

Adoption Framework Expansion based on the Computer Ethics' Related Research Models and Ethical Scenarios Analysis

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Abstract— Information security and computer ethics are one of the foremost integration of current computer scientist in cyber era. However, at the same time computer technology may raise some unethical issues with current life style and developments. As the general public becomes increasingly computer literate, the gap between technology and peoples' mental power notably shrinks and this gap fulfillment may not be possible unless by educating the students from the basic level of certain ethical instructions. On the other hand, understanding the factors that influence user acceptance of information technology is vital for further development of any technology and smart card technology as well. Knowing the customers ethical and intentional behavior to use information technology should be the key element in the decision-making process. The purpose of this study is to develop a model for smart card acceptance from ethical perspective. Also, a new method of real time scenario is introduced to identify personal understanding of ethical circumstances by using smart cards.

Keywords- Computer Ethics Smart Card, Acceptance; Information Technology (IT).

I. INTRODUCTION

As the general public becomes increasingly computer literate, the gap between technology and peoples' mental power notably shrinks. The available computer resources, software, and assorted output devices have enlightened many unethical activities, privacy invasion and illegal purposes. Computer ethics is viewed as one of the foremost areas of concern and interest by academic researchers and industry practitioners. They are defined as an all-encompassing term

that refers to all activities needed to secure information and systems that supports, in order to facilitate ethical use.

To ensure successful effect of information technology, various controls and measures is implemented, current security policies [6], smart card application [29] and information security ethics [23] are the most useful examples of information technology and computer (IT) growth. An interesting point of analysis on these topics would be on ethical issues which remain the heart of [28] in order to develop and suggest a model to realize problems and complicated concern on smart card adoption [27] and related ethical behavior [19][21].

As information technology and internet become ubiquitous and pervasive in our daily lives, a more thorough understanding of issues and concern over the information security and ethics is becoming one of the hottest trends in the whirlwind of research and practice of information technology. As numerous ethical and social issues caused by computer technology arise every day and many concern are getting higher on unethical behavior of IT industries, the following statements are prove of computer ethics in educational and industrial levels:

- New concerns are rapidly emerging,
- Computer ethics presents a continuous stream of new situations.
- Computerized information systems are usually complex.

The past few years have seen an increased orientation of societies becoming information intensive. Business are increasingly relying on information technology (IT) or their

survival. Recently, smart card technology is interested all over the world and it is used in a wide range of applications such as telecommunication, financial, transportation, healthcare, information security, education, government and many other industries. Smart card is defined as: "A plastic credit card-sized transaction card that contains a microprocessor chip" [22]. With the progression in the smart card technology, the smart cards could be replaced coins, cash, identification cards, passports, airline tickets, driving licenses, medical records for patients, credit cards. This all is achievable due to increased memory capacity and using data encryption for better security [2]. Also, the current development in information and communication technologies has impacted all sectors in our daily life. To ensure effective working of information technology, various controls and measures had been implemented. Current policies, smart cards and guidelines between information technology developers are the most useful examples of information technology (IT) growth. However, lack of proper computer ethics frameworks within information technology is affecting underdevelopment societies day by day.

Nowadays, even though benefits of smart card proved in the most development societies, but still this important factor of IT world has not been studied from ethical view. For the new technology in any society, acceptance measurement is more important rather than relevant benefits. In fact, user acceptance is an undeniable key of any further IT implementation and development. In addition, public use of smart cards may root from educational basis to ethical behavior analysis of end user under the certain circumstances of information and telecommunication technology.

In the current growth of information technology; the last decades have brought smart card as an ideal device for any transaction such as healthcare, telecommunication, banking, and many other applications. Smart card provides better possibilities for security, customization and improved services for users. Understanding the factors that influence user acceptance of this aspect of current development is vital for sophisticated consumer with respect to ethical action and reaction, where knowing the customers ethical and intentional behavior to use smart cards should be the key element in any decision-making process [27] [28] [29].

According to [27], one of the factors which can influence user acceptance of new technology is anxiety. Furthermore, the psychological elements which makes people un motivated to use smart card are: Duplication; Chip (blocking card); Friendship; Place of using; Lost; Valuable and personal data is there (privacy); Fraud and misuse; Life (stolen people), so it is understood that these explanations are highlighted the anxiety factor which has negative effect on smart card acceptance in terms of security, privacy, and technical problems.

