DIGITAL FORENSICS ADOPTION MODEL FOR MALAYSIAN LAW ENFORCEMENT AGENCIES

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To my beloved family,

Thank you for your love, sacrifices, prayers, understanding, and continuous support.

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ABSTRACT

The increasing number of digital forensics (DF) cases has resulted in the surge of cybercrimes leading to the need for DF to be used in Malaysian Law Enforcement Agencies (MLEAs). This is to enable the agencies to conduct an efficient digital investigation. In spite of the notable benefits of DF, adoption of this innovation by MLEAs is not widely accepted. Currently, there are limited studies conducted on DF adoption in the context of law enforcement agencies. Hence, in addressing the issue, this study investigated potential factors influencing DF adoption by MLEAs. This study proposed and developed a research model based on the combined Technology Organization and Environment (TOE) framework and Institutional Theory and Human Organization Technology (HOT)-fit model that uses quantitative approach. The research model was developed based on an extensive review of the literature. Twelve hypotheses were developed for the quantitative approach to test the model. A survey method using paper based questionnaire was employed. Based on purposive sampling, questionnaires were distributed to 180 decision makers of the MLEAs and the data were analysed using the Structural Equation Modelling (SEM) with Partial Least Squares (PLS) technique. The findings were used to develop a Digital Forensic Adoption Model that facilitates the understanding of factors affecting DF adoption by MLEAs. The results indicated that Relative Advantage $(\beta = 0.210, t = 3.526, p < 0.001)$, Compatibility $(\beta = 0.225, t = 3.523, p < 0.001)$, Coercive Pressure $(\beta = 0.200, t = 2.562, p < 0.01)$, Normative Pressure $(\beta = 0.171, t = 2.386, p < 0.01)$, Vendor Support $(\beta = 0.203, t = 3.128, p < 0.01)$, and Perceived Technical Competence $(\beta = 0.121, t = 1.851, p < 0.05)$ were the most significant factors driving the decision of MLEAs to adopt DF. Besides that, it was found that the agency size had no significant difference in the impact of perceived technical competence on the decision to adopt DF $(\beta = 0.158, t = 1.186, p > 0.05)$. The study has theoretical contributions and practical implications whereby the Digital Forensics Adoption Model serves as a tool for MLEAs to gain insight into the process of DF adoption in their working practice.

ABSTRAK

Peningkatan jumlah kes forensik digital (DF) telah mengakibatkan lonjakan jenayah siber yang membawa kepada keperluan untuk DF digunakan dalam Agensi Penguatkuasaan Undang-undang Malaysia (MLEAs). Ini adalah untuk membolehkan agensi menjalankan siasatan digital yang cekap. Walaupun manfaat DF adalah ketara, penggunaan inovasi ini oleh MLEA tidak diterima secara meluas. Pada masa ini, kajian tentang penggunaan DF dalam konteks agensi penguatkuasaan adalah terhad. Oleh itu, dalam menangani isu ini, kajian ini mengkaji faktor-faktor yang berpotensi mempengaruhi penggunaan DF oleh MLEAs. Kajian ini mencadangkan dan membangunkan satu model penyelidikan berdasarkan gabungan kerangka kerja *Technology-Organization-Environment (TOE)*, Model *Institutional Theory* dan Model *Human Organization Technology* (*HOT)-fit* menggunakan pendekatan kuantitatif. Model hasil dari kajian ini telah dibangunkan berdasarkan analisis literasi yang dijalankan secara menyeluruh. Dua belas hipotesis telah dibangunkan untuk pendekatan kuantitatif untuk menguji model. Dua belas hipotesis bagi pendekatan kuantitatif telah dibangunkan untuk menguji model. Kaedah tinjauan menggunakan borang soal selidik telah digunakan. Berdasarkan persampelan bertujuan, soal selidik diagihkan kepada 180 orang pegawai pembuat keputusan MLEAs dan data dianalisis menggunakan Model Persamaan Struktur (SEM) dengan teknik Kuasa Dua Terkecil Separa (PLS). Dapatan ini digunakan untuk membangunkan Model Penggunaan Forensik Digital yang memudahkan pemahaman tentang faktor yang mempengaruhi penggunaan DF oleh MLEA. Hasil analisis menunjukkan bahawa Kelebihan Relatif $(\beta = 0.210, t = 3.526, p < 0.001)$, Keserasian $\beta = 0.225, t = 3.523, p < 0.001)$, Tekanan Paksaan $(\beta = 0.200, t = 2.562, p < 0.01)$, Tekanan Normatif $(\beta = 0.171, t = 2.386, p < 0.01)$, Sokongan Vendor $(\beta = 0.203, t = 3.128, p < 0.01)$ dan Persepsi Kecekapan Teknikal $(\beta = 0.121, t = 1.851, p < 0.05)$ adalah faktor yang paling signifikan mendorong keputusan MLEA untuk menggunakan DF. Di samping itu, didapati bahawa saiz agensi tidak mempunyai perbezaan yang signifikan terhadap hubungan antara tanggapan kecekapan teknikal dan keputusan untuk menggunakan DF $(\beta = 0.158, t = 1.186, p > 0.05)$. Kajian ini memberi sumbangan teori dan implikasi praktikal di mana Model Penggunaan Forensik Digital berfungsi sebagai alat bagi MLEA untuk mendapatkan maklumat tentang proses penggunaan DF dalam amalan kerja mereka.

