Using TAM to Study the User Acceptance of IT in the Yemeni Public Sector

Esmat Abdulmajid Wahdain, Mohammad Nazir Ahmad, and Nor Hidayati Zakaria

***Abstract*—Although IT offers promising improvements in public sector efficiency, there is a consensus that these cannot be realised until IT tools become widely spread and used. This research in progress aims to improve the utilisation of IT in the context of the Yemeni public sector by identifying the factors that influence IT user's acceptance. The Research proposes a model based on the Technology Acceptance Model with some added factors that are believed to have a significant influence in the context being studied, such as: perceived personal benefit, organisational culture and gender.**

***Index Terms*—Information technology, public sector, technology acceptance model, ministry of social affairs and labour.**

I. Introduction

In response to the revolutionary achievements in the ICT industry and the growing proliferation of computers in the last 15 years, there have been many initiatives, in developing countries, including Yemen, aimed to leverage these new technologies as tool to automate and speedup work processes in the public sector. Such initiatives could lead to improved efficiency and quality in the services delivered to citizens. The Yemeni Government, driven by the strong eagerness to create an environment that is attractive to investments, has implemented many IT projects in different ministries; one of these is the Ministry of Social Affairs and Labour (MoSAL) which is responsible for monitoring the application of Yemeni labour law by private sector companies.

However, most of these initiatives have failed to realise the aims and achieve the expected results. In fact, the disappointing success rates of ICT projects are a phenomenon that is not limited to developing countries. In 2003, for example, the Standish Group reported that only 34% of ICT projects were considered successful, 51% didn't go according to the pre-implementation plan (but achieved some of goals), and 15% of ICT projects were a complete failure[1]. The poor success rate becomes poorer when it comes to the public sector. In 2004, for example, The Royal Academy of Engineering and the British Computer Society revealed that 84% of public sector information systems projects resulted in some level of failure [2].

The literature is full of studies that tried to explain the causes of this poor success rate from different perspectives. Table I presents the results of a survey conducted by the Standish Group to identify the factors that led some IT projects to be challenged projects rather than successful ones [3].

TABLE I: IT Projects Challenged Factors

Number	Project Challenge Factors	% of Responses
1-	Lack of User Input	12.8%
2-	Incomplete Requirements & Specifications	12.3%
3-	Changing Requirements & Specifications	11.8%
4-	Lack of Executive Support	7.5%
5-	Technological Incompetence	7.0%
6-	Lack of Resources	6.4%
7-	Unrealistic Expectations	5.9%
8-	Unclear Objectives	5.3%
9-	Unrealistic Time Frames	4.3%
10-	New Technology	3.7%
11-	Other	23.0%

Another study conducted in Singapore [4], classified ICT failure factors into three groups: context-driven (culture, leadership, organisational issues),content_driven (technology, business process), and process-driven (strategic formulation and change management). Nawi [5] presented the following classifications for the ICT failure factors: project management Factors, top management factors, technology factors, organisational factors, complexity/size factors, and process factors.

Despite the variations among the different studies that have investigated ICT projects, there is a consensus that the significant improvements in productivity promised by IT will only be achieved if IT tools are widely used [6].

That leads us to the concept of user acceptance as an important determinant and critical success/failure factor in any ICT project. In its 2010 CHAOS report, the Standish Group stated that projects with poor user involvement will perform poorly, and user involvement comes at the top of the list of project success reasons [7].

Although there is a rich body of literature regarding users' acceptance of technology, only a few studies have focused on technology acceptance in the public sector. Moreover, those few published studies did not cover the context of Arabic developing countries and their different cultural and social characteristics.

For example, in their study, [8], suggested empirical model of the IT usage in the Malaysian public sector (See Fig. 1).

The data in that study were collected through a survey questionnaire distributed to 47 Malaysian public agencies, all of which were applicants for the Malaysian Prime Minister's Award of Quality. Generally, the organisational and technological factors were found to have more impact than the external factors on the usage of IT. Although the study appeared to be comprehensive in terms of the factors

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The authors are with the Faculty of Computing, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia (e-mail: esmat_wahdain@ yahoo.com, mnazir@utm.my, hidayati@utm.my).

included, the context was very different to the context which the present research tries to investigate. Technologically, Malaysia is much more developed than Yemen, and gender in Malaysia is not an issue since the participation of Malaysian females in both education and the public service is very high.

