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Abstract

Be more productive and connected with significant cost savings is the Holy Grail for firm's looking for profit maximization. In this paper, we are looking at Unified Communications and Collaboration (UC&C) technology through Unified Theory of Acceptance and Use of Technology (UTAUT) to understand the likelihood of the technology acceptance within organizational culture dimension. We investigated the organizational culture impact on the adoption of the UC&C technology in 25 countries. We found that organizational culture influences adoption of the UC&C technology in organizations and we confirmed UTAUT model as valid one for technology adoption in large organizations.

Keywords: UTAUT; collaboration theory; cross-culture; UC&C technology; organizational culture

1 Introduction

Cheaper broadband access, improvements in the video compression, high definition video, telepresence and other amazing advances in the technology area played a significant role in leveraging importance and awareness of the Unified Communications and Collaboration (UC&C) technology. 2012 survey from the IDG Enterprise revealed that top drivers for implementing UC&C solutions correspond to the increased productivity, increased flexibility for employees and faster response time and delivery of information. On the other side, UC&C solutions cost, integration with the current infrastructure and lack of experience and skills are highlighted as key obstacles. Regardless of how the balance will turn at the end, the reality is that UC&C technology enabled easier communication, faster and more efficient collaboration from virtually anywhere, anytime. Moreover, benefits for the firm are evident and strictly aligned with the firm's goals and strategy: flexibility, interoperability, efficiency and

productivity. According to Parker, UC&C solutions focus on embedding communication and collaboration into business processes with the goal to increase workplace productivity and effectiveness (Parker M, UniComm Consulting, BCR 09 / 2007). Several software based services can be embedded into UC&C solutions: instant messaging, person-to-person or group video conferencing, mobility solutions, web conferencing or customer interaction centers.

Key challenges for UC&C solutions implementations can be seen from three different angles: technology, organization and project/change management. Some of these perspectives have already been studied. Pervan researched task-oriented collaboration with adoption and use of collaboration technologies in large organizations (Pervan et al., 2005).

However, studies of UC&C adoption combining organizational culture aspect with the cross-cultural context are still rare. Current research gap exists in the understanding of how organizational culture can influence UC&C adoption.

Our research aims to close the current research gap by answering following research question:

RQ: How does organizational culture impact adoption and use of UC&C solutions?

We will analyze employee's acceptance and use of UC&C solutions in the organizational culture context. We will use Unified Theory of Acceptance and Use of Technology (UTAUT) model developed by Venkatesh et al. (2003) to evaluate organizational culture impact on acceptance and use of UC&C solutions. The research paper is organized as follows. In the next section we will present the literature review in technology adoption and organizational culture. Then, we propose the research model followed by the research methodology. Finally, we will provide results, discussion and conclude exploring limitations and insights for practitioners.

2 Literature review

Relevant past research building the theoretical framework is presented in this section with the focus on technology adoption and organizational culture. In the next paragraph we will provide some background on different technology adoption models that precedent UTAUT model.

2.1 Technology adoption

Technology adoption models got high focus in the IS research: The Technology Acceptance Model (Davis, Bagozzi, and Warshaw, 1989; Venkatesh and Davis, 1996; Venkatesh and Davis, 2000) or TAM is one of the first widely used models to explain user adoption. Its origins are from the Theory of Reasoned Action, model developed by Fishbein and Ajzen (1975). Other models, presented in Table 1, added different dimensions like motivation or social component.

Model	Author
Theory of Reasoned Action	Fishbein and Ajzen 1975
TAM	Davis et al. 1989, and Venkatesh and Davis 2000
Motivational Model	Vallerand 1997, and Davis et al. 1992
TPB	Ajzen 1991
Combined TAM-TPB	Taylor and Todd 1995
Model of PC Utilization	Thompson et al. 1991
Innovation Diffusion Theory	Rogers 1995, Moore and Benbasat 1996
Social Cognitive Theory	Bandura 1986
Unified Theory of Acceptance and Use of Technology (UTAUT).	Venkatesh et al., 2003

Table 1 Technology Acceptance models

In this research paper we will use the Unified Theory of Acceptance and Use of Technology known as UTAUT model which represents the combination of height previous models (see Table 1.) aiming at having a unified view of user acceptance (Venkatesh, Morris, Davis, and Davis, 2003; Stafford, Stafford, and Schkade, 2004; Taylor, 2004). Model is particularly interesting and useful in understanding user's acceptance of a new technology and factors driving it within an organization. Furthermore, according to Venkatesh UTAUT model explains seventy percent of the variance in user intentions to use information technology confirming its robustness (Ventakesth et al., 2003). There are four constructs in UTAUT model which help to understand user acceptance and use: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC).

