Accountants Are from Mars, ICT Practitioners Are from Venus. Predicting Technology Acceptance Between Two Groups

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Abstract Several authors tried to explain the key determinants in technology acceptance using the technology acceptance model (TAM). TAM posits that ease of use and usefulness predict technology usage. Despite it strong usage there are several studies that show a lack in the model due to the absence of personal factors that should be considered. This paper aims to show the existence of significant difference in technology usage between different groups of people. Two hundred and fifty individuals responded to a survey about technology usage in their firms. Our results show that there is a statistically significant difference in ease of use and in perceived usefulness. The investigation applies TAM to help researchers, developers and managers understand antecedents to users' intention to use.

1 Introduction

Information systems researchers studied information and communication technology outcomes and ICT diffusion processes since the inception of the information systems field [1]. Many authors tried to explain the key determinants in technological acceptance in order to manage information systems change avoiding the risk of productivity paradox [2].

Nowadays, the ICT innovation-diffusion literature focused on factors such as relative advantage, complexity, ease of use, and results demonstrability in order to examine the overall impact of these variables on firms' adoption of technological innovations [1, 3]. All these factors were included in a model known as Technology Acceptance Model (TAM) and in its adapted versions [4]. TAM is the most diffused and used model in IS change field [5]. Indeed, it is considered as a good model to predict the enduring line of ICT implementation and diffusion [6]. The model posits on the idea that the key determinants of technology acceptance and usage (by the information systems actors) are the perceived ease of use (PEOU) and perceived

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usefulness (PU). These theoretical constructs are strongly related with attitude toward using. Moreover, Davis et al. [4] hypothesizes that actual system use is affected by behavioral intentions, which is affected by attitudes toward use. Beliefs about the system, PU and PEOU in TAM, directly affect attitudes toward use. What should be noted is that the model was largely criticized because it does not take into account several personal variables (such as gender, education, personal values, attitude to technology, etc.) that should influence the people's decision about technology usage [7, 8].

Several studies proposed to understand how personal values, traits and experience afflict information systems adoption and technology usage. However, the effect of personal variables on information technology acceptance is still an under investigate field [5, 9, 10].

The aim of this paper is to investigate how personal differences influences the technology acceptance. To this aim we integrated the technology acceptance model with "personal variable" (such as education, age, gender) and also we divided our sample in two different groups: accountant and ICT people. What should be noted is that in this paper we consider personal education as a discriminating factor in order to understand the existence of statistically significant differences in technology acceptance.

Using the TAM proposed by Davis et al. [4] as a basis, we carried out a questionnaire to understand users' degree of technology acceptance. The questionnaire was divided into two parts. The first part covered the personal data of the participants and the second part covered the different TAM theoretical dimensions. More specifically, the questions were divided as follows: six items for perceived ease of use; six items for perceived usefulness; and one item for usage intention. All the questions of the second part were quantified using a 5-point Likert Scale set from 1 (strongly disagree) to 5 (strongly agree). The final sample was composed by 142 SMES workers: 71 accountants and 71 engineers working in ICT division. After the questionnaire validation, we processed data using simple regression on the overall sample and on the two different groups, following the approach of Gefen and Straub [1] and Pikkarainen et al. [11].

The remainder of the paper is organized as follows. Section 2 explains the TAM and the research hypothesis. Section 3 examines the research methodology and provides descriptive statistics of the sample. Section 4 presents the research findings, and Sect. 5 provides discussions and concluding remarks.

2 Theoretical Background and Model Development

2.1 Technology Acceptance Model

Several researchers conducted studies in order to examine the relationship between perceived ease of use, perceived usefulness, attitudes, and the implementation of information technologies in firms recent years [12–14]. Their research supported

the technology acceptance model (TAM) as a model potentially able to predict human intention in technology usage [12–15]. TAM is based on the idea according whom perceived ease of use and perceived usefulness can predict attitudes toward technology that is the antecedent of technology usage. More specifically, according to Davis et al. [4] these two theoretical constructs represent the only variables that afflict intention to use.

More specifically, the author asserted that perceived usefulness and ease of use represent the beliefs that lead to technology acceptance. Perceived usefulness (PU) can be considered as the degree to which a person believes that a particular information system would enhance his or her job performance (i.e. by reducing the time to accomplish a task) [4]. Perceived ease of use is defined as the degree to which a person believes the use of a particular system would be free of effort. According to Davis et al. [4] and to other authors [5–8], both these constructs have a strong positive effect in people decision to accept technology.