In this paper, the authors suggested an ethical model for future successful use of smart card in developing societies and get rid of negative impact on social issues with respect of ethical scenarios and reviewed models.

II. LITRATURE REVIEW

In fact, computer ethics is defined as the analysis of the nature and social impact of computer technology and the corresponding formulation and justification of policies for the ethical use for technology [30]. The number and kinds of application of computing increase dramatically each year and the impact of computing has felt around the planet [18].

Computer ethics is a new branch of ethics that is growing and changing rapidly as computer technology grows and develops. The term "computer ethics" is open to interpretations both broad and narrow. For example, computer ethics might understand very narrowly as the efforts of professional philosophers to apply traditional ethics [4].

III. THEORITICAL PERSPECTIVE

In this part, various frameworks such as PAPA, Theory of Planned Behavior, Theory of Reasoned Action and Moral Model shall be studied in order to clarify aspect of smart card acceptance model from ethical perspective factors.

A. PAPA

According to [16] decision makers place such a high value on information that they will often invade someone's privacy to access it. As earlier Manson mentioned, these for elements are general human weaknesses that cannot be a part of their ethical behavior which are Privacy, Accuracy, Accessibility and Intellectual Property. Also he stated that, the ethical issues involved personal behavior and professional practice.

Privacy: It may define as the claim of individuals to determine for themselves when, to whom, and to what extent individually identified data about them is communicated or used. Most invasions of privacy are not this dramatic or this visible.

Accuracy: Represents the legitimacy, precision and authenticity with which information is rendered. Because of the pervasiveness of information about individuals and organizations contained in information systems, special care must be taken to guard against errors and to correct known mistakes. The question will remain that, who is held accountable for the unwanted smart card errors such as rejecting and blocking the card? And who and how does assist users in any terrible situation like loosing and fraud of smart card? These are important questions may come across every user's mind or which party liable for inexact or incorrect information that leads to devastation of another.

Prroperty: One of the more controversial areas of information technology and ethics concerns the intellectual property rights connected with smart card ownership. As a real time scenario, assume person X receive physical access card in order to use for interior building facilities. Prior to using the access card, a friend of person X who is person Y (Consider as an unauthorized person), needs to use the access card too, so person X shares his/her smart card. As earlier mentioned, ethically this behavior is an invasion to intellectual property rule and regulation where the only

responsible person is person X to hold security of entire building.

Accessibility: Means the information that a person or organization has a rights or privilege to obtain with which level of access and safeguards. At the same time, imagine a senior security officer who has recently resigned from his/her previous company. Nevertheless, still he/she is aware of smart card authentication process which has not been change yet and he/she would access the private information. On the other hand, his/her friend, suggesting him/her to publish the dishonesty among the employees and management in order to aware stockholder and society to prevent from further corruptions.

B. Theory of Planned Behavior

The central factor of this theory is individual's intention to perform an ethical behavior. Intention is assumed to capture motivational factors that influence behavior. These are indications of how hard people are willing to try and how much effort is exerted in order to perform the behavior [12]. Theory of Planned Behavior has been successfully applied to various situations in predicting the performance of behavior and intentions, such as predicting user intentions to use new software [17].

C. Moral Model

From morality perspective [8], researchers develop a model to create educational opportunity that allows students to examine their existing beliefs regarding ethical and technical issues. In fact, main object of this model was to encourage students to explore "who am I now" in relation to technical, professional, cultural, and legal solutions to the ethical and security issues.

D. Theory of Reasoned Action

Drawn from social psychology, Theory of Reasoned Action is one of the most fundamental and influential theories of human behavior, derived from previous research that started out as the Theory of Attitude [14], which lead to the study of attitude and behavior. It has been used to predict a wide range of behaviors [5].

TRA defines relationships between beliefs, attitudes, norms, intentions, and behavior. According to this theory, an individual's behavior (e.g., use or rejection of technology) is specified by one's intention to perform the behavior, and individual's attitude toward performing the behavior and subjective norm influence the intention, specified as "the person's perception that many persons who are important to her think she should or should not perform the behavior in question [5].

IV. COMPUTER ETHICS AND REAL TIME SCENARIOS

Using scenarios allows contributors to learn about the relevance and challenges of ethical decision making by resolving of dilemmas that arise in 'real life' situations. Participants can feel into personal understanding and have the opportunity to consider others' perspectives through

discussion and role play. In doing so, they can develop an understanding of the need and the ability to stand in another's shoes - a critical component of developing sensitivity to ethical issues on smart card technology.

