

**ADOPTION OF E-PUBLISHING AMONGST MALAYSIAN
JOURNAL PUBLISHERS**

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ABSTRACT

The study investigates *adoption of e-publishing* amongst Malaysian journal publishers through the lenses of the *Diffusion of Innovation Theory*. The main objectives of the study are to: (i) Determine the relevance of organizational variables and publishers characteristics in the adoption of e-publishing amongst Malaysian journal publishers. (ii) Identify key attributes and factors that are most relevant in the adoption of e-publishing amongst Malaysian journal publishers. (iii) Evaluate the diffusion rate of e-publishing amongst Malaysian journal publishers. (iv) Examine the level of implementation of e-publishing amongst Malaysian journal publishers. Quantitative research method was adopted using survey questionnaire as the data collection tool and SPSS software for statistical analysis. The participants are Chief Editors or managers of journals published in Malaysia with a total of 156 respondents. The study adopts the Innovation Diffusion Model for the e-journal publishing research framework, by studying and explaining the effect of adopter characteristics variables : *field of publishing, publishing experience, publication age, publication size; familiarity and innovativeness*; the five attributes of innovation : *relative advantage, compatibility, complexity, observability and trialability*; two supporting variables: *peer network influence* and *change agent influence* as antecedents to the adoption of e-journal publishing amongst Malaysian journal publishers. The study indicates a statistically significant association between *field of publishing* and *publication format* $X^2 (1, n = 140) = .207, P = .050, \phi = .207$ with publishers in *science/technology* field adopting e-publishing earlier and in large proportion than their counterparts in *social science/arts/humanities*. The finding reports that organizational variables or publishers characteristics are not relevant in the *familiarity* with e-journal publishing and *adoption* of e-journal publishing. *Innovativeness* is significantly associated

with *familiarity* with e-journal publishing but is not significantly associated with *adoption*. The most significant attributes in the adoption of e-journal publishing are: *relative advantage*, *complexity*, and *compatibility*, while *observability* and *trialability* are moderately significant compared to the first three. The study further indicates a significant but weak relationship between *peer network influence* and *adoption* and no relationship between *change agent influence* and *adoption*. Meanwhile, the study observed a difference in the relationship between the independent variables and *adoption* with respect to *field of publishing*, indicating that there is a *field factor* in the diffusion process. The findings show that diffusion of e-journal publishing is very low amongst Malaysian journal publishers. The average (mean) year of adoption is 2.33 years with a standard deviation of 3.00. It was observed that many of the publishers who have adopted e-publishing have failed to effectively implement it and the current state of e-journal publishing amongst Malaysian journal publishers is still at the *persuasion stage* in the innovation decision process. The study is relevant to research in journal publishing, innovation diffusion studies, technology adoption, social and behavioral studies.

ABSTRAK

Kajian ini menyiasat penggunaan penerbitan elektronik di kalangan penerbit jurnal di Malaysia berdasarkan Resapan Teori Inovasi. Objektif utama kajian ini adalah untuk: (i) Menentukan kaitan pembolehubah organisasi dan ciri-ciri penerbit dalam penggunaan penerbitan elektronik di kalangan penerbit jurnal Malaysia. (ii) Mengenal pasti sifat-sifat utama dan faktor-faktor yang paling relevan dalam penggunaan penerbitan elektronik di kalangan penerbit jurnal Malaysia. (iii) Menilai kadar penyebaran penerbitan elektronik di kalangan penerbit jurnal Malaysia. (iv) Memeriksa tahap pelaksanaan penerbitan elektronik di kalangan penerbit jurnal Malaysia. Kaedah penyelidikan kuantitatif telah dijalankan dengan menggunakan soal selidik sebagai alat pengumpulan data dan perisian SPSS telah digunakan untuk analisis statistik. Para peserta kaji selidik adalah seramai 156 responden yang terdiri daripada ketua editor atau pengurus jurnal yang diterbitkan di Malaysia. Kajian ini dijalankan berdasarkan Inovasi Resapan Model sebagai asas kepada kerangka penyelidikan penerbitan jurnal elektronik, dengan mengkaji dan menerangkan kesan ciri-ciri pembolehubah iaitu: bidang penerbitan, pengalaman penerbitan, tempoh penerbitan, saiz penerbitan; kebiasaan dan inovasi; lima sifat-sifat inovasi adalah terdiri daripada: kelebihan relatif, kesepadanan, kerumitan, pemerhatian dan percubaan; dengan dua pembolehubah sokongan iaitu: pengaruh rakan sebaya dan ejen perubahan sebagai latar belakang kepada penerimaan penerbitan jurnal elektronik di kalangan penerbit jurnal Malaysia. Kajian ini telah menunjukkan hubung kait yang signifikan di antara bidang penerbitan dan format penerbitan $X^2(1, N = 140) = 0,207, P = 0,050, \phi = 0,207$ dengan penerbit dalam bidang sains/teknologi telah lebih awal dan ramai menggunakan penerbitan elektronik berbanding golongan penerbit dalam bidang sains sosial/sastera/kemanusiaan. Dapatan kajian juga melaporkan pembolehubah organisasi atau ciri-ciri penerbit tidak

relevan dalam kebiasaan penerbitan jurnal elektronik. Inovatif yang berkaitan dengan kebiasaan penerbitan elektronik jurnal tetapi tidak signifikan berkait dengan penggunaan. Sifat-sifat yang paling ketara dalam penerbitan e-jurnal adalah: kelebihan relatif, kerumitan, dan keserasian, manakala pemerhatian dan percubaan adalah sederhana berbanding dengan tiga sifat yang pertama. Kajian lanjutan menunjukkan hubungan yang signifikan tetapi lemah antara pengaruh rakan sebaya dan penggunaan manakala tiada hubungan antara egen perubahan dan penggunaan. Sementara itu, kajian ini turut memerhati perbezaan dalam hubungan antara pembolehubah bebas dan penggunaan berdasarkan bidang penerbitan, iaitu wujud faktor bidang di dalam proses penyebaran..

Dapatan kajian menunjukkan bahawa penyebaran penerbitan e-jurnal adalah sangat rendah di kalangan penerbit jurnal Malaysia. Purata (min) tahun penggunaan adalah 2.33 tahun dengan sisihan piawai 03:00. Turut diperhatikan bahawa terdapat ramai penerbit yang telah menggunakan penerbitan elektronik telah gagal untuk melaksanakannya dengan berkesan. Keadaan semasa penerbitan jurnal elektronik di kalangan penerbit jurnal Malaysia masih di peringkat pujukan di dalam proses keputusan inovasi. Kajian ini adalah berkaitan dengan penyelidikan dalam penerbitan jurnal, kajian penyebaran inovasi, teknologi, kajian sosial dan tingkah laku.

DEDICATION

To the almighty Allah the Owner of knowledge, Most gracious, Most merciful. To my loving parents, Alhaji and Alhaja Kunle Sanni.

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CHAPTER 1

INTRODUCTION

1.1 Overview

This chapter presents the background on which the e-journal publishing innovation is founded. The chapter explains the purpose and motivation of the study, highlights the relevant theoretical framework which undergirds the study's conceptual framework and its accompanying methodology. The chapter further presents the problem statement, research objectives, research questions and research hypotheses as well as the method that was applied in the investigation process.