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LIST OF ABBREVIATIONS

AC	-	Agency Championship
AVE	-	Average Variance Extracted
CB	-	Covariance-Based
CCID	-	Commercial Crime Investigation Department
COMP	-	Compatibility
COMX	-	Complexity
COP	-	Coercive Pressure
CR	-	Composite Reliability
CSM	-	Cyber Security Malaysia
CUL	-	Culture
DF	-	Digital Forensic
DFD	-	Digital Forensic Department
DFR	-	Digital Forensic Readiness
DOI	-	Diffusion of Innovation
E-Commerce	-	Electronic Commerce
EFA	-	Exploratory Factor Analysis
GOV	-	Governance
HIS	-	Hospital Information Systems
HL7	-	Health Level Seven
HOT	-	Human Technology Organization
IDT	-	Information Diffusion Technology
INF	-	Infrastructure
IS	-	Information Systems
IT	-	Information Technology
LEA	-	Law Enforcement Agency
LEAs	-	Law Enforcement Agencies
MCMC	-	Malaysian Communication and Multimedia Commission
MDTCC	-	Ministry of Domestic Trade, Co-Operatives and Consumerism

MGA	-	Multi Group Analysis
MLEA	-	Malaysian Law Enforcement Agency
MLEAs	-	Malaysian Law Enforcement Agencies
MRPD	-	Malaysia Royal Police Department
MYCERT		Malaysia Computer Emergency Response Team
NOM	-	Normative Pressure
PER	-	Perceived Technical Competence
PLS	-	Partial Least Square
PRISMA	-	Preferred Reporting Items for Systematic Review and Meta-Analyses
RA	-	Relative Advantage
RFID	-	Radio Frequency Identification
SaaS	-	Software as a Service
SCM	-	Securities Commission Malaysia
SEM	-	Structural Equation Modelling
SLA	-	Service Level Agreement
TAM	-	Technology Acceptance Model
TMS	-	Top Management Support
TOE	-	Technology Organization Environment Framework
TPB	-	Theory of Planned Behaviour
TRA	-	Theory of Reason Action
UTAUT	-	Unified Theory of Acceptance and Use of Technology
VEN	-	Vendor Support
VIF	-	Variance Inflation Factor

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CHAPTER 1

INTRODUCTION

1.1   Introduction

Due to surge of cybercrime rate, digital forensics (DF) has been recognised as an effective technology that brings in a systematic scientific method in facilitating today's organizations to solving and responding towards an associated today's cybercrimes (Valjarevic and Venter, 2011; Barske, Stander and Jordaan, 2010; Hamdi, 2011; Issam, 2014; Reddy and Venter, 2013; John, 2012; Michael, Mariki and Jan, 2013; Nikkel, 2014; Charles and Pollock, 2015). Aware of the significance offered by this technology, DF is robustly practiced and notably being used internally by the law enforcement agencies (LEAs) in many developed countries (Derek, Francine, Ewa and Oscar, 2008; Khuram, Ahmer, Kamran and Nadeem, 2014; Mulazzani, 2014; Obwaya, 2011; Peter and Richard, 2012; Stephen Darrin and Alessandro, 2011).