The scenarios present dilemmas to be resolved amidst multiple, often competing, considerations and interests, and raise the kinds of issues and internal and external pressures with which many participants could identify. The point of the exercise is not to arrive at any one 'right' resolution to the dilemmas, but instead to:

- Appoint in challenging their own and understanding others' perspectives
- Recognise that reality is usually a better way to resolve a dilemma ethically, depending on the different factors with smart card technology and behaviour considered.

At this point, three real scenarios are introduced as examples.

Scenario one: Assume person X receive physical access card in order to use for interior building facilities. Prior to using the access card, a friend of person X who is person Y (Consider as an unauthorized person), needs to use the access card too, so person X shares his/her smart card. As earlier mentioned, ethically this behavior is an invasion to intellectual property rule and regulation where the only responsible person is person X to hold security of entire building.

Scenario two: Imagine a senior security officer who has recently resigned from his/her previous company. Nevertheless, still he/she is aware of smart card authentication process which has not been change yet and he/she would access the private information. On the other hand, his/her friend, suggesting him/her to publish the dishonesty among the employees and management in order to aware stockholder and society to prevent from further corruptions.

Scenario three: Suppose a university student, who is technical assistant of his /her supervisor, has already received a smart card as an access and credit card, which might be useful for other student. Also, as a developer he/she was assigned the task of developing software to control the number of print out pages in order to charge students for the facility expenses. While, he/she is acting in both the character (Student and teacher assistant) will it be an ethical behavior if he/she can share the free username and password for his/her friend.

Obviously, all these three scenarios can be covered by two elements of PAPA model which are accessibility and property. Therefore, having an educational fundamental including PAPA factors and making users aware about the smart card technology might be valuable to prevent misuse, fraud, unauthorized access and consequently increase the level of users' acceptance.

V. PROPOSED FRAMEWORK

A framework is expanded with respect to smart card acceptance from ethical perspective, base on the PAPA, Theory of Planed Behavior, and Moral Model. Figure 3 shows the schematic view of research model. The further discussion, monitor the proposed model from different dimension such as education, awareness, and PAPA.

The most important factor in effective ethical awareness is people's actions, attitudes, and their sense of right and wrong [30]. Anyone who regards information in any form as an important asset should be aware of the possible threats and vulnerabilities which are relevant. The issue of ethics has fallen into the gray area that have avoided for fear that too little knowledge could be hazardous and too much could be dangerous [8].

Most organizations acknowledge, need for awareness, but at the same time, it may be more important, and far more successful to address the issue of ethics as an attitude rather than a technology. In addition, many moral dilemmas are concern because of conflict between right and wrong actions due to lack of awareness in most of educated societies [10]. moreover, it is about revealing the more impacts of technology shocks which are morally controversial but people are facing problem due to lack of ethics awareness in computer science.

Dilemma arises from the fact that security-unaware users have a need for security but no expertise in such matter [10]. If individuals, through awareness and knowledge, develop an ethical, moral attitude toward computer security, the transitions into the future will be much smoother [10]. Having a general knowledge and knowing what features and benefits the smart card technology has is a significant issue and it can effect on intention to adopt the technology. However, as an earlier goal of any IT companies, information security would be an unquestionable factor of suggested model.

On the other point of view, several studies have reported that higher levels of education are positively related to favorable computer attitudes [25][12][26]. Educational level has been discussed along with two major analyses which are morality and attitude. The earlier model [19] examines the morality where failure in previous research [18] found few changes in students' opinion regarding unauthorized usage and duplication, with respect to lack of adequate attitudes towards ethical analysis. Also, there was no significant correlation between students attitudes and their religious believes or lack thereof. According to Mason's [16] views from PAPA model, in educational environment, new ethical concern are created and acting wrongfully becomes easier. These ethical issues must be addressed for a unique opportunity to help and educate technology users in order to make the best moral decision.

According to Bailey and Pearson [3] satisfaction is defined as the sum of users weighted reaction to a set of criteria. From the list of satisfaction factors which are reported by [3], for the proposed framework we have selected four elements stated as: Reliability, Understanding

of system, Attitude and Feeling to participation (Morality). According to [12] satisfaction of the computer system will have a direct effect on usage. Oliver [24] postulated that user's satisfaction of a system leads to continuance intention whereas dissatisfaction leads to discontinue subsequent use. Wolfenbarger and Gilly [31] identified a positive link between reliability, security, privacy and customer satisfaction. They also stated that reliability is the first dimension that explains satisfaction.