2.2 Organizational culture

Culture definition and measurement methodologies have been widely researched through different aspects: information technology adaptation (Harper et al., 2001; Fedrick 2001), information technology adoption and diffusion (Dasgupta et al., 1999), flexibility of information technology infrastructure (Syler, 2003). Moreover, different levels of culture have been analyzed: national (e.g. Hofstede, 1980,1983, Hofstede and Bond 1988, Hall 1976, 1983), organizational (Goffee and Jones 2000, Cooke and Lafferty 2003), subunit (Quinn 1988, Hofstede 1998, Jones 1983).

In the context of the organizational culture studies and the cultural influence on IT adoption and diffusion many articles have been published. Hoffman and Klepper discovered that organizations which have low level of social aspect and high in solidarity tend to reach faster technology adoption compared to high sociability and low solidarity cultures (Hoffman and Klepperr, 2000). According to Kitchell organizations where culture can be defined as flexible and open are clearly demonstrating faster adoption of the advanced manufacturing technology (Kitchell, 1995).

More recent studies mainly focused on the organizational culture (OC), focus also of this research. Organizational culture is set of common values and beliefs common to individuals within an organization (Punnett and Ricks, 1990). This paper will apply the competing values model (CVM) (Denison and Spreitzer 1991; Quinn and Kimberly 1984; Quinn and Rohrbaugh 1983) as a theoretical model of OC.

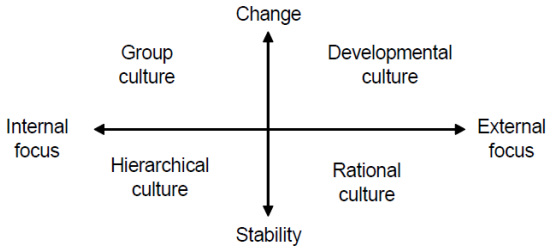

Figure 1. The Competing Values Framework for Organizational Culture

The CVM focuses on values which represent main elements of OC (Figure 1). It is composed of two dimensions: changes versus stability and internal focus versus external focus. Change is defined by flexibility and spontaneity while stability is related to control, order and continuity. According to Denison and Spreitzer internal focus is about integration and maintenance of the socio-technical system while external focus is more oriented to competition and interaction with the organizational context (Denison and Spreitzer 1991). Four types of the culture can be distinguished: Group culture (GC), Developmental culture (DC), Rational culture (RC) and Hierarchical culture (HC). For the purpose of this research paper we focus on DC and RC as defined by Denison and Spreitzer (2001).

3 Research model and hypotheses

This paper is focusing on organizational culture impact of employee acceptance and use of UC&C in the professional environment. UTAUT model is used as basis for our research model with organizational culture Competing Values Framework. In the next sections we will propose our research hypotheses and model.

Further details are provided in the remainder of this paper for specific situations.

3.1 Research hypotheses

In the UTAUT model, there are six factors that can influence use and adoption of information technology: performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), self efficacy (SE), intention to use (ITU) and Use (USE). According to Venkatesh et al (2003), Performance expectancy (PE) refers to the job performance and defines the degree to which an individual believes that using the system will impact his job performance. Effort expectancy (EE) is the degree of ease linked with the use of the system. Social influence (SI) is the degree to which an individual perceives that important others believe she should use the new system. Facilitating conditions (FC) refer to the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. Venkatesh et al. (2003) suggests that gender and age

moderate the effect of performance expectancy where it seems greater focus on tasks is done by younger workers, especially men. Also, according to Karahanna et al. study, organizational culture can be influenced by the organizational culture (Karahanna, Evaristo and Srite, 2005)

We posit that OC will influence the UC&C technology adoption and use and therefore, UTAUT model will be impacted by the OC values. On Figure 2 we present our research model.