In developed countries, an in-house forensics capability is supposed to be in place in these agencies as a means to support more than incident detection via digital investigation (Hamdi, 2011) as diverse as gathering and producing admissible digital evidence in response to link the perpetrator to the incidents that provide the chance of success in litigation (Derek *et al.*, 2008; Khuram *et al.*, 2014; Stephen *et al.*, 2011). Furthermore, the application of an in house DF has brought these agencies in the country into fast forensics results, cost effective, low-impact and efficient digital investigations (Obwaya, 2011).

Despite the benefits that the enforcement agencies in developed countries have derived from this technology in place, the pace towards DF adoption by the enforcement agencies in developing countries is unfavourable (Aswami, Jill and Husin, 2012; Kasun, Keerthi and Ravith, 2016; Khuram *et al.*, 2014; Obwaya, 2011).

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In the context of developing countries, Malaysian Law Enforcement Agencies (MLEAs) are depending on the third party namely known as Cyber Security Malaysia (CSM) in request for digital investigation assistance as well as other related action of DF response even for straight forward and non-complex cases. However, the increasing number of requests for digital forensics investigation and referred incident cases, have caused a big challenge for this national agency as well as the enforcement agencies (Aswami *et al*., 2012; Aswami and Izwan, 2008; Rafizah and Aishah, 2013; Sarah, Miratun and Zabri, 2018).

As a result, the investigations and other digital forensics actions taken in dealing with those incidents become very time consuming and at the same time, related enforcement agencies have to bear with the cost involved during the investigation and the loss due to the interruption of their operation while the digital forensics action being taken (Sarah *et al*., 2018). Similarly, an issue on privacy concerns for DF function being outsourced to the third party been raised up by Jerker and Ingvar (2004).

1.2 Background of the Problem

In dealing with a wide range of cyber threats and digital incidents which have recently demonstrated a rapid surge across the globe (Mitha and Venter, 2015; Nikkel, 2014), DF has been recognised as an essential technological application in facilitating the modern organizations to gather and secure an admissible and lawful production of digital evidence through a conduct of digital investigation (Aswami *et al*., 2012; Kruse and Heiser, 2002; McKemmich, 2002). In this case, DF serves as a tool that helps an organization to determine the root cause of an incident which takes place from the cyber criminal activities.

Hence, the use of DF is crucial in combating the cyber crime in order to put the cyber prosecutors behind the bars. Playing a role as an authoritative body, the enforcement agency becomes a point of contact in reference to the case of incident

detection and occurrence for the purpose of investigation and incident analysis to find the incident's root cause as well as the perpetrators of the incident. Despite the great benefits offered by this technology, there are very few law enforcement agencies in developing countries that have brought the DF in their organization (Aswami *et al*., 2012; Kasun *et al*., 2016; Khuram *et al*., 2014; Obwaya, 2011). While on contrary, DF is robustly adopted and internally employed by most of the enforcement agencies in developed countries (Derek *et al*., 2008; Khuram *et al*., 2014; Mulazzani, 2014; Obwaya, 2011; Peter and Richard, 2012; Stephen *et al.,* 2011).

Nevertheless, in the context of developing countries, most Malaysian Law Enforcement Agencies (MLEAs) are seen having a difficulty in catching up with the adoption of DF. In making a solution to all the cases referred to them, these agencies are dependent on the third party's assistance known as Cyber Security Malaysia (CSM) to perform, and run the responses towards the digital incidence cases (Aswami *et al*., 2012; Aswami and Izwan, 2008; Sarah *et al*., 2018) even for the straight forward and non-complex cases. At this point, Sommer (2009) pointed out that, the inability of an organization to conduct their own forensics will restrain them from gaining a cost-effective, low-impact and efficient forensics investigation as well bringing in fast forensics results. CSM is an agency that was established under the Ministry of Science, Technology and Innovation which serve as a national point in the country that provide a purely DF however, it is worth to note that CSM is not a part of LEAs and does not have an investigation unit.

