# Acceptance of Health Information Application in Smart National Identity Card (SNIC) Using a New I-P Framework

Ismail Bile Hassan, Masrah Azrifah Azmi Murad

*Abstract*—This study discovers a novel framework of individual level technology adoption known as I-P (Individual- Privacy) towards health information application in Smart National Identity Card. Many countries introduced smart national identity card (SNIC) with various applications such as health information application embedded inside it. However, the degree to which citizens accept and use some of the embedded applications in smart national identity remains unknown to many governments and application providers as well. Moreover, the factors of trust, perceived risk, Privacy concern and perceived credibility need to be incorporated into more comprehensive models such as extended Unified Theory of Acceptance and Use of Technology known as UTAUT2. UTAUT2 is a mainly widespread and leading theory up to now. This research identifies factors affecting the citizens' behavioural intention to use health information application embedded in SNIC and extends better understanding on the relevant factors that the government and the application providers would need to consider in predicting citizens' new technology acceptance in the future. We propose a conceptual framework by combining the UTAUT2 and Privacy Calculus Model constructs and also adding perceived credibility as a new variable. The proposed framework may provide assistance to any government planning, decision, and policy makers involving e-government projects. Empirical study may be conducted in the future to provide proof and empirically validate this I-P framework.

*Keywords*—Unified Theory of Acceptance and Use of Technology (UTAUT) model, UTAUT2 model, Smart National Identity Card (SNIC), Health information application, Privacy Calculus Model (PCM).

## I. INTRODUCTION

SMART Card can be defined as a normal plastic card that has processor and memory chip integrated inside it in order to operate certain functions. In addition to that, a smart card has an encryption feature to store much more data, process transactions and is more secure than single-function cards and magnetic strips cards. Furthermore, smart cards are portable and provide maximum security for its owners. Hence, the factors that make it more beneficial include: the portability, intelligence, and its compatibility with other devices [1]. If we randomly look at in a person's wallet, there can be numerous different cards, for instance: national identity card, driving license, ATM card, and transportation card. These cards or documents can be replaced with one smart national identity card which may securely keep data much better than non-smart or paper based cards. Basically, smart cards are changing the contents of our wallets day by day [2].

According to the current literature, health information can be stored in smart national identity cards, for instance, SNIC stores emergency data, thus allowing for immediate and accurate diagnosis of disease. The card is also positioned as a national health card comprising personalized medical emergency data such as allergies, blood type, organ implants, chronic diseases and information on beneficiary or next-of-kin [3]. In many circumstances, patients are admitted to hospitals in a condition which is not suitable to tell their important medical histories. Urgent medical information stored in a smart national identity card can be utilized to urgently treat the patient, particularly in paramedic cases where patient's data cannot be accessed fully from the hospital system and also picture on the SNIC could provide a dual verification for identification reason [4].

Following the global trend towards smart card implementation, many countries in Asia, Western Europe and the Middle East have begun introducing multipurpose smart identity card for instance, Malaysia[3]. Malaysia implemented SNIC known as "MyKad" with different applications embedded inside it [5]. From the study perspective, even though the government had achieved in persuading the Malaysian citizens to apply for SNIC, the degree that Malaysian citizens use and accept some of the SNIC applications remains undiscovered [3]. The public should be convinced on how an all-in-one function card will benefit them and how it can be used to identify genuine medical information of the citizens.

Smart National Identity Card (SNIC) is a plastic card with an embedded microchip and dimensions of a standard credit card. The memory capacity is 64 kilobytes which allowed more applications to be added into the card. The M-COS operating system enables different applications to be stored separately in the chip and prevents unauthorized access. MyKad utilizes biometric technology with thumbprints being encrypted in its chip [6].

According to the CEO of Multimedia Development Corporation (MDeC) [7], more than 50 applications with various functions embedded inside MyKad and these include: driving license, national identity card (NIC), health information, passport information, electronic purse, automated

Ismail Bile Hassan is a PhD candidate at the Faculty of Computer Science and Information Technology, Universiti Putra Malaysia (UPM), Serdang, 43400 Malaysia(e-mail: bile132@ gmail.com).

Masrah Azrifah Azmi Murad is the head of Department of Information System, Faculty of Computer Science and Information Technology, Universiti Putra Malaysia(UPM), Serdang, 43400, Malaysia (phone:+6 03 8947 1727; fax: +603 8947 1795; e-mail: masrah@fsktm.upm.my).

World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:8, No:12, 2014

teller machine (ATM) access, transit applicati on known as "Touch 'n Go", public key infrastructure and frequent teller card [8]. The cards have become an important part of their lives without notice and there is no feedback on the acceptance, efficiency and the effectiveness of some of these applications [5]. Moreover, there are many people that are not aware of that they can use their smart national identity card to get medical services. They don't know how it works and how useful it is while privacy and security are the two factors that the citizens are worried [9]. By investigating the determinants of smart national identity card applications adoption, recommendations can be developed to address the factors that hinders adoption and to leverage on the factors that increase adoption.

The work [10] presents the earliest examiners that studied the general feelings of Malaysian citizens towards MyKad. Malaysian citizens may think that the acceptance of MyKad has enhanced the efficiency and effectiveness of governmental sectors, e.g. hospitals [3]. However, the citizens' acceptability of health information application embedded in multipurpose smart national identity card remains unknown to the Malaysian government and the application providers as well. This shows the knowledge gap that can results research attention.

Therefore, the aim of this research is to examine the citizens' acceptability of health information application embedded in SNIC and develop a macro technology acceptance framework with a new concept that combines individual (I) and Privacy (P) factors, named as I-P. This work enriches to the current literature of individual level technology adoption with the discovery of new comprehensive model of I-P that combines UTAUT2 and Privacy Calculus factors and also adds a new variable (i.e. Perceived credibility). The study investigates the interrelationships between individual level technology adoption, privacy concern, privacy risk, trust and perceived credibility factors towards health information application in SNIC adoption.

The sections of this paper are organized as follows: the upcoming section analyses related literatures on e-heath application in SNIC along with the gaps and the next section discusses the extended Unified Theory of Acceptance and Use of Technology (UTAUT2) and privacy calculus models to develop and present I-P conceptual framework depicting citizens' acceptability of health information application embedded in SNIC. Lastly, the manuscript introduces a concise summary and chances for future study.