Further studies replicated these results in different fields and countries [16–18]. In light of previous literature, we expected that both theoretical constructs have a positive effect on people's intention to use technology in Italian firms, so we can state the following hypotheses:

H.1 Perceived usefulness positively afflict intention.
H.2 Perceived ease of use positively afflict intention.

2.2 Technology Acceptance Model and Cultural Differences

TAM has attracted a growing body of research [6], however despite its strong diffusion it was widely criticized by several authors since the beginning [19]. According to Adams et al. [19] it is not possible to consider just two dimensions in technology acceptance process so the model was considered too simple. More specifically, the authors emphasize the need to introduce new theoretical constructs that push the individual towards the adoption of a particular technology and to integrate the existent model with personal and cultural variables.

Also, several authors found significant cross-cultural differences [1, 20] that should be take into account in IS study. The extant literature on information systems ignored the effects of personal attribute such as gender, age, kind of education, job relevance, etc., even though in information systems research this kind of attribute represents fundamental aspects of culture [21, 22]. Moreover, the most diffused model in information systems change and ICT acceptance do not consider personal variable such as personal education or the role covered by people in firms in the process of ICT acceptance. These variables have strong importance and should be considered because they are active parts in the decisional processes [23]. Indeed, cultural and personal variables are proposed as a cornerstone for research by Delone and McLean [23] and have also been considered as a critical element in information systems change field [24, 25]. Several authors describe this as the main

TAM limitations explaining that personal values and education are important theoretical construct in decision-making process [18, 26]. This idea was shared also by Lergis et al. [6] that discuss about the existence of several significant factors in workers technological choice. These factors are not considered in the TAM, originating a lack of completeness.

Also, other studies show the existence of several personal (i.e. training, experience, role in the company, job relevance, etc.) and sociological (i.e. the process of change, groups resistance etc.) variables that should afflict technology usage [27]. Basing on the previous literature it is possible to expect different results arising two different group of people divided by their education.

According to Laudon and Laudon [28], in each company it is possible to find different culture and different groups of people. We consider two groups divided by the personal education: accountant and ICT workers. On one hand, the ICT workers should be more focused on the usefulness of new technological systems. On the other hand, accountants should be afraid of the routine change so they should be focused on perceived ease of use. On this basis we expect the following effects:

H.1a Perceived usefulness has greater importance for engineer than accountants.
H.2a Perceived ease of use has greater importance for accountants than engineers.

Moreover, Straub et al. [16] carried out a research in order to test the TAM in different culture. They found that the model may not predict technology use across all cultures. McCoy et al. [17] tried to explain the technology prediction due to different cultures. The authors show the existence of significant differences in perception of technology usage depending by age and personal culture of the people in the sample. More specifically, the authors using the inferential statistics examinee the potential moderating effect of Hofstede's [29, 30] cultural dimensions on people technology acceptance. They reach the same conclusion of Straub et al. [16] about the effect of personal variables on the model usability. Moreover, according to Benbasat and Barki [27] in order to have a good prediction of technology acceptance factors such as the personal attribute are fundamentals and we should consider them in a technological acceptance model. Several authors show that variables such as gender, age, role in companies should have a greater impact on people acceptance of technology. For example, Gefen and Straub [1] show the existence of statistically significant differences in different gender perception of technology. The study indicates that woman and man differ in their perception but not in the final choice of technology. According to previous studies we expect the following effect of personal variables on intention to use:

H.3 Gender has a significant effect on people acceptance of technology.

With reference to other personal factors several authors found different effect on the people intention to use technology. For example, Kowalczyk [31] and Hernandez et al. [22], using a structural equation modeling based on a survey, found that the relationship between age and intention to use technology was weak or negative. Indeed, age is strongly correlated with the amount of time that users need to become

familiar with new technology [22, 31–33]. However, according to the author, findings suggest that other environmental factors (such as education) could play a more important role in explaining people intention to use technology. On the basis of the previous literature it is possible to state the following hypothesis:

H.4 Age has a negative effect on people acceptance of technology.
H.5 Education has a positive effect on intention to use.

3 Research Methodology

In order to explore the existence of differences in technological perception between different group of people, we provide a regression model using as dependent variable the intention to use and as independents variables the other TAM construct. Data were collected using a Likert-based questionnaire on a sample of 250 individuals working in 125 small and medium enterprise (SMEs).

3.1 The Questionnaire

In order to test our research hypothesis, we carried out a Likert-based questionnaire [34]. The questionnaire was divided in 2 parts. The first part covered the personal data of the participants (age, gender, education, job relevance), while the second covered the TAM dimensions using 6 questions for PEOU, 6 for PU, 1 for INT. We used the questionnaire proposed by Davis et al. [4]. All the questions were quantified using a 5-point Likert Scale set from 5 (strongly agree) to 1 (strongly disagree). The questionnaire was disseminated online in order to avoid the typical problems of other dissemination methodology [35, 36]. The survey was carried out on a sample of 250 individuals (125 ICT people and 125 accountant), working in 125 different Italian SMEs. We had a final response rate of 142 individuals (56.8% of the total sample). The dissemination phase last for 60 days.