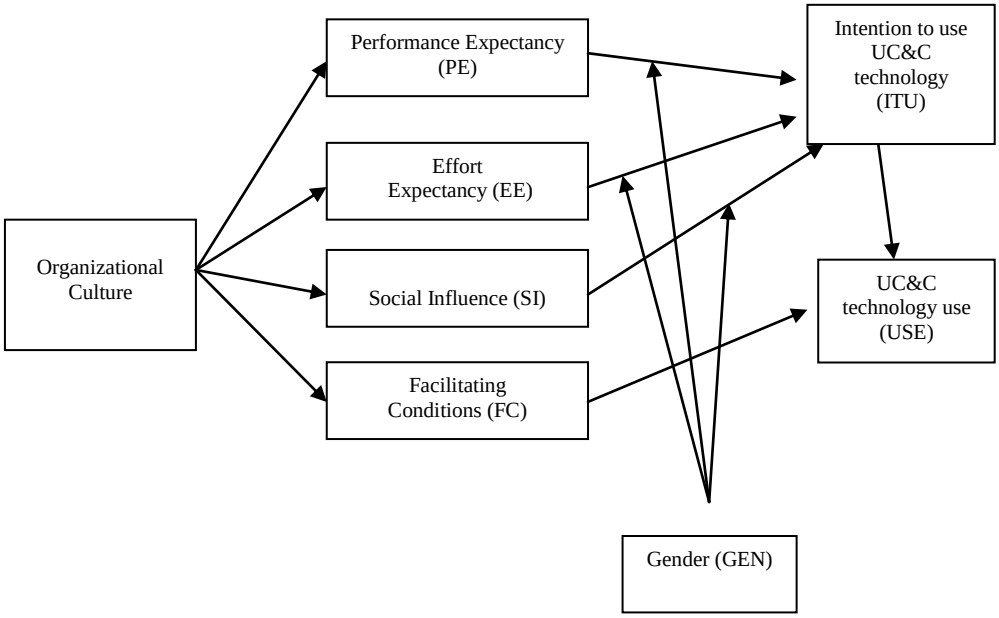

Figure 2. Research Model

As developmental culture (DC), change and external focus, are considering some future actions and is taking into account what could happen in the new context highlighting growth, creativity and mainly adapting itself to the external factors, we can assume DC will have an influence on the technology acceptance and use. Rational Culture (RC), stability and external focus, is very goal oriented with high focus on the productivity. It is very unlikely that one organization will reflect only one type (Denison and Spreitzer 1991) and in that context we can assume that for effective UC&C adoption and use, DC and RC cultural orientations will have the biggest impact.

We believe that Developmental Cultural Orientation (DCO) and Rational Cultural Orientation (RCO) values will impact and individual's perception of the ease of use and usefulness of the UC&C solutions.

Therefore, we hypothesize:

H1a: DCO will have a significant impact on performance expectancy

H1b: DCO will have a significant impact on effort expectancy

H1c: DCO will have a significant impact on social influence

H1d: DCO will have a significant impact on the facilitating conditions.

H2a: RCO will have a significant impact on performance expectancy.

H2b: RCO will have a significant impact on effort expectancy.

H2c: RCO will have a significant impact on social influence.

H2d: RCO will have a significant impact on the facilitating conditions.

Also, we propose additional hypotheses following original UTAUT model:

H3: The influence of performance expectancy on behavioral intention will be moderated by gender.

H4: The influence of effort expectancy on behavioral intention will be moderated by gender.

H5: The influence of social influence on behavioral intention will be moderated by gender.

H6: Facilitating conditions will have an impact on usage of the UC&C technology

H7: Behavioral intention will have a significant positive effect on usage of the UC&C technology

4 Research methodology

In this section we explain the research methodology.

4.1 Survey instrument

To measure organizational culture (Developmental and Rational culture) the instrument suggested by Iivari and Huisman (2007) was used. We used three five-point Likert-scale items for each construct. For technology adoption survey we used instrument as suggested by Venkatesh (Venkatesh et al., 2003) in the original UTAUT model. Final survey questionnaire included constructs from the research model: organizational culture, performance expectancy, effort expectancy, facilitating conditions, social influence, intention to use, use and demographics questions.