## II. RELATED LITERATURE WORK

Managing the patient record through an integrated information system has been a great concern for the researchers and practitioners during the past decades; many attempts took place during the past few years to fully computerize the management of patient health record. The aim behind these attempts was to make the patient's health record available across a network to hospitals, surgeries, billing agencies, and health insurance companies. However, with the increasing demand of providing access to the patient's record

anytime, anywhere, and as quickly as possible the e-health information in smart national identity cards is most probably the best solution. The health information application in smart national identity card provides number of benefits such as easy mobility, and storing a good amount of data and information related to the patient. Because of the processing capabilities of the smart card, the development of active programs is effectively designed to manage the patient record [11]. Smart cards are more appropriate to employ in health care applications as they are more cheap, simple to use, update with new information and carry and must not get damaged simply [12]. Patients would be able to carry this pocket-sized card around easily. The retrieval of health information will be more efficient and will facilitate better care. Immediate access to patient medical history in an emergency situation will expedite management which can even save lives.

With such innovation, information loss is minimized, and less storage space is required compared to the space required for hard copies of patient records. A smart card would also be more environmentally friendly as less paper will be required. In the long-term, the use of a health information application in smart national identity card to store, transfer and exchange health information can be expected to improve communication between healthcare providers. This will also have an important impact on the quality of healthcare and a reduction in healthcare budget [13].

Based on a study conducted by [14], the implementation of smart cards in some countries has often been linked to the requirements of a national insurance system, such as in Taiwan where the Bureau of National Health Insurance issued health smart cards in 2004. Consequently, the key areas for e-health should be to provide prompt, accurate and complete information about a patient that can be easily shared between healthcare providers. Therefore, consideration of health information application in smart national identity cards that carry vital patient medical information in the form of a credit card or use of the Malaysian multipurpose smart identity card (Mykad) can fill this gap but, Security and confidentiality are expected to be of primary concern to patients [13].

UTAUT2 was applied as the underlying theory for most of the earlier studies. The constructs of privacy concern, trust, perceived risk, and perceived credibility need to be incorporated into more comprehensive models [30], most of the previous studies investigated the role of trust in e-commerce while there is a research gap of investigating the role of trust, perceived credibility, privacy concern and perceived risk in e-government adoption [15] such as SNIC. Therefore, the interrelationship between UTAUT2's core factors and privacy calculus model factors has yet to be validated in the context of smart national identity card health information application adoption.

## III. THEORETICAL FRAMEWORK

### A. Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT was developed by [16] to establish a unified theoretical model that clarifies individual intentions to use information technology. UTAUT combines similarities and

World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:8, No:12, 2014

differences of elements from the following eight earlier theories on technology acceptance: Technology Acceptance Model (TAM) [17], Theory of Reasoned Action (TRA) [17], Theory of Planned Behavior (TPB) [18], Motivational Model [94], Combination TAM and TPB [19], Diffusion of Innovation Theory [20], Model of Personal Computer Utilization [21] and Social Cognitive Theory [22]. UTAUT is the mainly widespread and leading theory existing in the information system literature up to now [23]. With the formulation of the UTAUT model, researchers identified an extensive enhancement over any of the unique eight models and their extensions and these counts for variance of 70% adjusted R2 in using intention [3]. UTAUT theorizes the following four constructs which are directly determining the individual's acceptance and usage behavior: Performance Expectancy, Social Influence, Facilitating Conditions, Effort Expectancy and it describes how personal differences affect technology acceptance. The association between these constructs can be moderated by user's gender, age, experience and voluntariness of technology use.

However, the expanded UTAUT model was combined with new constructs that results the UTAUT2 model and it was also empirically assessed to guarantee its validity. UTAUT2 enables to explore behavioral use for individual consumer technology such as mobile internet consumers [24]. UTAUT2 incorporates hedonic motivation, price value and individual habit to the earlier UTAUT in order to apply to it in the context of consumer usage while the important objectives of expanding it are to: (1) examine the relevant factors from previous studies on both general acceptance and usage of technology, and user acceptance and use of technology as well, (2) change several of the current relationships of UTAUT original formation, and (3) set up novel relationships.

Moreover, facilitating conditions also directly influence user's behavioral intention to accept a technology which was found to only influence user actual use of technology behavior in previous UTAUT [24]. Thirteen studies [25]-[27], [23], [3] on the adoption of e-government studies have somewhat or completely applied UTAUT as basis theoretical framework [15]. This model was employed for investigating an e-tax filing software adoption in the United States of America [28].

Furthermore, UTAUT was used to study the identifiers of usage behavior of data kiosk by gathering information from the Taiwanese respondents [29]. By applying this model, [3] investigated the adoption of ATM application embedded in MyKad in the Malaysian perspectives. Most of the researches applying this model have received a higher number of welcome regarding the factors to identify the intention to accept the e-government applications. Both theories also emphasize the internal motivations of individual user that affects the technology use. The constructs of UTUAT2 are directly applicable to the adoption of health information application in SNIC as the origin UTUAT's construct were applied in prior research into some of the SNIC embedded applications.

### B. Privacy Calculus Model (PCM)

The Privacy calculus model was introduced by [30] and their model empirically investigates the instantaneous affect of an individual perception such as privacy risk, privacy concern and institutional trust, all related with facilitating or reducing the intention to do online transaction. Privacy and the self-disclosure of private information are viewed from an economic angle in the theory of privacy calculus. There are many researches on the privacy calculus which users will search for revealing a particular data on them to gain some advantages [31].

A study by [31] defines privacy risk as the degree to which an individual think that a high possible for loss is related with the revealing of person's data to a corporation. In the privacy literature, privacy risk has been considered as one dimensional construct which evaluates possible loss of control over individual's data [30]. Previous privacy work has classified sources of institutional opportunistic behavior, such as insider expose or illegal theft and access [32], and promoting individual's information to, or revealing data with third parties, financial organizations [33], or governmental institutions [34]. Several health information system researches identified that the key risk from citizens' view is security and privacy risks [35]. Patients are concerned that their information may fall into the wrong hands, or be used inappropriately [36]. Risk is a factor that clearly would reduce the potential user's interest in using health information application [35], and so would reduce the likelihood that the potential user intends to adopt the health information application in SNIC.