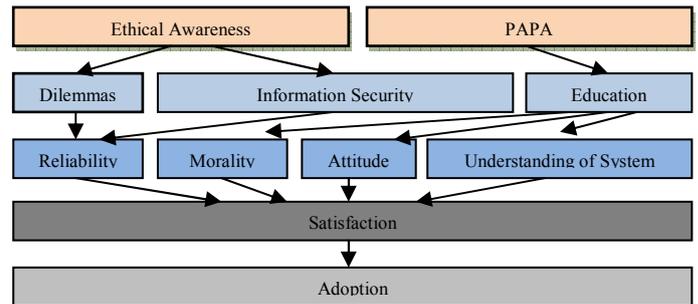


Figure 1. . Smart card acceptance model from ethical perspective

Besides, some previous studies [7][20] argued that reliability has the direct and positive impact on user satisfaction. Kim et al. [14] found that customer satisfaction is strongly related to reliability for repeat users. Similarly, Yoon [32] found that technology satisfaction is positively related to intention to use it.

VI. CONCLUSION AND FUTURE WORK

Although the technology used to implement a smart card system is important, educating and awareness of the end users is also significant. Technology should be bringing up to people and they have to be aware of its benefits, features, and attributes. Being aware of the technology will improve users' judgment and their ability in using the system in an ethical behavior manner [1][27]. IT professionals can benefit from acceptance and ethical frameworks for recognizing and understanding the ethical behavior and intention to use of users in the situations they encounter every day.

In this study, we proposed an acceptance model from ethical views. According to the model, ethical awareness can minimize the dilemmas, further; as a result of information security awareness the user will be able to make a right decision in an ethical situation and in interact with users to improve personal and professional capability. Therefore, users would trust the technology and they will be satisfied by using the system. On the other hand, education will help users toward better understanding the system and increase their level of attitude and morality. These factors would have the positive effect on user satisfaction and as a final point on the acceptance of the smart card technology. This research is still on progress and the proposed model should be tested and examined.

The findings from this study contribute to the existing body of literature and scholarly research on computer ethics and information security issues, policies, and educational instruction. Research is need within the area of computer ethics instruction and more specifically computer ethics policies and their effectiveness.

Even though from technical point of view, implementing of smart card system is important but, educating and awareness of the end users is also significant factor of social and behavioral modeling.

Technology should bring up to people and they have to be aware of its benefits, features, and attributes. Being aware of the technology will improve users' judgment and their ability in using the system in ethical behavior manner [4]. With elements of social factors, awareness, ethical analysis and user adoption a framework was develop as main heart of this research.

On the other hand, education which is based on the PAPA model will help and instruct end users towards a better understanding of smart cards and its benefits. In order to pre-evaluation of suggested model real life scenario was introduced and it might be applicable as future tools and further research. This research is still on progress and the proposed model should be tested and examined.