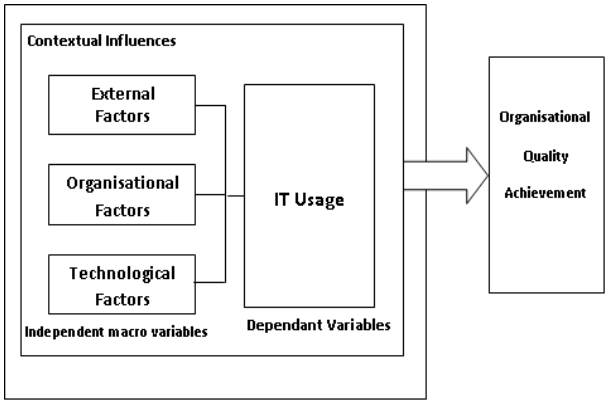

Fig. 1. Model of IT usage in the Malaysian public sector.

Another study, in [9] suggested a comprehensive model, the internet acceptance model (IAM) to describe the behavioural intention and usage behaviour towards the internet among Thai public universities staff. The model presents the possible impact of five (exogenous variables), namely, perceived usefulness, perceived ease of use, social influence, facilitating conditions and self efficacy toward four endogenous variables, namely, the usage behaviour constructs (usage in Teaching and Usage in other tasks) and their possible influence on behavioural intention (intention in teaching and intention in other tasks) .

Two groups of moderators were also hypothesised: the individual characteristics moderators and the cultural aspects moderators. However the IAM was not suitable to be applied in our case study because, although that study was conducted in a public sector organization, the context was academic and had completely different characteristics; for example, the level of education is very high and female participation in Thailand is very high compared to our case study (Fig. 2).

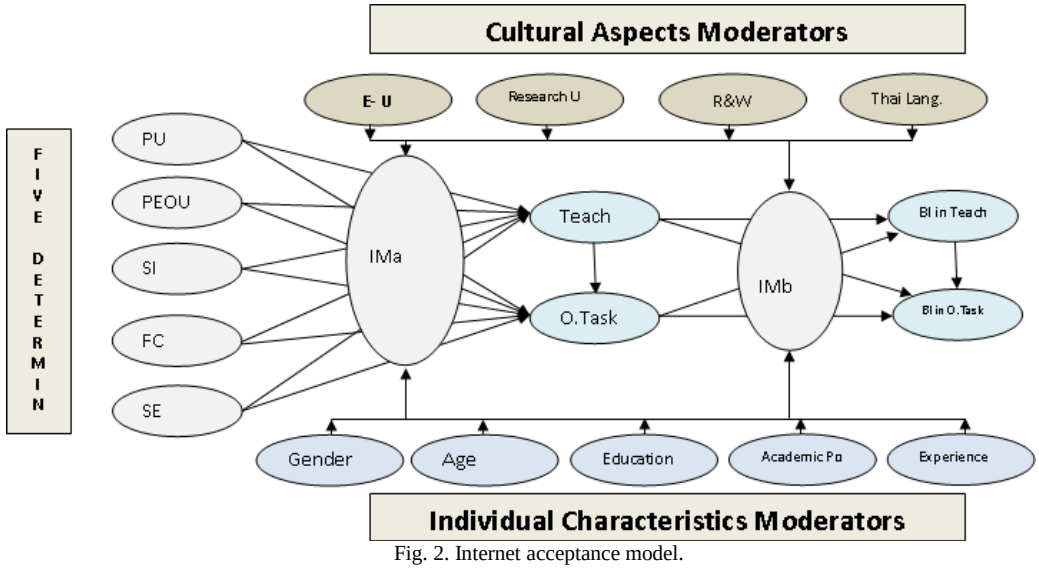

Fig. 2. Internet acceptance model.

In his dissertation, [10] examined individual and organisational factors that impacted on the IT adoption and use in the public sector of Jamaica. He extended the technology acceptance model (TAM) model by adding new factors, namely, the computer self-efficacy, infrastructure support, and technical support. (See Fig. 3).

One interesting finding of that study was suggestion that infrastructure support did not have a significant impact on the users' intention to adopt IT. Therefore, the researcher recommended that prior to any future IT investment, managers of public sector organisations should evaluate and determine what additional complementary investments (e.g. new business models, business process reengineering, organisational learning, and employee training) are needed to motivate users and promote their confidence in their ability to use the IT in their jobs.