1.2 Scholarly Journal Publishing

Scholarly journal publishing is experiencing fundamental changes, as it makes the transition from print to electronic format. Scholarly journal publishing commenced a momentous and continuous transformation with advances in information and communication technologies and the arrival of the World Wide Web, as technological, economic and social elements are altering traditional models of scholarship (Al-Ghaith, Sanzogni and Sandhu, 2010; Campbell and Meadows, 2011; Ghani, Suparjoh and Hamid, 2008; Houghton et al., 2009; Massad, Brown and Tucker, 2011; Park, 2007; Ponte and Simon, 2011; Zainab and Edzan, 2000). These changes were thrilling as it ushered in a new epoch in science; radically changing the capacity to produce, reproduce, distribute, control, publish and access information (Houghton et al., 2009)

The stage was set for the internet to take over information propagation and the salient growth is due to the fact that journal publishers, users and libraries all enjoy enormous benefit in utilizing electronic journals over traditional print-only journals. Users in particular enjoy the benefits of having ready access to limitless information from the broadest possible number of sources without having to physically store anything (Massad, Brown and Tucker, 2011).

Central characters who contribute to the transformation in this industry are the academics as producers and users of scholarly papers, publishers, subscription agents (vendors), and service providers (libraries), online system managers or network providers. In addition to these are the universities as communities and organizations, individuals and corporations, with research interests in the wider society, and governments which both contribute funding to and seek socio-economic benefits from academic research (Hahn and Schoch, 1997; Johnson and Luther, 2007; Mabe, 2006; Massad, Brown and Tucker, 2011; Schauder, 1993).

Due to the availability of digital publishing technologies and the internet, the traditional printed journal evolved into the e-journal (Ali and Nisha, 2011; Massad, Brown and Tucker, 2011), which offers great benefits in terms of timely access to and flexible delivery of information (Ling, Yaacob and Phang, 1996; Massad, Brown and Tucker, 2011; Park, 2007; Schulz, 2001). However, e-journals present unique challenges, and a pretty hefty task for publishers, service providers and users (Mabe, 2006; Pinfield, 2013; Ware, 2005), because the technologies associated with their use require new roles, routines, values, attitudes and patterns of behavior (Akinci, Aksoy and Atilgan, 2004; Hahn, 2001; Jange and Kademani, 1999; Johnson and Luther, 2007; Klein and Knight, 2005; Park, 2007; Zainab and Abrizah, 2007). These challenges are quiet apparent from the start, and these

might have slowed down the adoption rate in some part of the publishing world, notably in developing countries (Brown, 1981; Islam and Chowdhury, 2006; Jange and Kademani, 1999) as it took a while for journal publishers to come to terms with the idea of putting academic research papers online.

Most scholarly journals published in Malaysia are published by not-for-profit organizations, mostly by academic institutions and professional societies with little financial power and sales (Walsham, 2012; Zakaria and Rowland, 2006), and that is why it has been difficult for Malaysian journal publishers to adapt to technological shift over time. For this reasons, any attempt to introduce new techniques or new technologies may create uncertainties in the system, because diffusion is a kind of social change defined as the process by which alteration occurs in the structure and functions of a social system and the adoption of a technology innovation consists of several stages : knowledge, persuasion, decision, and implementation in the innovation-decision process (Rogers, 2003).

In the foregoing, two pivotal issues arose that concerns journal publishers, one which is how to go about implementing the new e-journal publishing system, and the effect it might have on their current practices. Another issue been debated amongst the community of publishers is how to handle the printed version of the journal, if any? Whether to continue or cease print versions and maintain only e-journal or maintain the hybrid model of both print and electronic. This has been an ongoing discussion among journal publishers. The operational costs of maintaining two systems and the costs of keeping electronic journals operating within the bounds of the print publishing process are increasingly affecting the stability of journal publishing (Johnson and Luther, 2007; Massad, Brown and Tucker, 2011; Schauder, 1993; Ware, 2005; Zakaria and Rowland, 2006).

Perceptions related to this kind of adoption decision process of publishers can be analyzed through the *Theory of Innovation Diffusion*. This theory can also explain why printed journals may refuse to fade-out just like the radio which refused to give-in to all other mass-media technologies that were born after it. However it is also conceivable that print would not be an obstacle to e-journals just like radio was not, and the next-generation would still need to learn how to write with a pen and not to be denied the satisfaction of reading from the cream color of the paper, even with all the educational technologies coming forth. On one hand some believe print-journals are still fashionable, while others consider the idea to continue print-journals to be outdated as they envisage a paperless scholarly world.

When the issue of technological innovations is discussed, it majorly centered upon the replacement of an old technology with a new one (Brown, 1981; Frambach and Schillewaert, 2002; Higa et al., 1997; Kim and Galliers, 2004; Rizzi, Ponte and Bonifacio, 2009; Rogers, 2003; Sheng et al., 1998). Accordingly, negotiation of new roles with regards to the new technology is a crucial task that deserves proper assessment. Issues regarding diffusion of technology innovations cannot be ignored and there is a need to boost our knowledge on the adoption and diffusion of new technologies. Therefore, it was imperative to devote a study with the goal of understanding factors that drives or hinders e-publishing adoption amongst Malaysian journal publishers.

Studies that have attempted a similar endeavor are unfounded in literature. However, a study by Zakaria and Rowland (2006) is the closest to this, on the account that they carried out surveys to measure Malaysian scientist's attitudes towards electronic publishing, and described the current state of electronic journal publishing in Malaysia. This present study

has broadened the discussion and explored the research questions through the prism of the *Theory of Innovation Diffusion* (Rogers, 2003).

1.3 Innovation Diffusion

The spread and span of the e-journal publishing innovation over time is very similar to the pattern in which new technologies are diffused across various social system units and the discussions in this latest study is tailored around the Innovation Diffusion Model (Rogers, 2003). The theory states that diffusion is a process by which an innovation is communicated over time through certain channels amongst the members of a social system. This communication is of a special kind because it is concerned about the spread of a brand new idea. Rogers (2003) also described five adopter categories for any particular social unit on the basis of their innovativeness or degree to which they are earlier in adopting a new idea. The five categories are: Innovators; Early adopters; Early majority; Late majority and Laggards.

The Innovation Diffusion Model, full of insights has been widely applied in many disciplines to understand and explain the characteristics of innovations and individuals preference of one technology over another. It is a well-established theoretical model developed by Everett M. Rogers, a scholar in the field of social and behavioral science whom Glor (2001) refers to as the “Dean of innovation studies”. Rogers’s model, with additional variables independently drawn from related literature, was used in the study to explain the characteristics of adoption decision of e-journal publishing amongst Malaysian journal publishers.

An innovation is an idea, product, practice, technique, or project that is perceived as new by an individual or other relevant unit of adoption (Rogers, 2003). It does not matter if the

idea has been created and adopted in the past, but as long as an individual or an organization perceives it to be new in their realm, then it is still considered an innovation to them. E-journal publishing is the innovation that has been studied here. This study examines the relationships between innovation diffusion variables as they are related to e-journal publishing. This serve as a contribution to the body of knowledge on this topic, as no study has examined the relations between innovation diffusion variables and e-journal publishing adoption amongst scholarly journal publishers.