Nevertheless, the fact is that requests for forensic analysis and the number of cases referred to CSM are increasing from years to years (MyCERT-Cyber Security Malaysia, 2018; Rafizah and Aishah, 2013;). According to Sarah *et al*. (2018) and Aswami *et al*. (2012), this situation has been exacerbated by issues leading to incompetence in the conduct of DF investigation, as the processes involved are time consuming hence resulting in delay on the actions to be taken in response to the reported incidences. The incompetency also refers to, the productivity of the agencies which is affected by the interruption of their business operations during the process of an investigation.

Indeed, Jerker and Ingvar (2004) also raise privacy concerns if the DF function is outsourced to a third party. In supporting the above challenges, Sarah *et al*. (2018) and Aswami (2012) highlighted the following issues as discussed. First, CSM faced a challenge of meeting up the agencies timeline expectations. Since the LEAs are subjected to the Service Level Agreement (SLA), they are unable to get faster forensics results and yet some critical cases require fast forensics results. In this case, both CSM and LEAs have to struggle to meet this requirement because they rely on SLA of CSM, which in average takes a minimum of three months. A request could be issued to expedite the forensics result, but even when this was offered, their case would still be put into a critical case queue. This makes digital incidents cases to take a long time to be solved.

The LEAs are not able to meet their own expectation timeline since the process of managing and handing over digital evidence; i.e. transportation, registration, briefing session, to CSM takes a lot of time, despite the criticality of the case. Second, the dependency on CSM on the forensics assistance caused the LEAs to bear the cost incurred when cases related to the crime were submitted to CSM. Sending cases back and forth to CSM resulted in some cost; for example, travelling from one point to another and managing the chain of custody. Instead of having a budget on this, it is worth for the LEAs to budget on conducting its own DF practice. Next, adopting the technologies of DF in house by the LEAs is needed to analyse the digital evidence in a safe and controlled environment to eliminate the risk of privacy and contamination thus making it admissible to the court for legislation purposes. Lastly, after 15 operational years, CSM directions have changed.

As a result of the dumping of cases referred to them from time to time, the agency now would like to give attention to more complex cases especially those that require an in-depth research work (Sarah *et al*., 2018). Therefore, LEAs are hoping to have their own capability of practicing digital forensics in order to conduct their own basic digital investigation. Looking at the prevailing issue, it is therefore important for today's organizations to recognise the importance of DF in their organizational environment. It is essential for modern organizations to actualise the effectiveness of this technology to be adopted in place.

Having DF in the house will enhance the organization's capacity to give a fast response to the security occurrences (Elyas, Ahmad, Maynard and Lonie, 2015; Suhaila, Arniyati, Mohd Afizi, 2011; Mankantshu, 2013; Saleh, 2013). When incidents occur, digital forensics investigation oughts to be conducted efficiently to react to the incidents and to provide the forensics results without delays (Mouhtaropoulos, Li and Grobler, 2014; Mouhtaropoulos, Panagiotis and Chang, 2013).

In Malaysia, the issues of DF are fairly explored (Aswami *et al*., 2012; Aswami and Izwan, 2008) primarily to, provide coherent understanding on the potential factors to assist organizations namely the enforcement agencies to adopt DF. In addition to this, the review of literature revealed that the DF area concentrated mostly on technical perspectives focusing on technical issues (Horsman, 2018; Lillis, Becker, O'Sullivan and Scanlon, 2016; Bilby and Caronni, 2011; Rekhis and Boudriga, 2010). Nevertheless, less attention was given to the managerial aspect while studying DF particularly in a context of organizations adoption behavior. Limited studies on this area resulted in not only a scarce of the comprehensive models developed in the context of this DF adoption in organizations (Elyas *et al.*, 2015; Hamdi, 2011) but also, caused a lack of understanding of factors influencing organizations' decision specifically, the enforcement agencies to adopt DF in house.