Institutional Trust is another factor considered in Privacy Calculus Model and it points to a personal perception of the institutional surroundings, such as the policy and structure which formulate surroundings feel protected [37]. It is a multidimensional factor consists of reliability, competence and safety trusting beliefs [30]. Health research recommends that individuals require additional control if data is to be applied for research that generates profits [38] and desires to propose permission even if their data is to be accessed secretly by third clusters [39]. Propensity to trust is termed as individual's common propensity to trust others. It consists of two ideas: belief in trusting attitude and humanity. Belief in humanity supposes others are dependable and good natured [30]. Propensity to trust is also known as trust based on personality as it points to an individual's overall tendency to trust or not believing to others [40], [41]. This disposition is particularly essential in the starting stage of an association [42], [43]. Privacy Concern measures the anticipation of a possible future loss of privacy [30]. With respect to personal medical information, the privacy debate has escalated considerably. The implications of using e-health records to administer patient caring and the privacy concern which will emerge as a consequence of such acceptance had been identified from the literature review of health informatics [44], [45]. Many researches on e-health used this model and its constructs are applicable to this work.

World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:8, No:12, 2014

*C. I-P Framework*

UTAUT2 and Privacy Calculus model have been studied by different settings and methods and their constructs have proved to be important to technology adoption, privacy; risk and trust researches. Integrating the constructs of these models provides a comprehensive explanation of the citizens' acceptance, trust, privacy and risk towards e-government technologies such as the acceptance of SNIC applications.

The four constructs of UTAUT are directly relevant to the adoption of SNIC health information application as these constructs were used in prior research into MyKad IC, ATM, and transportation card applications [3], [5], [46].

Moreover, the focal point in previous researches about the UTAUT2 has been on validation, adding new extra variables for extension purpose, and integrating with other theoretical models along with identification of new relationships from other models with key UTAUT2 variables. The factors privacy concern, perceived credibility, perceived risk and trust were ignored in the novel UTAUT2 [47], [48]. Over the earlier twenty years, researchers [49]-[51] have rigorously and empirically investigated the influence of perceived risk and trust on the TAM's main constructs. Hence, we concluded it to be vital to perform an empirical research to investigate the associations among perceived credibility, trust, perceived risk, privacy concern, and the main constructs of the UTAUT2 model.

With the SNIC health information application as the main domain in our research, the focus is to identify the precise impacts of perceived credibility, privacy concern, perceived risk and trust on the main factors of the UTAUT2 model, and thereby authenticating an extended UTAUT2 in an innovative context by answering the following research questions:

a) How do perceived credibility, privacy concern, perceived risk and trust act on the UTAUT2's core constructs?
b) Can the UTAUT2 be applied to the adoption of smart national identity card health information application?

There are few studies that investigated the role of trust, privacy, security and risk in e-government adoption research because there are not part of any one of the IT adoption models but such factors are significant in e-government studies [15]. There are high number of such studies using trust [52], [28], [53] privacy or security [25], [54]-[56], risk [57]-[61] and Perceived Credibility [46] as independent factors used along the well-known models of adoption and diffusion. The analysis reveals that although all other relationships have been empirically explored in some or the other studies but privacy and security have not been much examined.

Therefore integrating institutional trust, privacy concern, perceived credibility and perceived risk constructs in e-government adoption models such as UTAUT2 is crucial and this gap was supported by the study conducted by [62] in which they stated that the combination of the behavioral, trust and risk dimensions to examine the factors that influence new technology acceptance was not investigated yet. They proposed trust and risk factors to be included in technology acceptance models such as UTAUT. Moreover, according to another study done by [63], SNIC have negative impact on privacy and civil rights as well as security concerns which deserves an exploration on the privacy and trust constructs towards citizens acceptance of SNIC applications. Hence, the privacy calculus model constructs will be incorporated into our research frame work in order to break the stated gap in e-government research.

Along with the constructs from the technology adoption models, author will also include four other relevant adapted constructs such as: institutional trust [30], [62], [57], Perceived Credibility [46], perceived risk [30], [57] and privacy concern [30]. The new constructs added to UTAUT2 may increase the explanatory power of the model. The moderating variables to be considered include: Age [24], Gender [65], and Experience Level [66]. The dependent variable is the behavioral intention to use SNIC health information application [24]. After the study of the constructs, we formulated a research frame work with a combined constructs from individual level technology adoption and Privacy models and perceived credibility as a new variable. The dash line indicates new relation that needs to be tested in UTAUT2 context while the straight line is showing non-hypothesis tested relationships of UTAUT2.

Finally, the research framework provides more comprehensive views of the acceptability of SNIC health information applications and this will be a better guideline and framework for the governments and application providers as well. SNIC will be used if citizens trust its security and privacy features and this can be a success factor for the citizens' acceptability of the other embedded applications in SNIC [46]. The outcomes, contributions and recommendations from this research may be utilized by any governmental planning and development institutions for implementing health information application integrated in any smart national identity card. Furthermore, it can support policy and decision makers to direct the applications incorporated in SNIC. Hence, the research framework for this study is shown in Fig. 1 and the operational definitions of the constructs will be explained in the following sections.

*D. Dependent Variable*

The dependent variable for this study is the user's behavioral intention to use or reject a technology such as health information application in SNIC [16], [24], [67], [68]. Users' acceptance was studied by intention to use in the current work since it has been established to be extremely applicable in forecasting technology adoption for present consumers [69]. Intention to use can be defined as citizens' intention and prediction to smart national identity card health information application's usage and this is the similar description presented in UTAUT model [24]. The citizen's intention to this application is believed to be influenced by independent variables in this study.