Kim and Galliers (2004) has divided technology diffusion research into micro and macro level, where the former focuses on diffusion at the individual and organization level, the latter at the industry and national level. This present study is concerned with diffusion at the level of organization (micro-level) – by individual journal publishers or a journal publishing organization.

It is on record that the value of offering e-journals differs from field to field (Brody, Harnad and Carr, 2006; Johnson and Luther, 2007; Park, 2007). This can be explained by some of the attributes or characteristics of an innovation: relative advantage, compatibility, complexity, trialability and observability, as studied in several diffusion researches (Chieochan, Lindley and Dunn, 2000; Glor, 2001; Hahn and Schoch, 1997; Hu, Chau and Sheng, 2002; Kim and Galliers, 2004; Premkumar, Ramamurthy and Nilakanta, 1994; Rogers, 2003; Sheng et al., 1998; Wejnert, 2002). These five attributes are regarded as the nuts and bolts of the innovation diffusion process.

1.4 Attributes and Characteristics of an Innovation

Diffusion of any new idea is majorly characterized by the nature of the innovation itself, and the most widely reported attributes of any innovation are its: relative advantage,

compatibility, complexity, observability and trialability (Rogers, 2003). Some of the benefits or relative advantage of e-journal publishing is that it promotes more peer participation, higher interactivity, faster review, and smooth navigations. It also makes publishers more productive due to lower production costs in the long run and also facilitates faster access to information, making publication more timely and robust (Ling, Yaacob and Phang, 1996; Meadows, 1997; Rani and Zainab, 2006).

By offering these capabilities, journal publishers are enthusiastic to gain advantages in the competition for authors' works, best research and the possibility of been easily accessible and citable in subsequent research publications. However in Malaysia, a large number of publishers still offer their journals only in print and a small number of journals are available either in hybrid form or purely electronic (Roosfa, 2000; Zainab and Abrizah, 2007; Zainab et al., 2012; Zakaria and Rowland, 2006).

The study of Zainab et al. (2012) has indicated that around 62.9% of Malaysian publishers still offer their titles in print format, and while only 5.8% are born digital, the other 31.3% are in hybrid format. The problem might be due to some social factors as the publishing landscape is represented by a cadre of traditional publishing systems. Demographic variables like organization age, organization size, academic field and social status can also explain innovativeness and the rate of adoption of a particular innovation (Brown, 1981; Chieochan, Lindley and Dunn, 2000; Glor, 2001; Hahn and Schoch, 1997; Mustonen-Ollila, 1998; Premkumar, Ramamurthy and Nilakanta, 1994; Rogers, 2003; Wejnert, 2002; Zakaria and Rowland, 2006). This study aims to identify the factors that promote or relegate the adoption behavior of Malaysian journal publishers in the adoption of e-journal publishing.

Another important attributes of an innovation is compatibility and complexity. The rate at which an innovation is perceived to be in agreement with the values, norms, beliefs and past experience of an individual or social system unit can directly impact on its acceptance, likewise its perceived ease of use. Perceived compatibility as a factor might explain why most publishers in the science/medicine/technology fields are more likely to embrace e-journal publishing or other new techniques not available in the pre-digital era earlier than their counterparts in social science/arts/humanities.

Findings from the study of Massad, Brown and Tucker (2011) reveals that although popularity of e-journals is growing among scholars in business faculty, however, they still continue to show some bias toward print journals. In most general cases, perhaps, the service provider's perceptions of their client's readiness for e-journal will influence the rate of adoption. This provides as well a ground for investigation as it is still not very clear in literature whether field of expertise or discipline has any relationship with acquisition of new technology.

By responding quickly to changes in technology and move towards publishing e-journal, the publishers therefore emphasize their dynamism in a fast changing scientific environment and this form of behavior could be explained by variables such as competitiveness and image or prestige. Another factor in innovation diffusion is its cost or value. With regard to cost, the belief is that as opportunity cost of continuing to invest in print becomes too high, electronic platforms will be the main focus of journal publishers (Johnson and Luther, 2008; Mabe, 2006; Schonfeld et al., 2004).

Various benefits of electronic journals has been highlighted (Brody, Harnad and Carr, 2006; Hahn and Schoch, 1997; Harnad and Brody, 2004; Johnson and Luther, 2007;

Mabe, 2006; Massad, Brown and Tucker, 2011; Park, 2007), in terms of its ability to adequately measure usage, reduce printing, mailing, storage, claims (Johnson and Luther, 2008; Mabe, 2006) and other costs which are increasing sharply. It is expected that electronic publishing would reduce the size of backlogs, resulting in faster editing and production cycles. Publishers also have the opportunity to produce a variety of materials with little startup if they can reduce or eliminate the cost of editing, binding, shipping, and storage (Massad, Brown and Tucker, 2011). The cost of storage and bandwidth is drastically reduced since it is automatically transferred to the users. Other essential costs involved are : copyright payment, scanning/coding/tagging of content, content hosting costs, crossref membership fees, DOI submission fees, and supplemental materials (Massad, Brown and Tucker, 2011)

Advocates of e-publishing adoption argues that journal publishers should understand the great benefit provided by publishing electronically and these opportunities should be adequate enough to spur and motivate them to adopt. Other motivating factors can be: visibility, client expectations, value for prints over electronic journals or vice versa.

Granted, the superiority of e-journals over printed journals are overwhelming, however, academic publishers have cautioned that the uncertainties surrounding e-publishing remains, and it is rather too early to completely downgrade print materials. Be that as it may, an information society should have the ability to adjust to technological changes, because, the adoption of an innovation is basically the result of a learning or communication process. This implies that factors related to the effective flow of information are most critical and therefore that a fundamental step in examining the process of diffusion is identification of the spatial characteristics of information flows and

resistance to adoption (Brown, 1981) in any given society, Malaysia in the case of this study.

In spite of the observed benefits that can come from embracing e-journal publishing, the rate of adoption in Malaysia is below expectations, although progressing slowly. Moreover, it is well established that there is social and political interest towards research in Malaysian society as the production and management of scientific research output is controlled by Malaysian government, private agencies and the public institutions. In essence, these entities have a big stake in technology transfer and diffusion. As such, the roles of the government and private agencies, opinion leaders and decision makers can be a significant factor in innovation diffusion (Brown, 1981; Chiochan, Lindley and Dunn, 2000; Higa et al., 1997; Premkumar, Ramamurthy and Nilakanta, 1994; Rogers, 2003; Rogers, E. M., 2003; Wejnert, 2002; Yates, 2001; Zakaria and Rowland, 2006).

Thus, as emphasized in the preceding discussion, diffusion of innovation is a task of this study. Here, the study ventures into the adoption of e-journal publishing in Malaysian publishing circle. The diffusion of technology innovations in the sector which handles the production, publication and distribution of scientific papers are of significant importance in a fast developing and industrial country like Malaysia. Diffusion is a special type of communication in which the message is about a new idea and how this new idea spread throughout a population or region (Brown, 1981; Moore and Benbasat, 1991; Rogers, 2003; Wejnert, 2002) . Drawing upon Rogers theory of innovation diffusion, the study report on the findings emerging from the study and makes useful recommendations for journal publishers, government and future research.