3.2 Sample

The study focused on individuals who work in firms that choose to change their information systems during the survey period. Potential individuals were selected from firms in different fields in order to avoid the risks of considering just one sector. The respondent were 142 from 71 different firms. We had a 56.7% response rate. Table 1 provides useful information for sample description.

Table 1 Sample description

Measure	Item	n	Percentage (%)
Age	18–30	38	26.76
	30–40	44	30.99
	40–50	39	27.46
	50–60	21	14.79
Gender	Male	86	60.56
	Female	56	39.44
Education	High school	21	14.79
	University degree	63	44.37
	Master	55	38.73
	Ph.D.	3	2.11

Our sample was composed by accountants and ICT workers in the same percentage

3.3 Proposed Model

The final sample of 250 individuals was divided in two groups discriminated by the job in firms (ICT people or accountant). In order to understand the effect of job difference we provided the following regression model:

$$\mathrm{INT} = \alpha 1\,\mathrm{PU} + \alpha 2\,\mathrm{PEOU} + \alpha 3\,\mathrm{AGE} + \alpha 4\,\mathrm{GEN} + \alpha 5\,\mathrm{EDU} \quad (1)$$

where

INT intention to use the new information system
PU perceived usefulness of the new information systems
PEOU perceived ease of use of the new information systems
AGE number of years of respondents
GEN gender of the respondents
EDU the degree of personal education (i.e. University degree, Master, Ph.D., ECC)

The model was used three times. The first time in was used on the total sample in order to explain the general tendency in information systems intention to use, while the second time was used on two different sub-samples in order to understand the differences arising different groups using the personal education as discriminant.

4 Research Results

In order to ensure the consistency and unidimensionality of the scales, we consider a first sample of respondent in order to carry out a initial reliability studies and also an exploratory factor analyses (using PCA) [37–40]. This procedure was used to

suppress indicators which displayed an item–total correlation lower than 0.3, or whose exclusion increased the Cronbach's Alpha value, which should exceed the minimum limit of 0.7 [41, 42]. No factors were eliminated after this analisys. Table 2 show the Crombach's Alpha values.

All the obtained values are over 0.8 so they are considered good. Also, we carry out an exploratory factor analyses using varimax rotation with Kaiser normalization [43–45] in order to reduce all the concepts to just one factor [46]. Finally, we carried out a first regression model on the overall sample. Table 3 provides research results.

The explanatory power of the model was examined using the resulting overall R-square. Together, perceived usefulness and perceived ease of use were able to explain 37% of the total variances observed in people's intention to use the new information systems.

Perceived usefulness contribute more to the observed explanatory power than perceived ease of use. More specifically, perceived usefulness had a significant direct positive effect on people intention to use the new information systems (coefficient 0.33 and 0.26 both with $p < 0.05$). Our results suggest that every increment in perceived usefulness and perceived ease of use will increase the intention to use of the people in the sample. These results are compliant with those of Kim and Maholtra [47], Gangwar et al. [48] according whom the main predictor of systems intention to use is the perceived usefulness. Also, our results are compliant with Davis et al. [4], Holden and Karsh [49] and other authors [16–18], according whom there is a positive effect of PEOU on intention. As result H1 and H2 are fully supported.

With reference to gender, our result show that it does not have a significant effect on intention to use. This statement is not compliant to previous research of Gefen and Straub [1] according whom there are significative differences in technology adoption and information systems usage between woman and man. As result H3 is not supported.

Table 2 Crombach's Alpha value

Variables	Mean	S.D.	Crombach's Alpha
PU	4.33	0.28	0.93
PEOU	3.92	0.67	0.89
INT	4.55	0.12	1

Table 3 Research results of multiple regression using the overall sample

Variables	Coefficient	*P*-value
PU	0.33	$p < 0.05$
PEOU	0.26	$p < 0.05$
Age	−0.19	$p < 0.01$
Gender	0.02	$p < 0.01$
Education	0.08	$p < 0.05$
R-square	0.37	

With references to the age, we find a strong and negative effect of this variable on intention to use. More specifically, we find a coefficient of −0.19 (with $p < 0.1$). According to our results, it is possible to state that the age negatively affects the intention to use, so young people have greater propension to technology usage than older. This statement is compliant with the one of Diatmika et al. [50], Laudon and Laudon [28] and other authors [22, 32] according whom older people have less propension to new technology usage because they should change their routines. Also, this statement is not compliant with Kowalczyk [31] according whom age does not afflict technology usage. As result H4 is supported.