Some of the constructs of the proposed model do not fit with the case being studied here. For example, infrastructure support and technical support are not important issues in our case, since most of the implemented information systems in Yemen are completely supported by international donor organisations. Also, the important issue of gender is not included in the model.

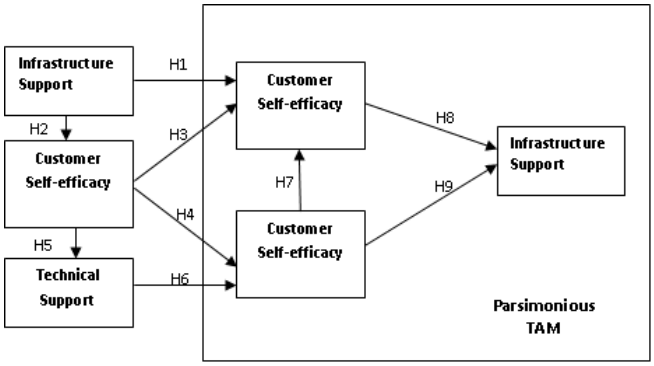

Fig. 3. Model of IT adoption in Jamaica's public sector.

Despite the importance of the above examples, none of them is suitable to be applied in the context being investigated, since applying a certain theory in a certain case requires sufficient knowledge about the context in which that theory will be applied. Hence, personal observations were very important to decide which model or theory better fitted the case being studied than others, and moreover, to determine, what amendments have to be made to that model in order to provide better reliability; that is what this study promises to achieve.

It is very important to understand the reasons that drive users to accept any newly implemented IT system or to reject it. In our case, the Yemeni public sector, it is important also to understand the role of the organisational culture in the IT adoption process. Since the government seeks to increase female employment, it is very important to understand the effect of current organisational culture on IT acceptance and usage among female employees. This is because when it comes to IT, women's jobs are normally limited to word processing or data entry).

The research presented in this paper has two purposes. The first purpose is to examine the factors that affect the IT acceptance among the employees of MoSAL. The second purpose is to propose a new research model based on the TAM with some added constructs to help in predicting employees' behaviours towards using any newly implemented IT tools.

II. Theoretical Background and Research Model

This section provides the theoretical foundation of the research topic by reviewing the previous related literature; then, the model that supports this study is presented. The addition of new constructs to the TAM and the construction of the suggested model are discussed in detail.

A. IT Investments

IT is globally regarded as a fundamental tool in promoting the competitiveness of the national economy of any country, and according to Melville *et al.* [11], there is sufficient evidence to propose that there is a correlation between IT investments and improved performance in organisations.

As a result, the investments in information and communication technologies around the globe have increased at an astonishing rate. Gartner, the well known IT consultant, stated that spending in IT all over the world was around US$3.4 trillion in 2010, and rose by a percentage of 5.3% to be US$3.5 trillion in 2011 [12]. However, most of these investments didn't achieve the expected results, causing a growing concern about the feasibility of those investments.

Over the past years, there has been considerable research undertaken to discover the reasons behind the failures of ICT projects, , in studies conducted by different research groups. Diversified reasons have been recognised as factors that determine the success or failure of an IT project. In a review of the Standish Group's annual CHAOS reports (from 1994 to 2012), [13] found that lack of user involvement and lack of executive support were the major causes of failures (and successes) in IT projects. Other factors such as: incomplete requirements, lack of proper planning, and unclear objectives were among the influential factors with less frequent occurrence in the report [13].

B. IT Public versus Private Sector

Everywhere in the world governments are the biggest consumers of IT products and services[10]. When comparing public organisations and private-sector organisations it becomes clear that public organisations have less clear IT strategies, they dedicate less investment to IT resources, they provide the end users with less technical support, the IT applications adopted are less sophisticated, their IT units are usually put in lower positions in the structure of the organisation, and the users' involvement in the process of system development is lower; finally, the IT objectives that are adopted by the public sector organisations are less clear and harder to measure [14].

C. User Acceptance

The concept of user acceptance can be defined as" the verifiable willingness within a group of users to utilize information technology for the tasks that it is designed to support"[15].