1.5 Motivation of Study

The dawn of the new millennium ushered in a period of great change in information propagation and scientific communication. This period saw the internet sector entering the second phase of rapid growth with new business and commercial enterprise competing for the internet investment. This prompted a lot of debate on the future of scholarly communications. Part of these internet-related technology growths is electronic publishing and the need to recognize this sector as an important area of development amongst Malaysian journal publishers is the motive behind this study. To understand the current situation in this sector within Malaysia, a study would be needed to identify the most important attributes in the *adoption decision* process of e-publishing amongst Malaysian journal publishers.

Results from a range of bibliometric studies and literature conducted on Malaysian scholarly journals revealed that Malaysian authors customarily source high profile foreign journals which are available in e-format in their research, whereas most Malaysian scholars seldom cite Malaysian journals in their work. The realization arises from the fact that most Malaysian journals are not available online and even those available online are suffering from lack of quality contents, quantity, accessibility and visibility. Malaysian scholarly journals are not very popular amongst Malaysian academics and students (Abrizah and Wee, 2011; Anyi, 2008; Sanni and Zainab, 2010; Sanni et al., 2013; Zainab and Abrizah, 2007; Zainal and Zainab, 2011). Although the first Malaysian e-journal was Malaysian journal of computer science which was published in 1995 (Abrizah and Wee, 2011), however the e-publishing concept is still very new within Malaysian scholarly community (Roosfa and Yahya, 2011; Sanni et al., 2014).

Presently, the key performance indicator (KPI) for scholars' is measured based on publication productivity in high-ranked e-journals. In order to achieve this KPI, scholars have to send their manuscripts to internationally renowned e-journals published abroad (Roosfa and Yahya, 2011; Sanni et al., 2013) rendering local Malaysian journals unproductive in terms of contributions and citations (Sanni et al., 2013). This is one the realities that motivates the current study.

Secondly, there is no sufficient research to date, on the link between e-journal publishing adoption and diffusion of innovation. Besides, e-journal publishing subject is a relatively unexplored area amongst Malaysian researchers and it is one that is increasing in importance as the emphasis is now directed towards international research collaboration and a virile information society (Sanni et al., 2013).

The human society is currently embroiled in the information age and the age of excess contents on the internet and it has been observed that Malaysian publishers are not making full use of the opportunity presented by the new digital economy. This research work is designed to fill this knowledge gap and directly address and give a good account of the scenario currently unfolding in the Malaysian journal publishing sector. The outcome of the findings will be of interest to respondents as they decide and progress through the adoption and implementation process of e-journal publishing. The discussions and recommendations of the study will be useful to decision makers, and for regulations and professional purposes.

1.6 Problem Statement

In the new economic world order, information has become not only a source of intellectual and knowledge stimulation, but also a source of income for the information managers,

service providers and the publishers. In order for journal publishers to take advantage of the opportunities presented through the digital economy, they need to embrace the changes brought about by the shift in technology and internet innovations.

Apparently, the rate of adoption of e-publishing amongst journal publishers in Malaysia is very low and is below expectation (Zainab et al., 2012) and yet in some cases where e-publishing has been adopted, the adoption has not been effectively implemented (Sanni et al., 2013). Moving journal publishing online presents opportunities and challenges for publishers. A visit to most Malaysian e-journals websites reveals a lack of proper organization and structure. There are lots of slow and broken links discovered in most of the pages. Most of the e-journal website is not really offering a complete package to users. This reflects the fact that even in cases where e-publishing has been adopted, the implementation and sustainability aspect of it, has not been achieved.

The first problem is that the shift from traditional print publishing to e-publishing will require publishers to change their roles, routines and improve on their skills. This automatically affects their capacity to produce, reproduce, and distribute their titles (Jange and Kademani 1999; Atilgan and Bayram 2004; Klein and Knight 2005; Hahn and Schoch 1997; Johnson and Luther 2007; Park 2007; Zainab and Abrizah 2007; Houghton et al 2009). Therefore negotiation of new roles with regards to the new technology is one of the challenges.

The second problem is that the publishing landscape in Malaysia is represented by a cadre of traditional publishing systems of which most are by small-scale, not-for-profit organizations, public higher academic institutions and professional societies (Roosfa and Yahya, 2011; Walsham, 2012; Zakaria and Rowland, 2006), and may lack the expertise to

transform their models or re-engineer their production systems to handle the new technique. Therefore any attempt to alter the traditional structure by introducing new technology may create a lot of uncertainties within the system.

As long as these journals remain in print or as peripheral journals online, they will no longer be useful for teaching and learning purposes and not for assessment purposes either. This is because the students and academics of the digital era now conduct their information acquisition, knowledge exchange and social integration online. Likewise, we are in the era of data science where the analyses and evaluation of serials is derived mainly from open-access dataset of numbers, bibliographic databases and indexing systems, in which many Malaysian journals are absent.

The third problem is that most publishers are trapped in the dual zone owing to lack of proper understanding on how to handle the already existing print with its potential e-version. As the scholarly community move along the Post PC Device (PPD) era where institutions are already adopting m-learning (mobile learning) expending iPad technologies to facilitate teaching and learning (Murphy, 2011), some scholars have moved the motion that printed journals should be permanently discontinued and the journal of the electronic form should henceforth be the norm; citing the operational costs of maintaining two systems as the reason. However, other scholars have countered, stating that print should still be maintained alongside the e-version, in view that some subscribers still values prints items and are not in any mood to switch sides. These latter categories share same sentiments with researchers who are of the opinion that printed items are *real work* and e-version just a supplement, which is unreliable since according to them, each e - journal's

life depends on its publisher's continued existence and what happens if the publisher cease to exist?

Noteworthy is the fact that Malaysian researchers are producing high quality research and contributing to scientific knowledge through the journal publishing medium. To make their work visible to the scholarly community, they must make sure their research is published in the first league journals of their discipline, which are largely published in developed countries by professional publishers. Sometimes they have to pay a large sum of money to publish in these foreign journals (mostly open access journals) and the copyright is transferred to the publisher and not the authoring institution or the funding agency.

Although there are new publishing models that protect the right of the author and the authoring institution, however, the challenges are still overwhelming. These issues and the like has invoke discussion on the future of scholarly communication in developing countries, and how to move forward, the goal of the funding agencies.

Conflicting arguments notwithstanding, most of the literatures are showing e-journal the green light. In Malaysia, however a large number of publishers still offer their journals only in print and while few are available in hybrid format, just a small fraction existed in purely electronic (Roosfa, 2000; Sanni et al., 2013; Walsham, 2012; Zainab and Abrizah, 2007; Zainab, Edzan and Ang, 2002; Zakaria and Rowland, 2006). The reason for this slow adoption is unknown and the need to know is what motivates this study.