*E. Independent Variable*

The independent variables for this study are related with two aspects known as technology adoption and privacy, security, risk and trust issues towards technology acceptance. Facilitating condition, effort expectancy, performance

World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:8, No:12, 2014

expectancy, social influence, habit, hedonic motivation and price value are hypothesized to affect behavioral intention to a technology usage [24], while integrating perceived credibility, perceived risk, privacy concern and institutional trust construct in order to increase its explanatory power. Definition

of the hypothesis that relate the independent variables with dependent variables of citizens' intention to use SNIC health information application are discussed in the following sections.
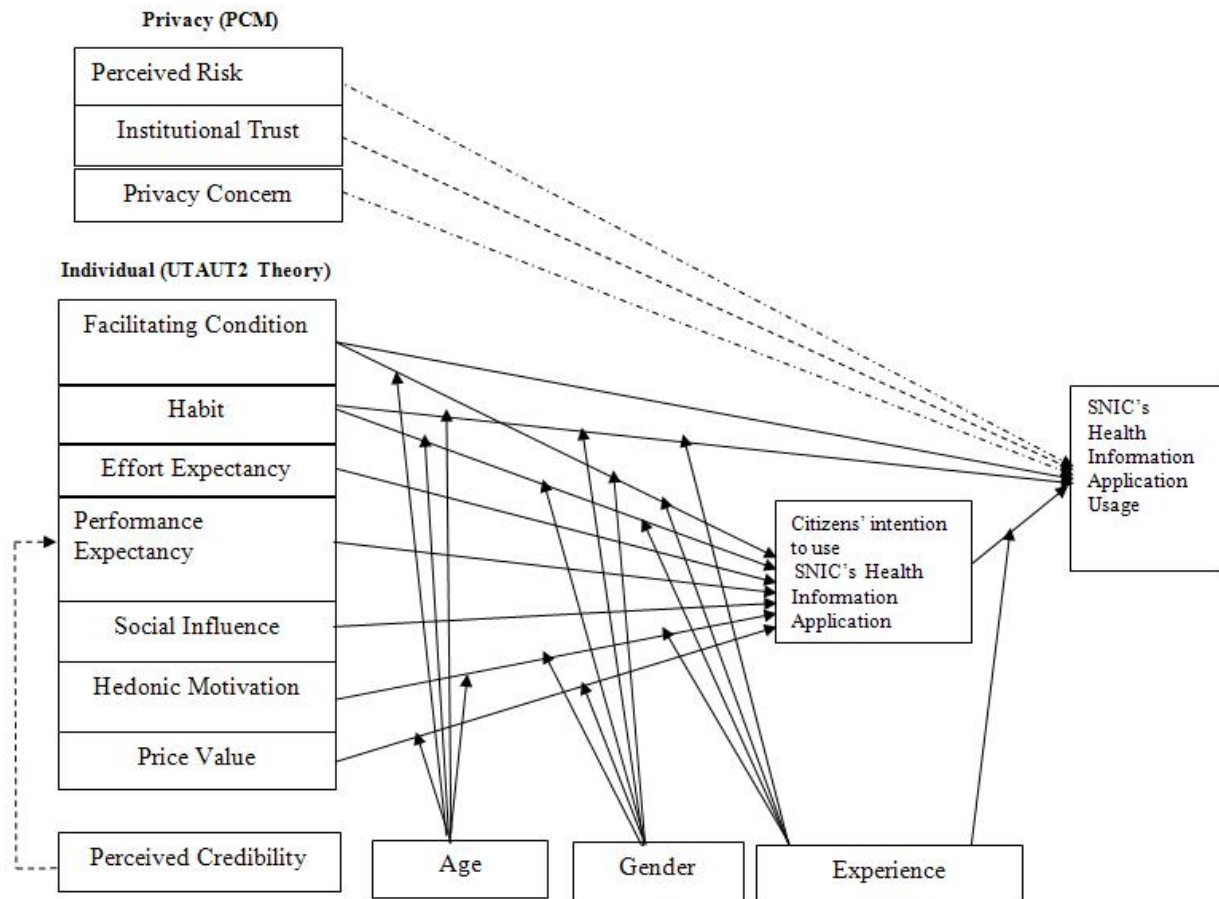


Fig. 1 I-P Conceptual Framework of health information application in SNIC adoption

## IV. PRIVACY CALCULUS CONTEXT FACTORS: PERCEIVED RISK, INSTITUTIONAL TRUST, PRIVACY CONCERN AND PERCEIVED CREDIBILITY

### A. Perceived Risk

The perceived risk is the unfavorable and uncertainty outcomes related with consumers' anticipation [70]. Perceived risk is the citizen's individual anticipation of suffering a loss in search for a preferred result [57] and [71].

However, [70] shows the earliest researcher to put concentration on the perceived risk construct when he stated that user behavior include risk since the outcome of using the product could not be expected with confidence, and which some outcomes of using the product are possibly to be unlikable. Perceived risk go through the adoption/buying choice when situations of the judgment result manner of discomfort, uncertainty or anxiety conflict stimulated in the user concern and emotional distress approach of ambiguity, pain as a result of cognitive dissonance and anxiety [72]. Cognitive dissonance occurs from the product evaluation as

having attractive advantages but probable costs such as rewards but also immeasurable threats. This felt integration of ambiguity (possibility of loss) and danger (price of loss) forms the construct perceived risk.

Several health information system researches identified that the key risk from citizens' view is security and privacy risks [35]. Patients are concerned that their information may fall into the wrong hands, or be used inappropriately [38], [36]. Unlike financial situations where data are lost and the institution can issue new accounts, cards, and cheques. Health data cannot be reset in the same way and so has a more rigorous requirement on data security and privacy. Several empirical studies have demonstrated that risk is a direct factor in the adoption of technology, with high risk systems being less likely to be adopted [73]. Risk is a factor that clearly would reduce the potential user's interest in using health information application [35], and so would reduce the likelihood that the potential user intends to adopt the health information application in SNIC.

World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:8, No:12, 2014

## B. Institutional Trust

Trust can be defined as the eagerness of a party to be susceptible to the dealings of another party based on the anticipation that the other will execute a particular task essential to the trustor, irrespective of the capability to control or screen that additional party [74]. More recent information system research has highlighted belief in technology where the trustee is a technical artefact for instance, an information system or a recommendation agent [75], [74]. Trust in this context is defined likewise to interpersonal trust in that it reveals the eagerness of the trustor to behaviorally depend on a part of application e.g., a statistical system to perform an activity [76].

Institution based trust is a person's perceptions of the institutional environment, including the structures and policies which create an environment feel protected [57], [37]. In the context of this study, trust is defined as a collection of three perceptions that reflect confidence in which health information stored in smart national identity card will not be used opportunistically and it is a confidence perception which may completely affect eagerness to reveal individual data. These values consist of reliability, competence and safety [30]. Competence points to the capability of the trustee to have the essential knowledge to do the expected behavior by the trustor. Reliability clusters with integrity and it is the consistency between words and actions. Safety is the extent of confidence that data given to the trustee will be kept safe or held in confidence [30].