Due to the great concern about the importance of user attitude, acceptance, and behaviour towards increasingly adopted IT tools, there are many theories that have tried to understand, explain, and anticipate the new technologies' acceptance among users. Among these theories: the theory of reasoned action (TRA)[16] which suggests that an individual's behavioural intention depends on the individual's attitude toward the behaviour and the subjective norms; the theory of planned behaviour [17], which added the construct of "perceived behavioural control" to TRA; the diffusion of innovations theory [18], in which professor Everett Rogers divided the adopters of any new technology to five categories, namely, "innovators, early adopters, early majority, late majority, and laggards"; and the unified theory of acceptance and use of technology that was proposed by Venkatesh and other authors in 2003 as an attempt to provide a unified view of user acceptance of technology by integrating components from eight models which were considered as the most prominent models in user acceptance [19].

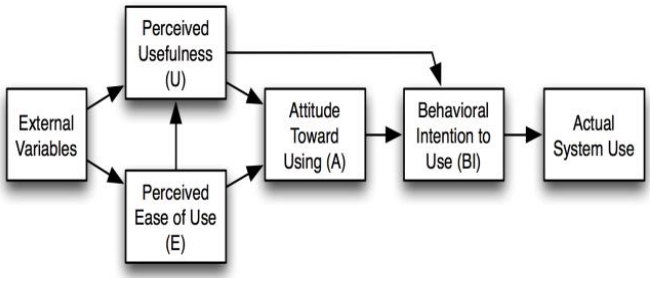

Fig. 4. Technology acceptance model.

D. Technology Acceptance Model

The technology acceptance model (See Fig. 4) which was suggested by Fred Davis in 1989, is one of the most influential information systems' theories; it models the way in which users accept, and as a result, use a technology. The TAM suggests that when a new technology is presented to the users, the users decide when and how they will use the technology based on a number of factors:

- Perceived usefulness, which is defined as "the degree to which an individual believes that using a specific system would improve his job performance".
- Perceived ease-of-use, which is "the degree to which an individual believes that using a specific system would be free from effort"[20].

The TAM was particularly designed for the purpose of modelling the acceptance of information systems by potential users. Its primary purpose was to predict IS/IT acceptance and diagnose any design problems before the systems were actually used by the users[21]. The present research

employed TAM to study technology acceptance in the Yemeni public sector for the following reasons:

- The TAM is a parsimonious (simple), predictive, and robust tool to assess the acceptance of IT by users [22].
- It is essential for anyone wishing to study user acceptance of technology to have an understanding of the TAM [23].
- The TAM provides flexibility, as the construct external variables can be extended to include the factors that fit every single case study.

E. Research Model and Hypotheses

The research model that was developed in this study is shown in Fig. 5. This model was derived from the literature and the researchers' assumptions about the factors that influence Yemeni public sector employees' acceptance of new information systems and IT tools. The model was based on the TAM, with the following additions:

- The construct of perceived personal benefit was added, as an independent variable in addition to the originally existing two variables (perceived ease of use and perceived usefulness). This construct was proposed by[24] in a study that aimed to expand the TAM to examine personal computing technology utilisation in government agencies in developing countries.in that study, the writers stated that the personal benefit (or utility) factor, which was expressed in the form of financial compensation for using computers, had a real effect on the behavioural intention of users, and the subsequent actual use of personal computers.
- It is strongly believed that this was very similar to the case being researched in the present study, namely, the case of the Yemeni Ministry of Social Affairs and Labour where employees in some departments received extra payments for using computers or information systems. It was observed that computers and information systems were better utilised in these departments than in the departments where the employees were not financially compensated for using IT [25].
- The construct (external variables) in the original TAM was decomposed to two variables to cover in detail the external variables that are believed to affect the technology acceptance in the case study. Those variables are organisational culture and individual factors. Previous research has reported that the absence of a favorable organisational culture is a critical obstacle to the effective usage of computer [26]. A facilitating environment such as a positive culture in an organisation will affect directly the behaviour that can influence utilisation [26].
- Individual factors, on the other hand, are believed to play an important role in determining the attitude of employees toward using IT tools.For example, in 2010, a new information system was deployed called the Automated System of Issuing Foreign Workers' Permits in MoSAL. In the beginning there was strong resistance against using the new system, not only from those who had low computer efficacy, but even from those who had adequate computer skills. One of the researchers in the present study, who was at the time the administrator of the information system, suggested to the management that different computer training courses for the information system should be organized. Every employee was enrolled in a suitable course based on his previous computer background, and two months later, the resistance had decreased, and the level of acceptance for that information system was higher than it was before the training [27]. This is an example of the importance of training as one of the individual factors that will be investigated in this study.