4.2 Data collection

Quantitative research method was used to collect answers from participants from a Fortune 500 company. Multi-country survey was run in 35 different countries in 5 different functional departments (Accounting, Marketing, Operations, Management, Call Centre). UC&C solution company is using is Microsoft Lync software which is accessible to all employees with different features available: chat, video conference, audio conference, online meeting. Important to note is that company has migrated from a similar technology (IBM Sametime) to Lync technology recently, so employees were pretty aware of other similar solutions.

4.3 Participants

Online questionnaire invitation was sent to 210 employees, users of UC&C technology, in 35 different countries.

Country	Respondents	Country	Respondents	Country	Respondents
Mexico	12	Morocco	4	Pakistan	2
Austria	10	Sweden	4	Philippines	2
Costa Rica	9	Canada	3	Spain	2
United States	7	Ireland	3		
India	6	Romania	3		
Argentina	5	South Africa	3		
Brazil	5	Turkey	3		
Croatia	5	UAE	3		
Peru	5	Bangladesh	2		
Russia	5	Chile	2		
Lithuania	4	Germany	2		

Table 2 Summary of Country respondents

Out of 210 contacted employees, we received 115 answers from 25 different countries. Out of 115 answers, we removed 14 answers as invalid (UC&C usage was none). Total of 101 responses were kept as the final sample. Table 2 indicates responses per country where more respondents from certain countries are due to higher number of employees present in those company offices.

Of the 101 participants, 41 were women (40.5 percent) and 60 men (59.4%); the average age of the participants was 33.41 (SD = 7.65) and 34.56 (SD = 8.13) in the initial and follow-up surveys, respectively. Table 3 illustrates the distribution.

	Age	(%)	*Gen*	N	(%)	Exp. with Computers	N	(%)
< 20	1	0.9%	Male	60	59.4%	< 3 years	2	1.9%
20-30	35	34.6%	Female	41	40.5%	3 – 5 y	15	14.8%
31-40	39	38.6%				6 – 9 y	30	29.7%
> 40	26	25.7%				10 – 19 y	37	36.6%
						> 19 y	17	16.8%

Table 3 Sample Characteristics

4.4 Pre-tests

We conducted pre-tests survey to understand its validity. Nine personal interviews were conducted together with six online surveys to check the validity of the proposed measures and constructs. Respondents were chosen from different countries ensuring good sample representatively. Finally, based on the returned responses instrument reliability and validity were checked with conclusion that instrument possesses good reliability and validity.

5 Results

To analyze our research model SmartPLS 2.0 M3, software application for (graphical) path modeling with latent variables (LVP) was used. Partial least squares (PLS)-method is used for the LVP-analysis.

5.1 The measurement model

Reliability results are presented in Table 4. The composite reliabilities of the different measures range from 0.71 to 0.98, which exceeds the recommended threshold value of 0.70. Also, as per Fornell and Larcker (1981) recommendation average variance extracted (AVE) for each variable construct is exceeding 0.50.

Variable constructs	AVE	Composite Reliability
Developmental Culture (DC)	0.89	0.96
Effort Expectancy (EE)	0.66	0.84
Facilitating Conditions (FC)	0.49	0.71
Intention to Use (ITU)	0.94	0.98
Performance Expectancy (PE)	0.77	0.91
(Rational Culture (RC)	0.81	0.93
Social Influence (SI)	0.87	0.95
Use behavior (USE)	0.74	0.89

Table 4 Assessment of the measurement model

According to the Fornell-Larcker criterion (Fornell and Larcker, 1981), the AVE of each latent construct should be higher than the construct's highest squared correlation with any other latent construct. Table 5 shows the square root of the reflective constructs' AVE on the diagonal and the correlations between the constructs in the lower left triangle, establishing discriminant validity test.

Latent variables	1	2	3	4	5	6	7	8
Developmental Culture (DC)	**0.95**							
Effort Expectancy (EE)	0.19	**0.82**						
Facilitating Conditions (FC)	0.17	0.27	**0.70**					
Intention to Use (ITU)	0.22	0.44	0.21	**0.97**				
Performance Expectancy (PE)	0.17	0.62	0.27	0.73	**0.88**			
(Rational Culture (RC)	-0.12	0.16	0.05	-0.03	0.13	**0.90**		
Social Influence (SI)	0.20	0.35	0.37	0.32	0.42	0.03	**0.93**	
Use behavior (USE)	0.17	0.33	0.31	0.53	0.51	-0.03	0.35	**0.86**

Table 5 Discriminant validity (intercorrelations) of variable constructs

We also checked cross loadings where discriminant validity is established when an indicator's loading on a construct is higher than all of its cross loadings with other constructs and all items loaded are more highly on their respective construct than on any other. Finally, factor loading on each item's respective construct is highly significant ($p < 0.0001$) as shown by the

T-statistics of the outer model where values are going from a low of 1 to a high value of 91. Thus, initial results indicate that the model passed all criterions of the model evaluation.