Trust that health information application in SNIC is reliable and safe for storing health information and this information will be handled in a competent fashion which should increase the willingness of citizens to use health information application [30]. Therefore, the focus of our study on this construct (Institutional Trust) is the Citizens' specific trust in the context of the use of health information application in SNIC.

## C. Privacy Concern

Privacy Concern measures the expectation of a probable future privacy loss [30]. Privacy concern comprises compilation, illegal access, secondary use and errors [56]. Privacy concern has important influence on user acceptance of online healthcare services [64] and e-health records [77]. The traits of digital data in general and e-health records in particular are such that there is unpredicted increase in the likelihood of privacy breaches and mistreat of data. With respect to personal medical information, the privacy debate has escalated considerably. The implications of using e-health records to administer patient caring and the privacy concerns which will surface as a consequence of such usage have been identified in the health informatics literature [44].To the degree which people have stronger privacy concerns on their health information, their view towards the use SNIC health information application should be more negative [78].

## D. Perceived Credibility

Perceived credibility evaluates privacy and security worry related with the technology usage [79]-[81], [16]. In this research, perceived credibility measures the privacy and security of consumers towards health information application in SNIC usage i.e. the card is secure due to its biometric and chip features; thus, it is difficult to forge. In addition, privacy include unauthorized person getting access to personal information in the card and government abusing its right to keep track of citizens. The work of [82] identified that intention of using SNIC is positively related with perceived credibility.

## V. TECHNOLOGICAL ADOPTION CONTEXT FACTORS: PERFORMANCE EXPECTANCY, SOCIAL INFLUENCE, FACILITATING CONDITION, EFFORT EXPECTANCY, HABIT, HEDONIC MOTIVATION AND PRICE VALUE

### A. Performance Expectancy

In order to operationalize and explain the formation research framework, we studied the past researches about UTAUT2. Based on [24], performance expectancy (PE) is the degree to which using smart national identity card health information application will present benefits to the Citizens' in enhancing trustworthiness of individual health data, enables faster authentication, offers convenience, reduces identity theft, and fits well into everyday life.

### B. Social Influence

Social influence is the degree that acceptance of technology by the users is acknowledged by his/her social circles [83]. It is referred to as subjective norm in Theory of Planned Behavior (TPB) and Theory of Reasoned Action (TRA) [24]. In this study, social influence is the extent to which Citizens identify the essential of others for instance: Malaysian citizens, peer groups and government to believe they must use smart national identity card health information application.

### C. Facilitating Condition

Facilitating conditions refers to the existence of organizational and technical infrastructure in support of an individual's adoption of technology [84], [5], [16], and [85]. In this context, facilitating conditions are the citizens' view about the accessibility of physical and technological resources in every organization which may support citizens to use SNIC applications, for instance health information application integrated in SNIC, the conditions to use governmental and private institution services, the support from the health division and safety of information privacy.

### D. Effort Expectancy

The use of e-health technology is positively affected by effort expectancy [93]. Based on [24]; effort expectancy is the extent of ease associated with the use of health information application in SNIC.

### E. Habit

Habit has been described as the degree to which citizens inclined to execute involuntarily behaviors as of knowledge [24], [86], while Kim et al. [87] associated habit with automaticity. Even though described quite alike, habit has

World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:8, No:12, 2014

been defined in two different views: firstly, habit is considered as earlier behavior [87]; and second, habit is assessed as a degree that the consumers believe the behavior to be automatic [86].For example, after an comprehensive time of using smart national identity card health information application for hospital visit, a citizen may have introduced a positive vision toward the technology (e.g., acceptance of SNIC applications) and an associated behavioral intention (e.g., I will use SNIC health information application during hospital visit). This intention is therefore saved in the mindful mental of the user. Hence, stronger habit will result to an embedded intention that in turn will affect behaviour [24].

*F. Hedonic Motivation*

Hedonic motivation is one of the added new constructs to UTUAT model by [24] and it is defined as the enjoyment or pleasure resulted from technology usage. Hedonic motivation has been found to influence technology acceptance and was used as a forecaster of users' behavioral intention to technology usage [88]. Another study regarding hedonic motivation found that enjoyment of the technology was a consistent and strong predictor of user acceptance [89] and [90]. In this context, Hedonic Motivation is an extent to which citizens have pleasure with the use of SNIC health information application e.g. simple thumbprint verification, reduction of errors, immediate and accurate diagnosis of disease in emergency situations.

*G. Price Value*

The study of [24] revealed that price value has a significant influence on the users' technology use. There will be higher number of users if the price of the technology is lower [91] for instance; many Malaysian citizens applied SNIC when the application processing fee was reduced from RM50 to RM10 for the late applicants [6]. Price Value is defined as users' cognitive substitution among the perceived advantages of the applications and the economic cost for using them [92]. The price value is optimistic while the advantages of technology usage such as health information application in SNIC are seemed to be more than the financial cost and such price value has a constructive influence on intention [24]. Thus, Price Value will have optimistic affect on behavioral intention to a technology usage.

*H. Moderating Variables*

Age, gender and experience [24] are identified as the moderating variables for this study and are theorized to moderate the proposed conceptual framework relationships. The effect of the moderating variables and hypothesis toward the acceptance of smart national identity card health information application will be discussed in detail.

## VI. CONCLUSION AND FUTURE RESEARCH

In conclusion, this paper discusses the variables depicting citizens' acceptability of health information application embedded in SNIC and there was no previous studies investigated these variables. It adapts UTAUT2 and privacy calculus model variables in order to study the adoption, Risk, privacy and trust issues of SNIC applications. Future research will be done by empirically testing and validating the framework while the relationship between the variables may further be studied. The framework may be applied by enforcing effective legislation, educating the public and providing sufficient card readers.