Malaysia is one of the early adopters of internet technology among developing nations (Ramasami, 2010). The recent globalization of higher education and research institutions

in Malaysia coupled with focus on university rankings by Malaysian ministry of higher education (Roosfa and Yahya, 2011) has expanded the tentacles of research focus. The government's drive for research never falters. The globalization of higher education must flow in sync with diffusion of innovations and scientific development which is influenced by research production.

If stakeholders and institutions alike are keen on improvement in scientific production and development, then diffusion of innovative technologies is the key. As regards, it was observed that an important innovation that needs to be studied is e-journal publishing adoption amongst Malaysian journal publishers as there are no studies yet dedicated to this topic. This would be achieved by identifying the role of familiarity, innovativeness, adopter characteristics: field of publishing, publication age, publication size, publishing experience, the five attributes of innovation: relative advantage, compatibility, complexity, observability and trialability, and the two supporting factors: peer network and change agent influence on the adoption of e-journal publishing amongst Malaysian journal publishers.

As a way of contributing to the array of literature on this discourse, the study would also be able to verify the strength of relationships that exists between innovation diffusion variables highlighted in the introduction part and e-publishing adoption. This would illuminate on the factors that drives e-publishing adoption amongst Malaysian journal publishers.

1.7 Objectives of the Study

The objectives of this study are as follows:

- [i] To determine the relevance of publishers characteristics in the adoption of e-publishing amongst Malaysian journal publishers.
- [ii] To identify key attributes and factors that are most relevant in the adoption of e-publishing amongst Malaysian journal publishers.
- [iii] To evaluate the diffusion rate of e-publishing amongst Malaysian journal publishers.
- [iv] To examine the level of implementation of e-publishing amongst Malaysian journal publishers.

1.8 Research Questions

The study attempt to answer the following research questions:

- [i] How relevant are the publishers characteristics in the adoption of e-publishing amongst Malaysian journal publishers?
- [ii] What are the key attributes and factors that are most relevant in the adoption of e-publishing amongst Malaysian journal publishers?
- [iii] What is the diffusion rate of e-publishing amongst Malaysian journal publishers?
- [iv] What is the level of implementation of e-publishing amongst Malaysian journal publishers?

1.9 Research Hypotheses

According to Roger's diffusion theory, innovation adoption exemplifies a process over time, which begins with an initiation or stage of awareness, moving on to having a

perception about the attributes of the innovation, then the decision making stage where external and internal factors comes into play to influence the decision to adopt, and finally the adoption and implementation stage. All these stages are represented by specific variables. Therefore, in order to answer the research questions, the following hypothesis were formulated:

Research Hypothesis H1: There is a statistically significant relationship between field of publishing and publication format.

Research Hypothesis H2: There is a statistically significant relationship between publishing experience and familiarity with e-journal publishing.

Research Hypothesis H3: There is a statistically significant relationship between publishing experience and adoption of e-journal publishing.

Research Hypothesis H4: There is a statistically significant relationship between publication age and familiarity with e-journal publishing.

Research Hypothesis H5: There is a statistically significant relationship between publication age and adoption of e-journal publishing.

Research Hypothesis H6: There is a statistically significant relationship between publication size and familiarity with e-journal publishing.

Research hypothesis H7: There is a statistically significant relationship between publication size and adoption of e-journal publishing.

Research Hypothesis H8: There is a statistically significant relationship between familiarity with e-journal publishing and adoption of e-journal publishing.

Research Hypothesis H9: There is a statistically significant relationship between innovativeness and familiarity with e-journal publishing.

Research Hypothesis H10: There is a statistically significant relationship between perception about the five attributes of innovation and adoption of e-journal publishing.

Research Hypothesis H11: There is a statistically significant relationship between peer network influence and adoption of e-journal publishing.

Research Hypothesis H12: There is a statistically significant relationship between change agent influence and adoption of e-journal publishing.

Research Hypothesis H13: There is a statistically significant difference in the relationship between familiarity and adoption with respects to field of publishing.

Research Hypothesis H14: There is a statistically significant difference in the relationship between the five attributes of innovation and adoption with respects to field of publishing

Research Hypothesis H15: There is a statistically significant difference in the relationship between peer network influence and adoption with respects to field of publishing.

Research Hypothesis H16: There is a statistically significant difference in the relationship between change agent influence and adoption with respects to field of publishing.

The formulation of the research hypothesis with relevant literature is extensively discussed in Chapter 3. Table 1.1 shows the research questions, research objectives and the research hypothesis.

1.10 Research Phase and Framework

The stages involved in conducting this research are highlighted in Figure 1.1 which identifies significant outcomes from each of the stages in the process. The research work is framed along the path of the Innovation Diffusion Model. The e-journal publishing research model presented in Figure 1.2 highlights the links between the variables studied and the research questions that is answered.

Table 1.1: Research Questions, Objectives, and Hypothesis

	Research Objectives	Research Questions	Research Hypothesis
1	To determine the relevance of publishers characteristics in the adoption of e-publishing amongst Malaysian journal publishers.	How relevant are the publisher's characteristics in the adoption of e-publishing amongst Malaysian journal publishers?	<p>H1: There is a statistically significant relationship between field of publishing and publication format.</p> <p>H2: There is a statistically significant relationship between publishing experience and familiarity with e-journal publishing.</p> <p>H3: There is a statistically significant relationship between publishing experience and adoption of e-journal publishing.</p> <p>H4: There is a statistically significant relationship between publication age and familiarity with e-journal publishing.</p> <p>H5: There is a statistically significant relationship between publication age and adoption of e-journal publishing.</p> <p>H6: There is a statistically significant relationship between publication size and familiarity with e-journal publishing.</p> <p>H7: There is a statistically significant relationship between publication size and adoption of e-journal publishing.</p>
2	To identify key attributes and factors that are important or serve as an influence to the adoption of e-publishing amongst Malaysian journal publishers.	What are the key attributes and factors that are important or serve as an influence to the adoption of e-publishing amongst Malaysian journal publishers?	<p>H8: There is a statistically significant relationship between familiarity with e-journal publishing and adoption of e-journal publishing.</p> <p>H9: There is a statistically significant relationship between innovativeness and familiarity with e-journal publishing.</p> <p>H10: There is a statistically significant relationship between perception about the five attributes of innovation and adoption of e-journal publishing.</p> <p>H11: There is a statistically significant relationship between peer network influence and adoption of e-journal publishing.</p> <p>H12: There is a statistically significant relationship between change agent influence and adoption of e-journal publishing.</p> <p>H13: There is a statistically significant difference in the relationship between familiarity and adoption with respects to field of publishing.</p> <p>H14: There is a statistically significant difference in the relationship between the five attributes of innovation and adoption with respects to field of publishing.</p> <p>H15: There is a statistically significant difference in the relationship between peer network influence and adoption with respects to field of publishing.</p> <p>H16: There is a statistically significant difference in the relationship between change agents influence and adoption with respects to field of publishing.</p>
3	To evaluate the diffusion rate of e-publishing amongst Malaysian journal publishers.	What is the diffusion rate of e-publishing amongst Malaysian journal publishers?	
4	To examine the level of implementation of e-publishing amongst Malaysian journal publishers	What is the level of implementation of e-publishing amongst Malaysian journal publishers?	