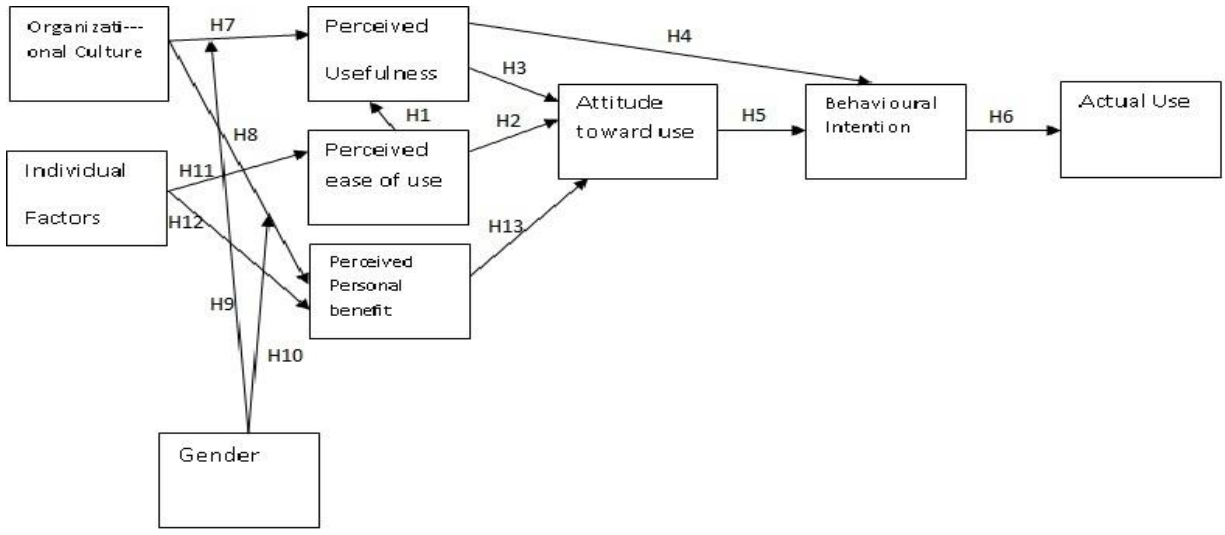

Fig. 5. The proposed research model.

- The gender factor was added as a moderator to two relationships: firstly, between organisational culture and (perceived usefulness (H9), and secondly between organisational culture and perceived personal benefit (H10). The issue of gender has been receiving increasing attention from the government of Yemen, and improving women's education and employment is one of the aspects of this attention. It is believed that there are some negative conceptions about female employees in the public sector organisations in Yemen, for example, when it comes to IT, it is very common for women to only be allocated simple, routine tasks that do not

require high skills or intelligence, such as data entry or typewriting. This is reflected in the acceptance of IT tools from the point view of the female employee. In addition, the perception that women are less qualified to do sophisticated IT-related tasks has an effect on the benefits that women can receive from using IT tools. This study aims to discover the importance of gender as a determinant of technology acceptance in the Yemeni public sector.

- The relationships between the basic TAM constructs (perceived usefulness, perceived ease of use, attitude toward use, behavioral intention, and actual use) are being hypothesized as follows:

Hypothesis 1: perceived ease of use has significant positive effects on the perceived usefulness of IT tools.

Hypothesis 2: perceived ease of use has a significant positive effect on attitude towards using IT tools.

Hypothesis 3: perceived usefulness has significant positive effect on attitude towards using IT tools.

Hypothesis 4: perceived usefulness has significant positive effect on behavioural intention to use.

Hypothesis 5: attitude towards using the IT tools has a significant positive effect on behavioural intention to use.

Hypothesis 6: Behavioural intention to use the IT tools has a significant positive effect on actual use.

- The relationships between the added constructs, namely, organisational culture, individual factors, gender and perceived personal benefit, and other constructs are hypothesized as following:

Hypothesis 7: Organisational culture has a positive effect on the perceived usefulness.

Hypothesis 8: Organisational culture has a positive effect on perceived personal benefit.

Hypothesis 9: The positive relationship between organisational culture and perceived usefulness is stronger in the case of men than it is in the case of women.