### REFERENCES

[1] Mahmut, T. (2011). Identifying Factors that facilitate the use of Multi-Purpose Smart Cards by University Students: An empirical investigation. Informatics institute. Ankara, Middle East Technical University Master 99.
[2] Fancher, C. (1997). "In your pocket: smartcards." Spectrum, IEEE 34(2)(47-53).
[3] Yeow, P. H. P., Loo, W.H. (2009). "Acceptability of ATM and transit applications embedded in multipurpose smart identity card: An exploratory study in Malaysia." International Journal of Electronic Government Research, 5 (2), 37-56 (IGI Publishing; Scopus journal).
[4] Jim Briggs, J. B. (2001). Smart cards in health, Healthcare Computing Group, University of Portsmouth, Portsmouth, PO1 3AE.
[5] Loo W. H., Yeow, P.H.P., & Chong, S.C. (2011). "Acceptability of Multipurpose Smart National Identity Card: An Empirical Study." Journal of Global Information Technology Management 14 (1), 35-58. (Thomson ISI journal).
[6] Yeow, P. H. P., Loo, Wee Hong and Chong, Siong Choy (2007). "Accepting Multipurpose "Smart" Identity Cards in a Developing Country." Journal of Urban Technology 14: 1, 23 — 50.
[7] Ghazali, D. B. "More with Mykad."
[8] Department, M. N. R. (2012). "Available: http: //www.jpn.gov.my/en/ informasi/main-applications."
[9] Mallika, K. (2011). Patient Acceptance Analysis on National ID Smart Card in Health Care Orgarnization Using a Thailand Hospital Example. School of Health Care Administration, Taipei Medical University. Master 69.
[10] Yeow P.H.P., Miller. (2005). "The Attitude of Malaysians towards MyKad." Proceedings of the 4th International Conference on Information Technology in Asia 2005 (CITA '05).
[11] Aisha, F. B. (2011). Smart Card Systems: Managing Risks and Modelling security protocols using systemc and Transaction level Modeling School of electronic and Computer Science Southampton. PHD.
[12] N. Anju Latha*, B. R. M., U. Sunitha (2012). "Smart Card Based Integrated Electronic Health. Record System for Clinical Practice." www.ijacsa.thesai.org.
[13] Sellappans, R., S. S. Chua, et al. (2013). "Health innovation for patient safety improvement." Australasian Medical Journal 6(1): 60-63.
[14] Helen Cripps, C. S., Vesna Prijatelj (2012). Smart Health Care Cards: Are they applicable in the Australian context? 25th Bled eConference eDependability: Reliable and Trustworthy eStructures, eProcesses, eOperations and eServices for the Future Bled, Slovenia https://domino.fov.uni-mb.si/proceedings.nsf/0/.../P34_Cripps_43.pdf.
[15] Rana (2012). Evaluating Suitability of Alternative Theoretical Paradigm for Examining Citizen Adoption of E-Government, Information Systems Evaluation and integration group (ISEing), Brunel University, London, United Kingdom.
[16] Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. (2003). "User Acceptance of Information Technology: Toward a Unified View." MIS Quarterly (27:3), pp. 425-478.
[17] Davis, F. D. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology." MIS Quarterly 13(3): 319–340.
[18] Ajzen, I. T. T. o. P. B.," Organizational Behavior and Human Decision Processes (50:2), pp. 179-211. (1991). "The Theory of Planned

World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:8, No:12, 2014

Behavior." Organizational Behavior and Human Decision Processes 50(2): 179-211.

[19] Taylor S, T. P. (1995). "Decomposition and crossover effects in the theory of planned behaviour: A study of consumer adoption." International Journal of Research in Marketing 12(2): 137-155.

[20] Rogers, E. M. (2003). "Diffusion of innovations (5th ed.)." New York: Free Press.

[21] Thompson Ronald L., C. A. H., Jane M. Howell. (1991). "Personal Computing: Toward a Conceptual Model of Utilization." MIS Quarterly 15.

[22] Bandura, A. (1986). Social Foundations of Thought and Action: A Social Cognitive Theory, Prentice Hall, Englewood Cliffs, NJ.

[23] Schaupp L.C. Carter L, M. M. E. (2010). "E-file adoption: A study of U.S. taxpayers' intentions." Computers in Human Behavior 26(636-644).

[24] Venkatesh Viswanath, J. Y. L. T., Xin Xu (2012). "Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology." MIS Quarterly Vol. 36 No. 1 pp. 157-178/March 2012.

[25] Carter L., S. L. C., Hobbs J, Campbell R. (2011). "The role of security and trust in the adoption of online tax filing'. Transforming Government: People, Process and Policy." Transforming Government: People, Process and Policy 5(4): 303-318.

[26] Chan F.K.Y. Thong J.Y.L. Venkatesh, V. B., S.A. Hu, P.J-H and Tam, K.Y. (2010). "Modeling Citizen Satisfaction with Mandatory Adoption of an E-Government Technology." Journal of the Association for Information Systems 11(10): 519-549.

[27] Van Dijk J.A.G.M. Peters O, E. W. (2008). "Explaining the acceptance and use of government Internet services: A multivariate analysis of 2006 survey data in the Netherlands." Government Information Quarterly 25: 379-399.

[28] Carter L, S. L. C. (2009). "Relating Acceptance and Optimism to E-File Adoption." International Journal of Electronic Government Research 5(3): 62-74.

[29] Wang Y-S, S. Y.-W. (2009). "Why do people use information kiosks: A validation of the Unified Theory of Acceptance and Use of Technology." Government Information Quarterly 26 158-165.

[30] Dinev, T. (2006). "Privacy calculus model in e-commerce" European Journal of Information Systems.

[31] H. Jeff Smith, T. D., Heng Xu (2011). "Information Privacy Research: An Interdisciplinary Review." MIS Quarterly 35(4): 989-1015.

[32] Rindfleisch, T. C. (1997). "Privacy, Information Technology, and Health Care." Communications of the ACM 40(8): 92-100.

[33] Budnitz, M. E. (1998). "Privacy Protection for Consumer Transactions in Electronic Commerce: Why Self-Regulation Is Inadequate " South Carolina Law Review 49.

[34] Wald, M. L. (2004). "Threats and responses: The airlines; U.S. wants all air traveler files for security test." New York Times (September 22) 1.

[35] David, D. (2013). Electronic Personal Health Records: A Matter of Trust. The School of Graduate Studies, McMaster University PhD: 149.

[36] Willison, D. J., Schwartz, L., Abelson, J., Charles, C., Swinton, M., Northrup, D., & and L. Thabane (2007). "Alternatives to Project-Specific Consent for Access to Personal Information for Health Research: What Is the Opinion of the Canadian

[37] Mcknight DH, C. V., Kacmar C (2002). "Developing and validating trust measures for e-commerce: an integrative typology." Information Systems Research 13(3), 334–359.