5.2 Hypotheses results

For t-statistics calculation we applied bootstrapping procedure with 5.000 bootstrap samples and 101 cases, which corresponds to the original sample. To test moderator variables in SmartPLS we used multi group analysis splitting gender in two samples and compared the results. The results of the hypotheses testing are showed in Table 6.

Hypothesis	Dependent Variable	R square	T-value	Independent Variable	Coeff.
H1a	Performance expectancy	0.05	2.090	Developmental culture	0.186
H2a			2.045	Rational culture	0.152
H1b	Effort expectancy	0.06	2.045	Developmental culture	0.206
H2b			1.928	Rational culture	0.180
H1c	Social influence	0.42	2.064	Developmental culture	0.204
H2c			0.534	Rational culture	0.056
H1d	Facilitating conditions	0.03	1.522	Developmental culture	0.175
H2d			0.525	Rational culture	0.069

Table 6. Hypotheses results – Organizational Culture Variables

In summary, we found that organizational culture influences information technology adoption. Hypotheses 1a and 2a are supported. DCO and RCO have significant impact on performance expectancy. Effort expectancy is influenced only by the DCO (H1b), while RCO (H2b) does not seem to have any impact on the effort to adapt the technology. Social influence is positively impacted by DCO (H1c) and Facilitating conditions are not influenced neither by DOC nor RCO.

We followed Chin et al. (1996, 2000) recommendation to model the interaction effects by multiplying the corresponding indicators of the predictor and moderator constructs and implementing the hierarchical process to construct and compare research models with and without the respective interacting constructs.

Hypothesis	Dependent Variable	R2	T-value	Independent Variable	Coeff.
H3	Behavioral Intention	0.63	6.304	Performance expectancy Gender	0.753
H4	Behavioral Intention	0.91	0.497	Effort expectancy Gender	-0.047
H5	Behavioral Intention	0.04	0.179	Social influence Gender	0.017
H6	Use	0.03	2.309	Facilitating conditions	0.203
H7	Use	0.53	4.422	Behavioral Intention	0.486

Table 7. Hypotheses results – UTAUT Variables

6 Discussion

We found that organizational culture does impact technology adoption and use of UC&C solutions. In particular, performance expectancy is influenced by DCO and RCO, while effort expectancy is only influenced by DCO. Also, behavioral intention (H4 and H5) is not influenced by effort expectancy and social influence. This could be explained by the fact that the company had another UC&C technology for several years and in that context, users already had good background on similar technology. Our findings are also in line with the previous research (e.g. Dasgupta et al., 2012; Dasgupta et al., 1999; Doherty and Doig, 2003; Harper and Utley, 2001; Harrington and Guimaraes, 2005). We also found that gender did not have any influence on the technology acceptance and use among men and women in the organization.

One limitation related to our research is related to subcultures. According to Gregory and Smircich (1983) in large organizations, like the one we used for our data collection, there could be a number of subcultures a not just one single culture as used in this paper. Also, our study was conducted in the company that previously had another UC&C technology implemented which could have influenced some of the UTAUT constructs.

Some future research directions could take this sub cultural element intro consideration and extend the study.

7 Conclusion

This research paper used UTAUT model and organizational culture orientations to understand employee adoption of UC&C solutions. We found that organizational culture does impact

UC&C technology adoption and use of an employee in a Fortune 500 company. Results also reveal that more company has external focus aiming at flexibility and adaptability, technology adoption and use of UC&C solution will be greatly facilitated.

Also, this study is useful for organizations implementing UC&C solutions as it highlights organizational culture dimension importance and the way it can positively influence UC&C technology adoption.

Overall, this research provides useful insights on UC&C technology adoption and use in organizations within organizational culture context.

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