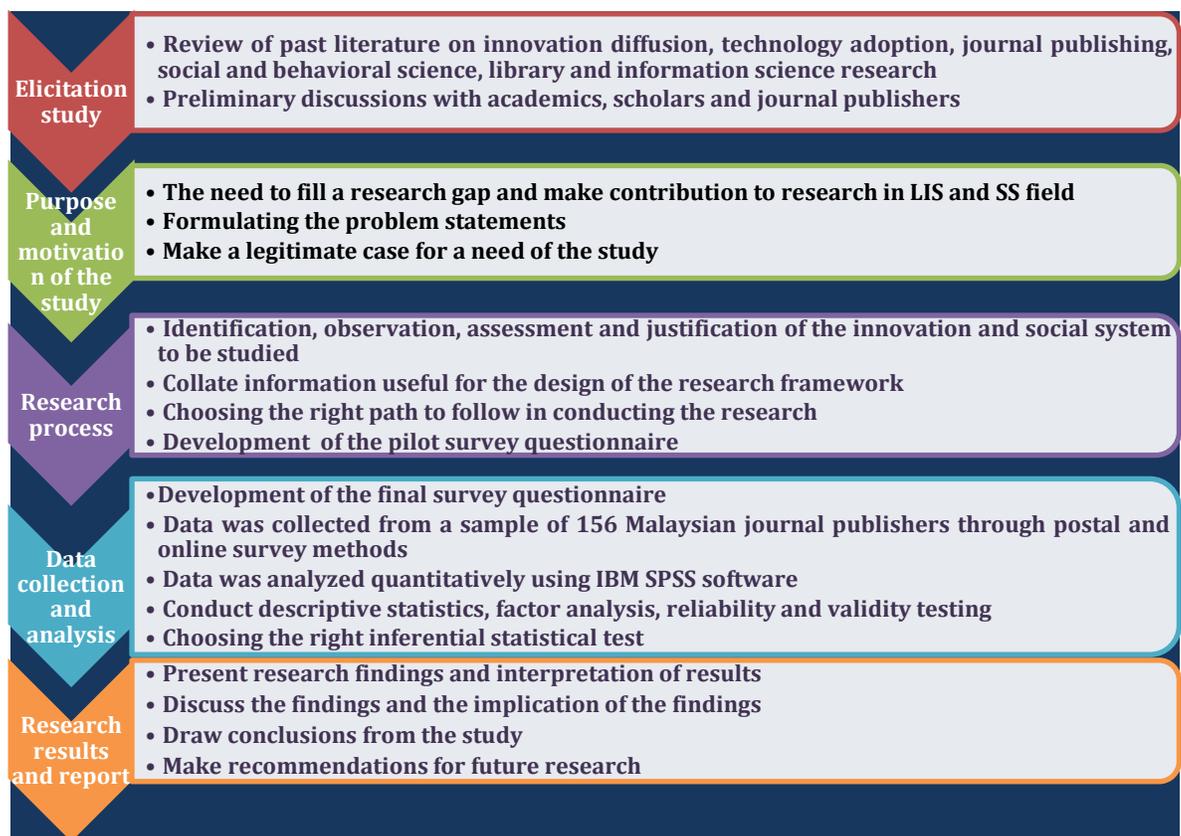


Figure 1.1: Stages Involved in the E-Journal Publishing Adoption Research

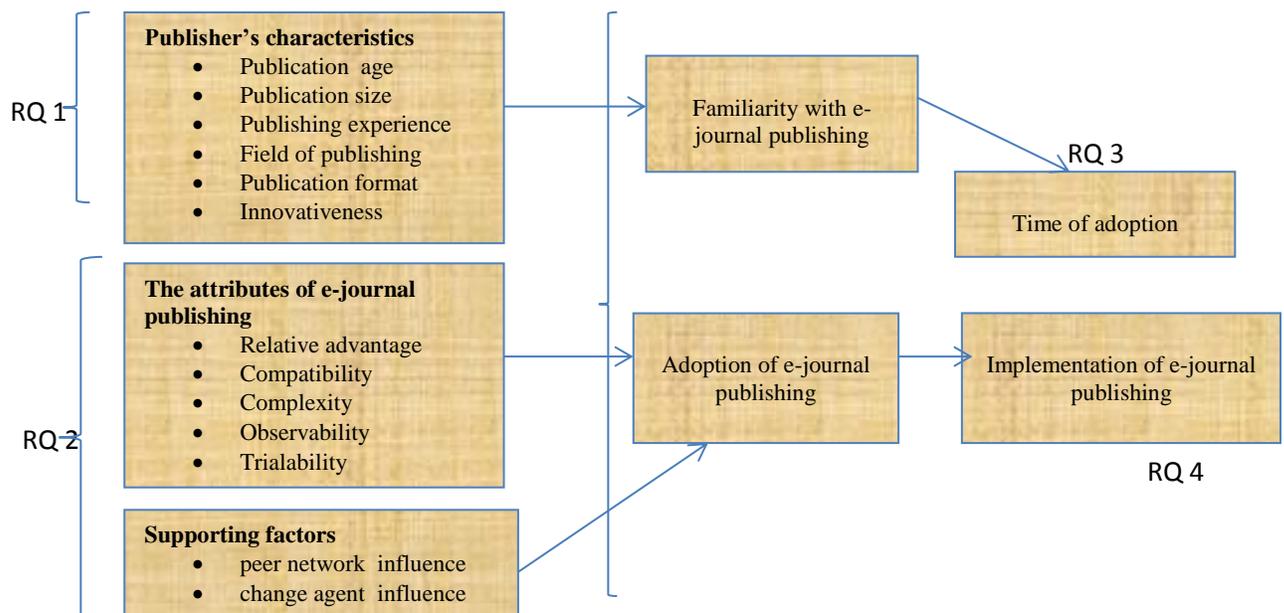


Figure 1.2: E-Journal Publishing Research Model

1.11 Definition of Terms

Scientific journal paper: This refers to a paper describing scientific research results, which has undergone some form of anonymous peer-review, published in a regularly appearing serial, usually by a third party publisher and not by the university of the author. These papers belong to the science, technology and medicine category as well as social science, arts and humanities (Björk, Roos and Lauri, 2009).

The publishing cycle: This refers to the movement of information between the different participants in the journal publishing process (Mabe, 2006).

E- journal publishing: Refers to the dissemination and archiving of full-text professional scientific journal paper via computer storage media (eg. Magnetic or optical disks). Access is through computers in standalone mode and/or connected to communication networks and online portals (Schauder, 1993).

E-journal: E- journal is scholarly journal that is available on the internet and may or may not have a print version (Brennan et al., 2002).

Innovation: Innovation is any idea, technique, practice, or project that is perceived as new by an individual or other unit of adoption (Brown, 1981b; Rogers, 2003).

Innovativeness: The degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of his social system (Rogers, 2003).

Invention: refers to the process by which a new idea, technique or tool is discovered or created (Rogers, 2003).

Diffusion of innovation: Diffusion is the process in which an innovation is communicated through certain channels over time among the members of a social system. It is a special kind of communication in which the messages are about new ideas (Rogers, 2003).