[38] Willison, D. J., V. Steeves, C. Charles, L. Schwartz, J. Ranford, and J. C. G. Agarwal, L. Thabane. (2009). " Consent for use of personal information for health research: Do people with potentially stigmatizing health conditions and the general public.

[39] Coy, K. L. J. (2001). "The current privacy environment: Implications for third-party research." Continuing Ed. Health Professions 21(4): 203–214.

[40] Mayer RC, D. J., Schoorman FD (1995). "An integrative model of organizational trust." Acad Manage Rev 20:709-734.

[41] Gefen D., K., E., Straub, D.W. (2003). "Trust and TAM in online shopping: an integrated model." MIS Quarterly 27 (1): 51-90.

[42] Rotter, L. B. (1971). "Generalized expectations for interpersonal trust." American Psychologist 26 (5): 443–452.

[43] McKnight, D. H., Cummings, L.L., Chervany, N.L., (1998). "Initial trust formation in new organizational relationships." Academy of Management Review 23 (3): 473–490.

[44] Naser, C., Alpert, S. A., (1999) Protecting the Privacy of Medical Records: An Ethical Analysis. White Paper,National Coalition for Patient Rights, Lexington, MA.

[45] Alpert, S. A. (1998). "Health Care Information: Confidentiality, Access, and Good Practice, in Ethics, Computing, and Medicine: Informatics and the Transformation of Health Care, K. W.Goodman (ed.), New York:." Cambridge University Press, pp.: 75-101.

[46] Yeow, P. H. P., et al. (2012). "Ergonomics issues in national identity card for homeland security, Applied Ergonomics." http://dx.doi.org/10.1016/j.apergo.2012.04.017.

[47] Im, I., Kim, Y., Han H.-J. 2008. (2008). "The Effects of Perceived Risk and Technology Type on Users' Acceptance of Technologies." Information & Management 45(1): 1-9.

[48] Ji-Hwan Lee, S. W. K., Chi Hoon Song (2010) The Effects of Trust and Perceived Risk on Users' Acceptance of ICT Services. KAIST Business School Working Paper Series Index:

[49] Thiesse, F. (2007). "RFID, privacy and the perception of risk: A strategic framework." Journal of Strategic Information Systems 16: 214-232.

[50] Lui, H. K., Jamieson R. (2003). Integrating Trust and Risk Perceptions in Business-to-Consumer Electronic Commerce with the Technology Acceptance Model. European Conference on Information System (ECIS), Naples.

[51] Pavlou, P. (2003). "Consumer acceptance of electronic commerce: integrating trust and risk with the technology acceptance model." International Journal of Electronic Commerce 7 (3): 69–103.

[52] Al-Sobhi F. Weerakkody, V. a. E.-H., R. (2011). "The Relative Importance of Intermediaries in eGovernment Adoption: A study of Saudi Arabia." M. Janssen, H.J. Scholl, M.A. Wimmer, and Y-H. Tan (Eds.): EGOV 2011, LNCS 6846, 62-74.

[53] Hussein R., M. N. A. A. R., Mahmud M, Aditiawarman U. (2010). "G2C Adoption of E- Government in Malaysia: Trust, Perceived Risk and Political Self-Efficacy." International Journal of Electronic Government Research 6(3): 57-72.

[54] Chiang, L. (2009). "Trust and security in the e-voting system'. Electronic Government." an International Journal 6(4): 343-360.

[55] McLeod Jr. A.J, P. S. E. (2009). "Security and Privacy Trust in E-Government: Understanding System and Relationship Trust Antecedents." 42nd Hawaii International Conference on System Sciences 1-10.

[56] Smith, J. (2006). "Determining Key Factors in E-Government Information System Security." Information Systems Management 23-32.

[57] France Be´langer, L. C. (2008). "Trust and risk in e-government adoption."Journal Strategic Information Systems doi:10.1016/j.jsis.2007.12.002.

[58] Ciborra C, N. D. D. (2005). "Good Governance, Development Theory, and Aid Policy: Risks and Challenges of E-Government in Jordan." Information Technology for Development 11(2): 141-159.

[59] Colesca, S. E. (2009). "Increasing E-Trust: A Solution to Minimize Risk in E-Government Adoption." Journal of Applied Quantitative Methods 4(1): 31-44.

[60] Lee S.M. Tan X, T. S. (2006). "M-government, from rhetoric to reality: learning from leading countries'. Electronic Government." An International Journal 3(2): 113-126.

[61] Loukis E, C. Y. (2011). "Why Do e-Government Projects Fail? Risk Factors of Large Information Systems Projects in the Greek Public sector." An International Comparison'. International Journal of Electronic Government Research 7(2): 59-77.

[62] Taiwo, A. A., A. K. Mahmood, et al. (2012). User acceptance of eGovernment: Integrating risk and trust dimensions with UTAUT model. Computer & Information Science (ICCIS), 2012 International Conference on.

[63] Yap Ai Kee, Y. C. N., Leau Yu Beng, and Tan Soo Fun (2012). "Security Issues on Identity Card in Malaysia." IA CSIT International Journal of Engineering and Technology Vol. 4 (No. 5).

[64] Bansal, G., F. M. Zahedi, D. Gefen (2010). "The impact of personal dispositions on information sensitivity, privacy concern and trust in disclosing health information online." Decision Support Systems 49(2): 138-150.

[65] Gilbert, D., Kelly, L. L., and Barton, M. (2003). "Technophobia, gender influences and consumer decision-making for technology-related products." European Journal of Innovation Management, 6 (4), 253-263.

[66] Wang, Y. S., Wang, Y. M., Lin, H. H., and Tang, T. I. (2003). "Determinants of user acceptance of internet banking: An empirical

Open Science Index, Medical and Health Sciences Vol:8, No:12, 2014 publications.waset.org/9999826.pdf

World Academy of Science, Engineering and Technology
International Journal of Medical and Health Sciences
Vol:8, No:12, 2014

study." International Journal of Service Industry Management, 14 (5), 501-519.

[67] Alshare, K. A., Freeze, R., Kwun, O. (2009). "Student intention to use expert systems: an exploratory study." J. Comput. Inf. Syst. 49 (4): 105e113.