Meanwhile, Yang, Sun, Zhang and Wang (2015) emphasised on the necessities of considering technological, organizational and environmental factors while studying the organizational context for new technology adoption as the integration of the factors will reflect on the basis of innovation characteristic (Grover, 1993). Therefore, it is imperative to derive a perspective from the enforcement agencies as they will usually be correlated to cases of incident detection (Mouhtaropoulos, 2011), thereby facilitating an understanding with regards to the drivers of DF adoption and assisting the agencies' decision makers to bring up this capability towards the in-house DF adoption.

1.3   Research Problem Statement

As shown in Figure 1.1, the rise of cyber incidents has caused a great affect against organizations namely loss of valuable and sensitive data, organization's reputational damage as well as financial loss (Sarah *et al.*, 2018; Elfadil, 2013; Mankantshu, 2013; Khuram *et al.*, 2014; Sommer, 2009). In addressing this issue, digital forensic (DF) has been recognized as an effective tool for an organization to react, respond and dissolve into any occurrences of related incidents (Nordiana, Wahid, Idna and Laiha, 2014; Suhaila *et al.*, 2011; Aswami *et al.*, 2012; Garfinkel, 2010; Mohay, 2005). Despite of these great benefits of DF, this technology is slightly adopted by MLEAs as an authorized and relevant referral body in the case of cyber crime (Sarah *et al.*, 2018; Rafizah and Aishah, 2013; Aswami *et al.*, 2012; Suhaila *et al.*, 2011). In subject to this, lack of comprehensive understanding as a coherent direction to help the law enforcement agencies towards the adoption of DF was found to be the challenge (Elyas *et al.*, 2015; Hamdi, 2011; Suhaila *et al.*, 2011).

In the Malaysian context, the issues of DF are fairly explored (Aswami *et al.*, 2012; Aswami & Izwan, 2008) notably to explore factors that influence the decision of law enforcement agencies to adopt DF. Hamdi (2011) in studying the DF adoption and practice is solely focused on environmental and organizational factors in the context of American Police Agencies. However, in organizational context for an innovation adoption, it is necessary to not only include the holistic dimensions namely technological, organizational and environmental factors (Yang *et al.*, 2015) for a comprehensive innovation characteristics outcome in order to provide a better explanation on innovation adoption of a developing country (Riyadh, Akter and Islam*,* 2009; Hemlata, Hema and Raoot, 2014). Therefore, in the context of developing countries, exploring the factors that consider the characteristics of DF can have significant value in the adoption of DF by MLEAs. Hence, the aims of this study is aligned with a suggestion made by Pangalos and Katos (2010) that advocated the need of research in a scope of DF to be expanded into another domain in order to encompass the difference in perspectives and to ensure the continuation of maturity of this discipline.
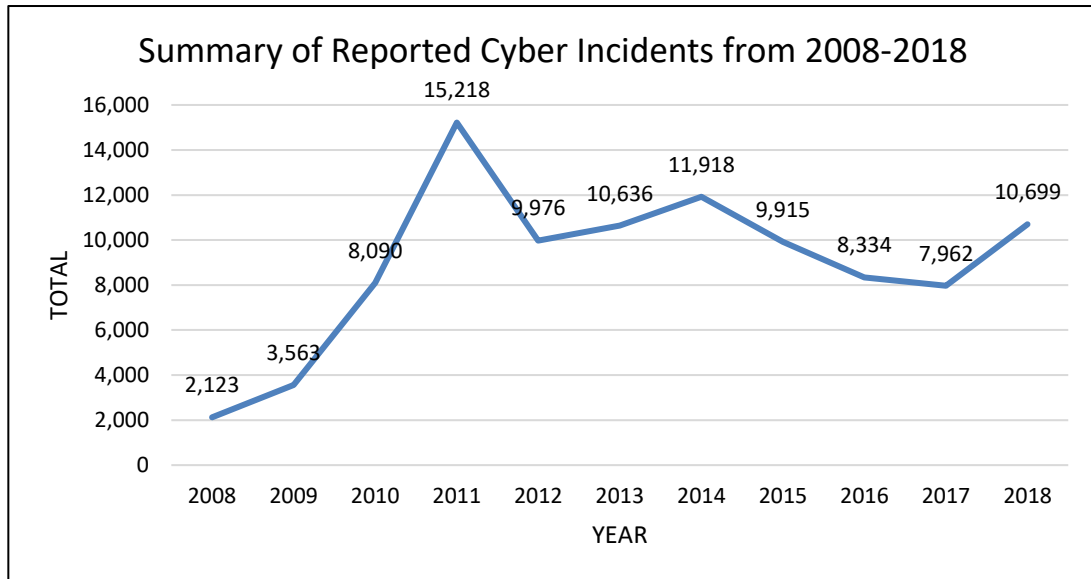
Figure 1.1   Summary of Reported Cyber Incidents from 2008 to 2018 (MyCERT, 2019)