REFERENCES

- [1] Ajzen, I. 1991. The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*. 50(2): 179-211.
- [2] Al-Alawi, A. I., Al-Amer, M. A. 2006. Young generation attitudes and awareness towards the implementation of smart card in Bahrain: an exploratory study, *Journal of Computer Science*, 2 (5), 441-446.
- [3] Bailey, J. E., Pearson. S.W. 1983. Development of a tool for measuring and analyzing computer user satisfaction, *Management Science*, 29, pp. 530-544.
- [4] Cruz, J. A., Frey, W. J. 2003 .An Effective Strategy for Integration Ethics Across the Curriculum in Engineering: An ABET 2000 Challenge," *Science and Engineering Ethics*, p. 543-568.
- [5] Fishbein, M., and Ajzen, I. (1975). *Intention and Behavior: An Introduction to Theory and Research*. Boston, MA: Addition-Wesley.
- [6] Fowler, T.B., (2002). *Technology's Changing Role in Intellectual Property Rights*, *IT Pro*. Volume 4(2): 39-44.
- [7] Fornell, C., M. D. Johnson, E. W. Anderson, J. Cha, and B. E. Bryant. 1996. The American customer satisfaction index: Nature, purpose and findings. *Journal of Marketing* 60 (October): 7-18.
- [8] Friedman, B. (Ed.) 1997. *Human values and the design of computer technology*. New York: Cambridge University Press and CSLI, Stanford University.
- [9] Halawi L., Aronson, J., and McCarthy, R. 2005. Resource-based view of knowledge management for competitive advantage. *Journal of Knowledge Management*, 3(2),pp. 75-86.
- [10] Howard, R.A. 1988. Decision analysis: practice and promise. *Management Science*, 34(6), 679-695.
- [11] Huff, C., and Frey, W. 2005. *Moral Pedagogy and Practical Ethics*, in *Science and Engineering Ethics* (Forthcoming).
- [12] Igbaria, M. and Parasuraman, S. 1989. A path analytic study of individual characteristics, computer anxiety, and attitudes towards microcomputers. *Journal of Management*, 15 (3), 373-388.
- [13] Jussipekka, L., Seppo, H. (1998). An Analysis of Ethics as Foundation of Information Security in Distributed Systems. *HICSS*. Volume 6 (6): 213-222.
- [14] Kim, Soyoun and Leslie Stoel, 2004. Apparel retailers: website quality dimensions and satisfaction. *Journal of Retailing and Consumer Services*, 11.109-117.
- [15] Langford, D. (2000). *Internet Ethics*, London: Macmillan.
- [16] Mason, R.O. 1986 Four Ethical Issues of the Information Age, *Management Information Systems Quarterly*, 10, 1, 5-12.
- [17] Mathieson, K. 1991. Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research* 2(3): 173-191.
- [18] McGee, R. W. 2005. The Ethics of Tax Evasion: A Survey of International Business Academics. Presented at the 60th International Atlantic Economic Conference, New York, October 6-9, 2005.
- [19] Mellisa, D. 2006. A Framework for Information Security in Ethics Education system. University of Maryland.
- [20] Michael D. Johnson, Nilsson . L, 2006. The Importance of Reliability and Customization from Goods to Services. *Quality Management Journal*. Vol 10, No 1.
- [21] Namayandeh, M., and Masrom, M., and Ismail Z., (2009). Development of Computer Ethics Framework for Information Security with in Educational Context. SEATUC. Shibua University. 235-240.
- [22] NBS Technologies Inc., 2004. Smart Card Frequently Asked Questions. http://www.nbstech.com/solutions_faq.html
- [23] North. S.M., George, R., Shujaee, K., and Mumford, A. Collaborative Information Assurance Capacity Building at a Consortium of Colleges and Universities. Proceedings of the 43rd Annual Association for Computing Machinery Southeast Conference. March 2005, 361-362.
- [24] Oliver, R.L. 1980. A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions, *Journal of Marketing Research*, Vol. 17, No. 4, pp. 460-469.
- [25] Raub, A. C. 1981. Correlates of computer anxiety in college students. Unpublished doctoral dissertation, University of Pennsylvania.
- [26] Smith, H. (2002). *Ethics and Information Systems, Resolving the Quandaries*, the Database for Advances in Information Systems. Volume 33 (3): 8-20.
- [27] Taherdoost. H, Masrom. M, Ismail. Z. 2009. Evaluation of Smart Card Acceptance: Security, Technology and Usage. Conference Proceedings of 3th International Conference on e-Commerce, e-Administration, e-Society, and e-Education (e-CASE). The Grand Copthorne Waterfront Hotel, Singapore, January 8-10, 2009.
- [28] Taherdoost. H, Namayandeh. M. 2009. Social Modeling of Smart Card Technology Acceptance Based On Ethical Scenarios Analysis.
- [29] Taherdoost. H, Namayandeh. M, Masrom. M. 2009. Development a Smart Card Acceptance Model from Ethical Perspective, The 2009 World Congress in Computer Science, Computer Engineering, and Applied Computing (WORLDCOMP'09), Monte Carlo Resort , Las Vegas, Nevada, USA, July 13-16, 2009.
- [30] Walters, G.J. 2001. Privacy and Security: An Ethical Analysis, *Computers and Society*, 31, 2, 8-23.
- [31] Wolfenbarger, M., Gilly, M.C., 2003. eTailQ: Dimensionalizing, Measuring and Predicting Etail Quality. *Journal of Retailing*. 79(3), 183-198.
- [32] Yoon, Sung-Joon, 2002. The antecedents and consequences of trust in online-purchase decisions. *Journal of Interactive Marketing*, 16: 47-63.

