoption, diffusion and cultural effects. On one hand, in nation-level studies, researchers use regression or similar techniques to discover the effects of multiple variables (including UA) on ICT metrics (e.g. broadband usage) (e.g. Huang and Chen, 2010). Comparatively, researchers studied the effects of cultural variables on the Technology Acceptance Model (TAM) (Davis, 1989; Davis, 1993; Venkatesh, Morris, Davis and Davis, 2003; Venkatesh and Bala, 2008) and evaluated UA as a moderator on various relationships in the TAM (e.g. Srite and Karahanna, 2006). From this, the two major streams, using different underlying frameworks, may be identified as follows:

- UA and ICT diffusion – nation-level studies regressing on national level ICT indexes, using UA;
- UA as TAM moderator – using UA as a moderator on TAM relationships (either national level or individual level). This stream may further be subdivided to be either meta-analysis of existing papers published in different countries or direct comparison of individuals (from different countries) in information technology usage.

Both major streams are reviewed and findings common and applicable to high UA countries are identified. Analyzing these alternative approaches enables us to provide recommendations not only at the national, but also at the individual level. This way more comprehensive guidelines may be summarized for emerging countries with their higher UA status.

In the next sections we highlight key findings of the above streams. We also comment on the inherent limitations present in various streams.

UA and ICT Diffusion

The literature review found a number of papers emphasizing the importance of culture in the diffusion process (Png, Tan and Khai-Ling, 2001; Kiiski and Pohjola, 2002; Bagchi et al., 2004; Erumban and de Jong, 2006; Huang and Chen, 2010). These studies use Hofstede's cultural variables, but in general posit that low UAI countries have higher rates of adoption. This is due

to the reasoning that adopting ICT implies an uncertain situation. Some authors find strong support (e.g. Png et al., 2001), while others only very weakly support (e.g. Bagchi et al., 2004) the above hypothesis. Many of these papers concentrate on a cross-sectional approach, which is problematic due to the longitudinal nature of the diffusion process (Rogers, 2003). As ICT researchers Myers and Tan (2003) commented, culture cannot be examined in terms of a static view, but should be viewed as being dynamic and emergent.

Using the product adoption Bass model (Bass, 1969) a particularly detailed analysis evaluating a long time period and thus avoiding the cross-sectional problem has been completed by Huang and Chen (2010). It was concluded that in the early days of Internet diffusion, UAI had an important negative effect (though statistically only significant), but this effect diminishes as time (and the diffusion curve) progresses.

While these are important findings, these results are limited in scope and context, as

- statistical diffusion data (e.g. reliable Internet, wireless or broadband data) is difficult to obtain across the world;
- due to the large number of correlating variables, multi-colinearity is difficult to deal with;
- these approaches fully assume a static cultural variable approach; and
- Finally, these approaches require some assumptions on the diffusion curve which may or may not be true.

UA as TAM Moderator: Meta-analysis

An analysis of TAM articles uncovered four papers related to this topic (Ma and Liu, 2004; King and He, 2006; Schepers and Wetzels, 2007; Cardon and Marshall, 2008). However, culture is only addressed by two of these studies: Schepers and Wetzels (2007) contrast Western and non-Western societies, without identifying the cultural dimensions. Their findings showed that culture does seem to have a significant moderating influence; however, there is no clear emerging pattern.

The only paper discussing both Hofstede and the GLOBE study is written by Cardon and Marshall (2008). A summary of 95 studies from 19 countries and using UAI, UAP and UAV items revealed that UAI and UAV are poor predictors of the traditional proposition (i.e. higher UA countries use more technology), although UAV outperforms UAI. It seems, that similarly to

cross-sectional diffusion studies, the hypothesis of higher UA countries being associated with more technology remains an open question based on this stream of research as well.

It should be noted that the above analysis approach is severely limited by the following issues:

- TAM has several different versions and the authors usually added extensions to the model. That is, only overlapping parts of the models are applicable;
- not all authors reported correlation matrices and statistical data in detail;
- some authors are more interested in structural relationships; and
- Western societies (particularly the USA) are over-represented in the literature (i.e. out of 95 papers 39 were USA-based in the Cardon and Marshall study (2008)), but several other countries have been sampled only once.

UA as TAM Moderator: Direct Comparison

Relatively few studies attempted to directly compare the cultural dimensions and TAM. Most of these studies relied on Hofstede's dimensions when comparing cultures. The first such empirical work evaluated email use in the United States, Switzerland and Japan and expected high UA cultures to use computer-based communication less (Straub and Keil, 1997). The authors concluded that TAM was not appropriate in Japanese settings.

The most ambitious study on this area has been completed by McCoy (2002), who collected almost 4000 surveys (McCoy, 2002). The study confirmed high UA culture expectations (ICT solutions reduce uncertainty; hence, most TAM relationships are positively moderated in high UA cultures). However, in a latter paper McCoy (2007) reported key problems related to the application of UAI to the TAM and concluded that low UAI interferes with core TAM relationships.

As issues with the application of national-level scores to the individual-level based TAM were identified, researchers attempted to measure the national level dimensions at individual level. Applying and using national level constructs at individual level is strongly advised against by both Hofstede (Hofstede, 1991) and the GLOBE researchers (House et al., 2004). However, a particular approach recommended by Srite and Karahanna (2006) discusses the application of espoused national cultural values. The approach follows the logic that individuals espouse national cultures to differing degrees. Thus, these espoused values may be used as individual

difference variables (Srite and Karahanna, 2006). Srite and Karahanna (2006) hypothesized that the relationship between subjective norms and behavioural intention to use a given technology is moderated by Uncertainty Avoidance. Their reasoning follows the logic that being exposed to an uncertain – or unknown - situation (i.e. using personal computers), individuals may feel anxiety. The anxiety level – i.e. uncertainty – could be reduced by supervisors' and peers' supportive influence. As a consequence, social norms will be more influential predictors of behavioural intention for individuals with high espoused UA cultural values. This hypothesis has been supported in their study.