1.4   Research Question

The research questions are defined based on the problem statement and research questions as follows:

How digital forensics can be adopted by Malaysian Law Enforcement Agencies?

Accordingly, the main research question is supported by the following sub-questions:

i.   What are the factors that affect the adoption of digital forensics by Malaysian Law Enforcement Agencies?
ii.   What is the relationship between the factors that affect the adoption of digital forensics by Malaysian Law Enforcement Agencies?
iii.   How the digital forensics adoption model can be developed to support the Malaysian Law Enforcement Agencies in using digital forensics?

1.5   Objectives of the Research

The research objectives are defined based on the problem statement and the research questions as follows:

i.   To identify the factors that affect the adoption of digital forensics by Malaysian Law Enforcement Agencies.

ii.   To examine the relationships of the factors that affect the adoption of digital forensics by Malaysian Law Enforcement Agencies.

iii.   To develop and validate a digital forensics adoption model that aims to support the Malaysian Law Enforcement Agencies in using digital forensics.

1.6   Significance of the Research

This study is important as it provide an understanding of the crucial factors that affect the decision of MLEAs to use DF. By incorporating DF into an organizational infrastructure and operational environment, the adoption brings considerable benefits. In Malaysia, the DF is currently at the stage of development (Sarah *et al.*, 2018; Suhaila *et al.*, 2011) notably among the enforcement agencies. In fulfilling their roles, the enforcement agencies must deploy new tools and applications to keep up with the threats and the challenges of the pace of evolving technologies. These initiatives include incorporating DF into their infrastructure and operational environment, tackling the technical digital issues in order to facilitate the judicial process and still to serve as efficient, economical and effective digital investigation process executed in the agency. Nevertheless, the trend of DF innovation adoption in the agencies is seen progressing slowly.

Even more, the increase of threats and the complexity in an organizational environment particularly among the government agencies due to a strong reliance upon information system in every single operation, has led to the acknowledgment of the government in advocating the DF initiatives to be extended into research and

development (Aswami, 2012). Hence, it was important to conduct this research as the findings of this study contribute to the guidance and the idea of better understanding the adoption decision of DF at the organizational level particularly the Malaysian Law Enforcement Agencies. An extensive literature reviewed (Elyas *et al*., 2015; Hamdi, 2011; Obwaya, 2011; Suhaila *et al*., 2011) revealed that there is lack of comprehensive study conducted to characterise the factor of DF adoption at the organizational level. In fact, the scarcity of this study in a scope of enforcement agencies particularly in a context of Malaysia has been found from the literature.

This endeavour was supported by Grobler, Louwrens and Von Solms (2010a) who noted that, there is a need for organizations to have a suitable framework that will assist them in adopting DF. In order to ensure the adoption can happen, organizations need to first understand the factors that influence the decision to adopt DF. Hence, a major contribution of this study is a proposition of a theoretical model that can be used by the organization that works to help the government and the decision makers of the agencies to understand the key factors that affect the evaluation process of DF innovation adoption. In addition, based on the existing DF literature, no researchers up to now incorporated the IS model into the development of their proposed framework.