Hypothesis 10: The positive relationship between organisational culture and perceived personal benefit is stronger in the case of men than it is in the case of women.

Hypothesis 11: Individual factors have positive effect on the perceived ease of use.

Hypothesis 12: Individual factors have positive effect on the perceived personal benefit.

Hypothesis 13: Perceived personal benefit has a positive effect on attitude toward use.

III. Current Research Direction

This research in progress will be carried out in Yemeni ministry that experienced the implementation of a large scale information system. Moreover, the Ministry of Social Affairs and Labour is one of the biggest ministries in Yemen in terms of the number of employees, budget, and number of beneficiaries. This study will collect quantitative data. A questionnaire will be distributed among the participants, who are MoSAL employees in IT-related jobs. The responses will be entered into the SmartPLS software and analysed by the SmartPLS structural equation modelling tool to test the hypotheses and to recognise the direct and indirect influences between the constructs of the suggested model.

IV. Conclusion

This study is expected to make significant contribution in both the study domain (MoSAL) as well as the technology acceptance literature.

Locally, the study will attempt to enrich the managerial knowledge in the Yemeni public sector and to raise awareness about the importance of the pivotal issue of user acceptance. It is also expected that the study will have a positive impact on the culture and mindset of the management in the ministry and that this will lead, consequently, to better practices when adopting new IT tools.

In addition, the study tries to solve a dilemma in the Yemeni governmental sector which is the disappointing results of huge investments in IT. Finally, it is expected that the results of this study can be generalised to other similar Yemeni ministries and public sector departments.

More importantly, the study will enrich the body of literature on technology acceptance by introducing a case study that has not been previously covered, namely, a public sector organization in a growing country with special cultural and social conditions.

Although there is a large body of literature examining the technology acceptance in different organisations, the number of studies that focus on public sector organisations is comparatively limited, and most of these studies were in developed countries. Therefore, the current study is trying to enrich the literature by investigating the technology acceptance in the public sector in a country which has been identified by the UN [28] as one of the least developed countries, from the Arabic area.

The current study also proposes additional factors to the original TAM, namely, organisational culture and personal benefit along with the gender factor. The lack of facilitating organisational culture is thought to be one of the obstacles that hider the successful adoption of new IS in Yemeni public sector. Previous experiences have shown the importance of personal benefit as a major determinant of the employees' acceptance and utilisation of any new IS. The relationship between those two factors is moderated by the gender factor, which is believed, as discussed above, to be very effective in a conservative country like Yemen, where the gender gap in education and employment is among the highest in the world.

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Esmat A. Wahdain is a computer engineer, who was born in Mukalla-Hadhramout-Yemen in 1976. Esmat holds a bachelor degree in computer engineering from the Faculty of Engineering, Cairo University, Cairo-Egypt (graduated in 2005), and currently he is undertaking his master's in IT- management in the Faculty of Computing- Universiti Teknologi Malaysia (UTM).

He has been working in the Ministry of Social Affairs and Labour since September 2007 as an IT specialist, and administrator of the Labour Market Information System. In 2010 he was promoted to the role of Head of Employment and Yemenisation Department. He worked as a computer course Trainer from 2008 until 2011 in the Al_Hashemi Institute of Technology and Innovation.

His research interests are information systems and the obstacles to the adoption of IS in the public and education sectors in the developing and least developed countries.

Mr. Wahdain is a member of the Yemen Engineers Syndicate.

Mohammad N. Ahmad is a senior lecturer in Universiti Teknologi Malaysia, born in Batu Pahat in 1976.

Nazir holds a PHD from the University of Queensland in information systems and a masters degree in information systems from the Universiti Teknologi Malaysia. He holds a bachelor degree in industrial computing from Universiti Kebangsaan Malaysia .

He is part of the Software Engineering Research Group (SERG) and is involved in teaching and research in databases, system development and information systems. Under SERG, he is a founder of the Applied Ontology and Conceptual Modeling Special Interest Group (AOCO-SIG).

Dr. Nazir is a member of the Association for Information Systems (AIS)and the International Association for Ontology and its Applications (IAOA).

Nor H. Zakaria is a senior lecturer in Universiti Teknologi Malaysia, who was born in Malaysia, in 1976.

Zakaria holds a PhD in information systems from the University of Queensland, and a masters degree in computer science from UTM, and a bachelor degree in IT and information science from Universiti Kebangsaan Malaysia.