[68] Simon, B., 2001. Knowledge media in education e a user acceptance in universities. and V. Master dissertation. Wirtschaftsuniversität Wien (2001). Knowledge media in education e a user acceptance in universities. Wirtschaftsuniversität Wien, Vienna. Master

[69] Sun, H. (2003). An integrative analysis of TAM: toward a deeper understanding of technology acceptance model. Proceedings of the 9th American Conference on Information Systems (the 9th AMCIS), Tampa, Florida.

[70] Bauer, R. A. (1960). Consumer behavior as risk-taking. In R. S. Hancock (Ed.), Dynamic marketing for a changing world. Chicago, American Marketing Association: 389-398.

[71] Warkentin, M., Gefen, D., Pavlou, P., Rose, G. (2002). "Encouraging citizen adoption of e-government by building trust." Electronic Markets 12 (3) 157–162.

[72] Mauricio Featherman, P. A. P. (2003). "Predicting e-services adoption: a perceived risk facets perspective." International Journal of Human-Computer Studies 59: 451-474.

[73] Richards, R. J. (2012). A Study of the Intent to Fully Utilize Electronic Personal Health

[74] Xin Li, T. J. H., Joseph S. Valacich Bernama (2008). "Why do we trust new technology? A study of initial trust formation with organizational information systems." Strategic Information System 17(1): 39–71.

[75] Wang, W., Benbasat, I. (2005). "Trust in and adoption of online recommendation agents." Journal of the Association for Information Systems 6(3): 72–101.

[76] McKnight, D. H. (2005). "Trust in information technology." The Blackwell Encyclopedia of Management. Blackwell, Maiden, MA, 329–331.

[77] Angst, C. M. a. R. A. (2009). "Adoption of electronic health records in the presence of privacy concerns: The elaboration likelihood model and individual persuasion." MIS Quarterly 33(2): 339-370.

[78] Chellappa, R. K., Sin, R. G. (2005). "Personalization Versus Privacy: An Empirical Examination of the Online Consumer's Dilemma." Information Technology and Management 6(2): 181-202.

[79] Donna, M. (2003). "Evaluating Electronic Commerce Acceptance with the Technology Acceptance Model." Journal of Computer Information Systems 44(2), 2003, 49-57.

[80] Gefen, D., and Straub, D. (1997). "Gender Differences in the Perception and Use of E-mail: An Extension to the Technology Acceptance Model." MIS Quarterly 21(4), 389-400.

[81] Vijayasarathy, L. R. (2004). "Predicting Consumer Intentions to Use Online Shopping: The Case for an Augmented Technology Acceptance Model." Information and Management 41(6), 747-762.

[82] Loo, W. H., Yeow, P.H.P. & Chong, S.C. (2009). "User acceptance of Malaysian government multipurpose smartcard applications." Government Information Quarterly, 26, 358-367. (Publisher: Elsevier; Thomson ISI).

[83] Venkatesh, V., Morris, M.G. (2000). "Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behaviour." MIS Quarterly, 24(1) 2000, 115-139.

[84] Al-Gahtani, S. S., Hubona, G.S., and Wang, J. (2007). "Information Technology (IT) in Saudi Arabia: Culture and the Acceptance and Use of IT." Information and Management, 44(8), 681-691.

[85] Yuen, Y. Y., Yeow, P.H.P., Lim, N., and Saylani, N. (2010). "Internet Banking Adoption: Comparing Developed and Developing Countries." Journal of Computer Information Systems 51(1), 52-61.

[86] Limayem, M., Hirt, S. G., and Cheung, C. M. K. (2007). "How Habit Limits the Predictive Power of Intentions: The Case of IS Continuance." MIS Quarterly (31:4), pp. 705-737.

[87] Kim, S. S., Malhotra, N. K., and Narasimhan, S. (2005). "Two Competing Perspectives on Automatic Use: A Theoretical and Empirical Comparison." Information Systems Research (16:4), pp. 418-432.

[88] Brown, S. A., and Venkatesh, V. (2005). "Model of Adoption of Technology in the Household: A Baseline Model Test and Extension Incorporating Household Life Cycle." MIS Quarterly 29(4): 399-426.

[89] Van der Heijden, H. (2004). "User Acceptance of Hedonic Information Systems." MIS Quarterly 28 (4): 695-704.

[90] Thong J. Y. L., H., S. J., Tam, K. Y. (2006). "The Effects of Post-Adoption Beliefs on the Expectation Confirmation Model for Information Technology Continuance" International Journal of Human-Computer Studies 64(9): 799-810.

[91] Chan, K. Y., Gong, M., Xu, Y., Thong, J. Y. L. (2008). Examining User Acceptance of SMS: An Empirical Study in China and Hong Kong. 12th Pacific Asia Conference on Information System. Suzhou, China.

[92] Dodds, W. B., Monroe, K. B., and Grewal, D. (1991). "Effects of Price, Brand, and Store Information on Buyers." Journal of Marketing Research (28:3), pp. 307-3 19.

[93] Nisakorn Phichitchaisopa, T. N. (2013). "Factors Affecting the Adoption of Healthcare Information Technology" EXCLI Journal 12(ISSN 1611-2156): 413-436.

[94] Davis, F. D. (1989). "Perceived usefulness, perceived ease of use, and user acceptance of information technology. ." MIS Quarterly 13(3): 319–340.

**Mr. Ismail Bile Hassan** is a PhD candidate in Information System program at the Universiti Putra Malaysia and graduated with MSc. in Information Technology - Management from Universiti Technologi Malaysia (UTM) and one year Bachelor of Science in Technical Education with Specialization in Computer Science and Information Technology, 3 years Higher Diploma in Computer Science and Information Technology from Islamic University of Technology (IUT) - A subsidiary organ of OIC, Dhaka, Bangladesh. He has published a journal, book chapters and conference proceedings in the areas of information system.

**Masrah Azrifah Azmi Murad** is an Associate Professor in the Faculty of Computer Science and Information Technology, Universiti Putra Malaysia, Malaysia. She graduated with PhD in Artificial Intelligence from the University of Bristol, UK, MIT in Computer Science from the Universiti Kebangsaan Malaysia, Malaysia, BSc in Management Information Systems from Drexel University, Philadelphia, USA. She has given lectures on Information Systems and computer Science courses and published articles in the areas of Text Mining, Artificial Intelligence, Automated Software Engineering and Information Retrieval.