Adoption of innovation: Refers to the decision to make full use of an innovation as the best course of action available (Rogers, 2003).

Adoption of e-journal publishing: Refers to making a decision to produce, disseminate and archive full-text journal papers via computer storage media which can be access through computers in standalone mode and/or connected to communication networks and online portals.

Familiarity with an innovation: This refers to the degree at which a potential adopter is conversant with the various aspects, process and dynamics of an innovation.

Relative advantage of an innovation: This refers to the degree at which an innovation is perceived to be better than the idea it supersedes (Rogers, 2003).

Compatibility of an innovation: This refers to the degree at which an innovation is perceived to be consistent with the values, norms, past experiences, and needs of a potential adopter (Rogers, 2003).

Complexity of an innovation: This refers to the degree at which an innovation is perceived as difficult to understand and use (Rogers, 2003).

Observability of an innovation: This refers to the degree at which the result of an innovation is visible to others (Rogers, 2003).

Trialability of an innovation: This refers to the degree at which the new innovation can be tried out or experimented with on a limited scale before adoption (Rogers, 2003).

Peer network influence: This refers to the degree of potential influence of peers in a social system on individual's decision to adopt an innovation (Rogers, 2003).

Change agent influence: This refers to the degree of potential influence of private or government agents or agencies on individual's decision to adopt an innovation.

Implementation of innovation: Refers to the transition period during which individuals ideally become increasingly skillful, consistent, and committed in their use of an innovation (Klein and Knight, 2005).

Rate of adoption: Refers to the relative speed with which an innovation is adopted by members of a social system. It is generally measured as the number of individuals who adopt a new idea in a specified period measured in years (Rogers, 2003).

Technology: Technology is a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome. The definition implies a need or problem that a tool can help to solve. The tool has (1) A hardware aspect consisting of the material, equipment, products, and so on, and (2) A software aspect, consisting of knowledge, skills, procedure or principles that provide the information base for the tool. Almost every technology embodies software aspects, although they are less visible than hardware aspects (Rogers, 2003).

1.12 Significance of the Study

This study employs Rogers's Innovation Diffusion Model to investigate the variables and attributes that influence the *innovation adoption decision* of e-publishing amongst Malaysian journal publishers. Rogers's model has been used in various researches to describe individual preference of one technology over another and has produced a lot of useful results. For example the outcome of the findings in this study can help journal publishing system developers and service providers in targeting prospects for a brand new journal publishing technology innovation, thereby embarking on strategies to reach various adopter categories in the journal publishing social system.

Research in innovation diffusion is also useful to information system developers as it can assist in information system implementation. With information from this research findings, system developers could be able to determine the perceived attributes of a new publishing technology or platform, before it is developed and could modify it to suit the targeted journal publishing market. Another significant aspect is that system developers could be able to identify the perceived attributes after the technology or publishing platform is developed. This would enable to observe the most effective dissemination strategies for a

speedy diffusion while marketing and spreading the innovation. In doing so, they may choose to highlight attributes journal publishers perceive positively or to develop messages and embark on promotion efforts to improve attributes that journal publishers perceived to be negative.

Knowledge of variables and attributes that are positively or negatively related to the adoption of e-journal publishing would serve as a good recipe for journal management system designers, scholarly journal publishers, service providers, policy makers and other stakeholders. It can create a clear understanding of the issue and help to uncover underlying logics of publisher's activities and can aid technology transfer, implementation and future innovation diffusion promotions.

The results of this study would create better understanding about issues of e-journal publishing amongst Malaysian journal publishers and enriches our stock of ideas on the subject. It would help Malaysian journal publishers in planning their strategies as regards technology innovation diffusion. The current study would help to facilitate further research about the subject matter and lead to better understanding of these issues among journal publishers, so that barriers to a more effective and efficient scholarly communication can be reduced.

1.13 Assumptions

The study adopted survey questionnaire method through the traditional postal service and online survey. The questionnaire that was delivered through postal service was sent to the address of each Chief Editor with the name of the journal written on the address envelope. Therefore, if someone serves as an editor of more than one journal, s/he is likely to receive more than one questionnaire. It is therefore assumed that the response given by each

publisher corresponds to the situation pertaining to only one of the journal in which s/he is involved; in this case the journal name that is printed on the questionnaire envelope. For the online survey method, it was assumed that respondents have answered to the e-mail messages by themselves and not their secretary or staff; that respondents are familiar with online survey methods.

1.14 Limitation of the Study

This study is limited to the examination of publishers or chief editors of Malaysian journals only. The instrument for data collection is a questionnaire administered via e-mail (online web-based survey) and through postal service (postage stamp and envelopes). It means that participation is limited only to publishers with a functioning e-mail or postal address. The study did not attempt to consider service users or other service providers such as the libraries in the investigation, however it did not overlook the impact of users and service providers in the research discussion.

1.15 Organization of the Thesis

This thesis consists of six chapters. Chapter one introduces the readers to the background of journal publishing in general and the changes that is currently taken place in the publishing industry that motivate this study. The chapter highlights the challenges facing the practitioners in the industry due to technological shift and defends the necessity for a research of this nature to investigate this situation in depth. Chapter two discusses past studies on journal publishing, and identified relevant research that has been done concerning the diffusion and adoption of technology innovations. The chapter also discusses Malaysian journal publishing, past and present. Chapter three presents the theory

that guides the e-journal publishing diffusion framework and highlights the variables that are explained in the study. Chapter four discusses the methodology adopted for the study. The chapter provides detailed explanation on how the research was carried out, the pattern in which the data was collected and the participant in which data was collected from. It gives valuable insights into the analysis of the data and the statistical techniques that is administered in this endeavor. Chapter five presents the analysis of data and the interpretation of the result, while chapter six presents the overall discussion of results and gave recommendations as a result of the findings.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

This section of the study presents the literature that discusses historical background on philosophical and scientific writings, scholarly communication process, technology innovations, and scientific journal publishing. The researcher relates all these elements to the concept of innovation diffusion and advancement in science.

2.2 Scientific Communication and Scientific Journals

There has been no recorded accurate date of the first scientific writings. Early civilizations of China, India, Egypt, Assyria, and Babylonia contributed to science and technology in many different ways. However, writings and records from such civilizations are difficult to examine since only fragments remain of them. The discovery of paper by the Chinese, some 2000 years ago was one big achievement in the communications process, because in ancient times, the communication process was largely oral. The way information is presented, communicated and recorded was transformed by the idea of printing with movable type -- invented by Johannes Gutenberg in the year 1455 (Campbell and Meadows, 2011; Jange and Kademani, 1999). This was very significant in the dissemination of knowledge, and serve as a prerequisite to the wide circulation of scientific writings. Meanwhile, the invention of wood pulp based paper and the mechanical press in the early nineteenth century paved the way for monumental changes in *publishing technology* (Campbell and Meadows, 2011; Ling, Yaacob and Phang, 1996).