From this discussion, it was also found that the direct comparison approach is severely limited by the following issues:

- generalizing conclusions on a limited sample (only a few nations represented) may be problematic and difficult to corroborate – a minimum of 7-10 countries are recommended for comparative purposes (Franke and Richey, 2010);
- Hofstede specifically noted that his scores cannot be validated or evaluated on an individual basis;
- some of the scores (particularly for emerging countries) may be outdated due to the time that the TAM research was conducted.

CONCLUSION

Our findings based on the ICT literature are now summarized in the context of the research questions. To reiterate our research questions, first we were looking for a cultural factor that is advocated as having an effect on technology adoption and at the same time provides the ability to separate emerging and non-emerging economies.

For this purpose, we found that the dimension of Uncertainty Avoidance, which deals with a society's tolerance for uncertainty and ambiguity, is suitable. Statistical evidence found that emerging countries have, on average, higher Uncertainty Avoidance scores than other countries. An unexpected finding was the seemingly deepening divide of Uncertainty Avoidance between emerging and non-emerging countries based on Hofstede's (Hofstede, 1991) and the GLOBE study (House et al., 2004) ranks, though this phenomenon requires further investigation.

Turning to the second research question that required reviewing various streams of ICT literature and comparing their findings in the context of ICT adoption and UA, the following summaries of three major items are provided:

1. For introducing a completely new ICT solution, members of high UA countries face difficulties. This could possibly be attributed to initial adoption proffering a risky situation. This effect diminishes over time, which we believe could be due to the diffusion curve reaching an early majority, at which point most papers find no relationship with UA.
2. Once ICT solutions are strongly established, it has been assumed that usage would spread easier in high UA countries. This is still a furutre issue that should be debated, particularly since meta-analysis papers provide conflicting results on the TAM relationships.
3. The strongest affected TAM relationship is the Social Norm. In this case, when considering novel ICTs, individuals in high UA countries may seek more prominent supportive signals from friends and leaders to use new ICT solutions.

As we noted, all streams have inherent limitations due to their employed methodology. Nevertheless, the above conclusions overlap and present a well-supported set of findings from the various ICT research streams. Thus emerging economies, with higher UA scores, attempting to accelerate ICT adoption may employ the following strategies:

- Up to the early majority phase, initiate various support factors to reduce the uncertainty effect of the new ICT. This may include financial support, educational elements or unique prizes to establish a 'win situation' for individuals.
- Once past the early majority phase, common practices, such as policies and pricing, could be used to further the rate of adoption.
- Emphasize the Social Norm element – e.g. by having high level officials or media personnel using the new ICT solution and offering positive reviews, if that is the case.

Our aim was to further clarify and explain the role of culture when considering the acceptance of Information and Communication Technologies in emerging economies. We have identified a differentiating cultural dimension in terms of emerging economies, which is also relevant to ICT adoption. Focussing and summarizing the ICT literature from this angle we were able to provide guidelines to emerging economies.

By conducting this research, we envision the following contributions. For academics we offer an empirical understanding of the importance of the dimension of Uncertainty Avoidance. We also acknowledge that there are limitations but we intended to display the role of this dimension in research as well. For industry, organisations that are considering implementing ICT, particularly new solutions, in emerging economies, we add another dimension of planning when contemplating initial studies for marketing and development possibilities.

LIMITATIONS AND FUTURE RESEARCH

There are several areas where this research may be expanded upon, which are detailed further below.

Our findings are limited by the nature of working with the average values. We are aware that some emerging economies are truly representative of high UA values such as South Korea, Portugal or Greece and also the fact that some emerging countries go against the generic rule of having high uncertainty (e.g. Indonesia). We also acknowledge that our results are applicable in a sense of an umbrella term of 'emerging economy'. Many of these economies select different development paths and their cultural heritage also considerably differs. Nevertheless, the high UA factor does appear to be of relevance for many of these countries. Note, that as far as the comparable UA scores and the definition of 'emerging economy' are concerned, we attempted to draw our data from corresponding time periods to avoid longitudinal issues.

Various critiques have been formulated of Hofstede's work (McSweeney, 2002; Williamson, 2002). While this paper is not aimed at summarizing these critiques, we note one specific element, that is, timeliness of Hofstede's data. The original data collection of Hofstede (1980) is dated back to the 1980s and many authors question the applicability of the data after such a long time period (McSweeney, 2002). Thus, particularly in terms of the emerging economies, with their changing status (Hoskisson et al., 2000), it is important to use more recent data. The

GLOBE study (House et al., 2004) provides this opportunity, but a longitudinal analysis of UA metrics would provide further guidelines in terms of changes in Uncertainty Avoidance.

In terms of cultural dimensions, UA has to be much more clearly defined and its role distinctly investigated with respect to technology acceptance. The metrics UAI and UAV are correlated, but numeric values can be varied and diverse for individual countries. These constructs use different survey items and thus represent different characteristics. Linking them appropriately to ICT acceptance is an important goal – the TAM and its subsequent versions offer an excellent opportunity, though the location of the specific technology on the diffusion curve may interact with the measurements.

Further, while there have been attempts to create individual level UA items, understanding the underlying logic of UA survey items may help in providing further clarification into how UA affects ICT usage. For this, a review of individual psychological measures is required.

Finally, countries classified in the 'emerging' section change over time. Thus a longitudinal analysis of emerging economies and their UA scores would provide further understanding of the changing nature of culture.

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