Thus, this study is among the first studies that contributes to the development of recommendation theoretical model that incorporates the IS theories by applying the dimensional framework of Technology-Organization-Environment (TOE) Framework and Human-Organization-Technology (HOT-fit) Model in the field of DF adoption behaviour. This theoretical model will facilitate the decision makers of an organization (enforcement agencies) to gain a comprehension on the factors that critically affect the determination of digital innovation adoption from four categories of dimensions namely organizational, technological and environmental and human dimensions. Therefore, the proposed framework can be formalised and transformed into a comprehensive guide for DF adoption at the organizational level and can be used by the managerial level of the agencies to help them in allocating the resources when it comes to considering the decision of adoption on new technology such as DF.

This is aligned with the recommendation made by Hamdi (2011), who explained the need for a study to be conducted emphasising a wide range of inclusive determinants on DF practice in various aspects. All the significance of the research contributes to the expansions of current body of knowledge as this domain is relatively new to the public, legal communities and organizational environment in Malaysia.

1.7   Scope of the Research

This study mainly focuses on the organizational innovation adoption of innovation that is MLEAs decision to adopt in-house DF. Therefore, a group of selected Malaysian Enforcement Agencies was considered as the unit of analysis. In details, the study concerns the perspective of decision makers as the respondents which regard to the managerial level of MLEAs as they possess authority in the decision making process. The positivist approach was used as a research paradigm in conducting this study. This research was limited to data collection and interpretation through an objective approach, and the research findings were obtained through the quantitative method. The collected data was tested by Structural Equation Modelling (SEM) using the Partial Least Squares (PLS) approach. SmartPLS 3.0 software is utilized as a data analysis tool.

1.8   Definition of Terms

i.   *Digital Forensic*: An innovation that offered a specific process which identifying, analyzing, preserving and interpreting digital information derived from digital sources by using a scientifically proven method.

ii.   *Law Enforcement Agencies:* Law Enforcement Agencies (LEAs) are authority bodies representing federal or state government who are responsible for the enforcement under any existing laws.

iii.   ***Adoption:*** A decision to make full use of innovation continually.

iv.   ***Innovation:*** An idea, process, system, practice, product or technology that is perceived as new by an adopting organization.

v.   ***Digital Forensics Adoption:*** The decision of the organization to use, practice or to employ DF as a technological process in improving their business operation.

1.9   Structure of the Thesis

This thesis is structured in six chapters. The chapters are well related and complementary to each other. The brief outline of the chapters is as follows:

Chapter 1 provides a brief introduction to the subject and the context of the study, together with the research problem. It then highlights the objectives of this study, together with the scope and significance. Finally, this chapter also presents the overall organization of the current thesis.

Chapter 2 reviews the literature on Malaysian Law Enforcement Agencies, technology adoption as well as DF; this chapter also discusses the prior related studies on DF. In addition, the reviews also include a critical analysis of relevant IS theories particularly in the context of adoption and diffusion behaviour. Factors that could potentially be a driver towards the adoption of DF resulting from the selective theory are also identified in this chapter.

Chapter 3 presents the roadmap on how the research was carried out. It describes the appropriate research paradigm and research method that are relevant to this study. The research operational framework involved throughout the study is also being presented along with the research design.

Chapter 4 presents the formulation of the initial research framework, which is based on the results of Stage 2 (literature review) and in line with the related existing literature on technology and innovation adoption as well as DF adoption and practices at organizational level incorporated by the TOE and HOT-fit Model. The research hypotheses are also proposed. Finally, a pilot survey that was conducted to develop the relevant survey instrument is described.

Chapter 5 presents the main data analysis related to testing and developing the initial integrated theoretical framework by utilizing the SEM analysis with SmartPLS software. Consequently, the results are discussed.

Chapter 6 presents the research achievement and concludes with a discussion of the contributions and implications of the research outcomes, the limitations of the research.

1.10   Summary

This chapter begins with an overview of the research. The problem background of the study was then presented as an introduction to the study conducted. The discussion also covers the importance of the research and the gaps in existing literature in which then were highlighted as the problem statement of the study. Additionally, the discussion to determine the focus of the study led to the research questions and the research objectives. Following this the scope of this research was elaborated to concentrate on the specific areas, units of analysis, research methods and design and the software used. Finally the chapter provided the significance of study followed by the organization of the thesis.

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