Finally, with reference to education we found a low positive effect on intention to use (coefficient 0.08 with $p < 0.05$). According to our results it is possible to state that the degree of personal education does not affect significatively the intention to use. This statement is not compliant with results of previous research, according whom the degree of education positively afflicts the technology perception and usage [22, 31–33]. As result hypothesis 5 is not supported.

After the first analysis, we carried two different regressions using the role covered in firms as discriminant following the approach of Pikkarainen et al. [11]. The following table (Table 4a, b) provides the results.

With reference to the perceived usefulness (PU) our findings reveal a strong statistical it has a high positive effect on intention to use for both sample (0.30 for accountants and 0.41 for ICT people). More specifically, PU has higher effect on ICT people's intention to use (coefficient 0.41 with $p < 0.01$) than accountants (coefficient 0.30 with $p < 0.01$). ICT people perceived technology as something important in improving firms' efficacy and their personal activity so they would be more favorable to technology adoption. As result hypothesis 1a is supported.

Table 4 Research results of multiple regression using two different sample

a	Accountants	
	Coefficient	*P*-value
PU	0.30	$p < 0.1$
PEOU	0.39	$p < 0.05$
Age	−0.31	$p < 0.01$
Gender	0.06	$p < 0.01$
Education	0.18	$p < 0.1$
R-square	0.16	
b	ICT people	
	Coefficient	*P*-value
PU	0.41	$p < 0.1$
PEOU	0.35	$p < 0.05$
Age	0.03	$p < 0.01$
Gender	−0.02	$p < 0.01$
Education	0.05	$p < 0.05$
R-square	0.20	

With reference to PEOU, it has a positive effect for both sub-samples (coefficient 0.39 with $p < 0.05$ for accountants and 0.35 with $p < 0.05$ for ICT people). What should be noted is that the PEOU has greater importance for accountants than for the ICT people. A possible explanation of this phenomenon is that accountants are more interested in improving their experience in information systems usage in order to improve their productivity. As result hypothesis 2a is confirmed.

According to these results, we can make two different statements. First of all, the perceived ease of use has strong a positive effect on perceived usefulness. This means that technology is perceived more useful if it is more ease to use. Second personal variables have a great impact on people's intention to use new technology.

5 Discussion and Conclusions

This paper aims to use technology acceptance model in order to investigate the existence of differences in information systems usage between two different groups: accountant and ICT workers. To this aim, we used a regression model on an overall sample and on two sample discriminated by the role covered in firms. Our model has a good predictive and explanatory power, confirming TAM robustness in predicting workers' intentions to use new technology. It thus helps researchers understand the relationships between ease of use and usefulness, and the acceptance of new information systems by different groups. It confirms that information systems use depends on the usefulness and ease of use. Also, it helps to understand which are the personal factors that afflict workers intention to use allowing a clear understanding of technological change phenomenon.

More specifically, our results show that there is a statistically significant effect of the personal variable in some aspects of information systems intention to use. Indeed, we show that ICT people have a stronger degree of acceptation of new technology than accountant. Also, personal formation and gender are variables with an important role in ICT acceptance process.

Our results have implications for both academic and practitioners.

From an academic point of view, our findings suggest that TAM should be integrated with personal and cultural variables that can have effects on information systems intention to use.

Moreover, with reference to practitioners' perspective, our results provide useful information in order to well manage the information systems change process. We show that managers should consider the personal dimensions of information systems final users while they decide for new technologies implementation. A complete understanding of the personal factors could help managers to develop a better implementation strategy in order to avoid problems such as productivity paradox [2, 51–53] or people resistance to information systems change [53–58].

This research has limitations. First of all, there could be few cultural and national limitations of our findings. For example, there are several cultural differences that can generate influences on how individuals respond to information systems change.

These differences make our finding not generalizable and ask for further investigation about the phenomenon. Further studies could replicate our model using a cross-cultural approach in different national cultures. Also, our conclusions are based on cross-sectional data so this is just a snapshot of this model. We should enlarge our study using a longitudinal study in the future to investigate information systems perception in different time periods (i.e. *ex ante* and *ex post* the implementation) making comparisons and providing more insight into the phenomenon. Finally, due to the structure of the questionnaire several information about the people's perception of information systems could be loss. Future research could ask individuals to respond in general about their perception of ease of use and usefulness of the new information systems in order to understand how to improve people's perception of information systems.

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