The great thinkers of the Age of Reason and Enlightenment were scientists. Not only did many of them contribute to mathematics, physics, and physiology, but all of them were avid theorists in the sciences of human nature. They were cognitive neuroscientists, who tried to explain thought and emotion in terms of physical mechanisms of the nervous system. They were evolutionary psychologists, who speculated on life in a state of nature and on animal instincts that are “infused into our bosoms.” And they were social psychologists, who wrote of the moral sentiments that draw us together, the selfish passions that inflame us, and the foibles of shortsightedness that frustrate our best-laid plans (Pinker, 2013).

What we call *science* today used to be called *philosophy* and the philosophers of the early times were the generators and transformers of new ideas. Philosophical writings at the early period were facilitated by Latin, considered as the international language of the elite, but the vernacular was gradually also coming into use by natural philosophers (Pinker, 2013; Porter, 1964). Early form of scientific communication was in form of correspondence which was a kind of one-to-one mode, primarily through personal or group communications, letters or correspondence, while some others are in books and gazettes formats. But this publishing model was time consuming and inadequate for scientists based on the need to often communicate one new experiment at a time (Jange and Kademani, 1999; Porter, 1964; Shank, 1962; Ziman, 1969).

For books, unlike journals, an author had to wait until he accumulated several findings before he could get his work published as a book. These problems relegate these mediums as a model for scientific communication. One of its drawbacks also was that, these scientific writings were not sent usually to people who would critically review or appraise their contents. As a result, inaccurate theories were often not disputed or rejected, hence the need for a more truly scientific periodical. Thus, for proper openness came the

introduction of periodical journals by elite societies to report scientific findings and to serve as a platform for the intellectual exchange of ideas (Porter, 1964; Shank 1962; Ziman, 1969).

The inability of researchers in the early days to agree on common grounds, the ideal way to present and communicate scientific works has been widely reported by scientist. Scientific writings were heavily criticized and severely censored in the early days without discretion. Hardly any theory or principle stands beyond attack and scrutiny. It was such a challenging period that saw persistent conflict over ideas and scholarship which eventually set the tone for the future of scholarly communication (Mabe, 2006; Porter, 1964; Ziman, 1969).

Hence, in order to solve some of the competitive jealousies and sheer criticisms that existed between the experimentalists founding fathers of the *Royal Society*, one of the members and the first secretary of the *Royal society*, Henry Oldenburg came up with the idea of producing scientific journals. This idea was an *innovation* which traces its roots to the 17th century with the publication of *Philosophical Transactions and Le journal des savans (Journal of Learned Men)* (Mabe, 2006; Porter, 1964; Shank, 1962) and has rapidly or in some cases gradually diffused over the years across various disciplines and has even survived the transition to electronic delivery.

The practice of journal publishing, that is, periodical circulation of new discoveries was not immediately adopted by scientists of the day, as it was viewed to be controversial and treated with dissent. It was conceived to be a difficult medium to manage, and perhaps an inefficient and inadequate vehicle for its purpose (Mabe, 2006; Shank, 1962; Ziman, 1969). Nonetheless, scientific assemblies and societies whose vision were far reaching, like the *Royal Society*, the publisher of one of the foremost scientific journal, were resolute

in their conviction, that science could only move forward through a transparent and open exchange of ideas backed by experimental evidences. This strong conviction and a strengthened resolve, was what kept the *innovation* alive.

2.3 Traditional Publishing Methods

Traditionally, scholarly journals are responsible for four basic activities: (a) To ensure the content quality of an article through refereeing process; (b) To ensure quality control as regards the readability and format of an article; (c) Publishing an article for the value of recognition, availability and visibility; and (d) Marketing the publication for interested public. Many large societies employ full-time paid publication officers who may frequently serve also as editors. Some journals publish only articles accepted for delivery at various meetings of the societies. Others will publish any paper of importance regardless of its public delivery. Furthermore, redactory services may be provided by paid staffs at society headquarters if the society has a membership large enough to afford such services. Frequently redactory services are offered by printers. This service is still common today in the publishing firms (Shank 1962; Smith, 2004).

Dewiputri and Mohamad (2011) highlighted the process as regards to the publication of *Malaysian Journal of Medical Sciences (MJMS)* that to ensure articles are well written, they do send all accepted articles to a professional English editing service, American Journal Experts (AJE). Afterwards, the articles are returned by AJE, the accepted articles are processed carefully with respect to format and style by *MJMS* in-house copyeditors.

Many of the foremost journal titles are published by America's leading publishers, such as McGraw-Hill, Conover-Mast, and Chilton. Most of these publishers employ large staffs of technically-trained people to prepare feature articles and to report the news. Most of these

journals welcome contributions from industrial workers and indeed will even pay honoraria for such contributions; however, staff authors are seldom identified in trade journals. Many of these meatier house organs may have subscription prices which are usually far below costs, but, too many corporations overlook the issue of sales cost and distribute their journals free, particularly to libraries and in response to requests from interested individuals (Shank, 1962).

In Europe, on the other hand, commercial publishers such as Taylor and Francis, Butterworths, Elsevier, and Springer have long been active as the publishers for a large number of societies' journals as well as many archival journals without any notable association. American publishers, as at the mid-19th century however, are turning to the scholarly journal publishing field, again, as in Europe, either providing redactory and business services for societies (generally the smaller ones) or conceiving and managing journals of their own design. Academic Press, Interscience Publishers, and Pergamon Press have been the most active of these publishers in those period (Shank, 1962).

The traditional publishing model has been in existence and perfected for over three centuries. The core roles publishers have always been performing during the old days, still remains even up till today and these roles are not going to evaporate. Smith (2004) emphasized that the model is quite simple; the author submits an article to a journal. It is passed to the referees if it passes the subject appropriateness test, and feedback from the referees is passed back to the author until the required content quality is achieved. The article is then sub-edited for appearance and format and finally is published in a particular issue.

The reader gains access to the issue after paying (or the reader's institution pay) a subscription fee. This payment covers the cost of the publication phase and the organization of the refereeing (quality control) phase (but not the actual cost of the referees' time, which is given free). The reader is introduced to the issue via indexes or references from other articles, etc. The publisher also markets the journal to the community it serves. According to Jange and Kademani (1999) the journal has the following features developed through ages for greater standardization offered by the printing technology : (a) Organizing information in alphabetical order, (b) The title page, (c) Pages numbered, (d) Punctuation marks, (e) Indexing of individual works, (f) The ability to cite previous works.

2.4 Proliferation of Journal Titles

The scientific journal publishing grows and expanded with the passage of time, with different fields of research breaking out of larger ones, later journals published became more focused and streamed to fit a unit of research. Thus, the bulk of scientific literature grows by a complex process in which old journals expand, and then subdivide, and new ones also emerge in the interdisciplinary regions (Ziman, 1969). There is a challenge of the growing volume of materials managed by a single journal as the numbers of contributors increase yearly and the number of sub-fields been created also increase. The introduction of new journals from a wide subject area to focus on niche well suited to different research groups or practitioner, open more doors of opportunities for scientist, libraries, readers and publishers alike.

By the end of the 17th century, about 30 scientific and medical periodicals had been established, but most of these were short lived (Porter, 1964). Around 1800 there were 100 scientific and technical journals and in 1850, it has grown to 1000 journals. Today's

characteristic form of the scientific paper appeared during 1780-1790, with the publication of specialized journals in physics, chemistry, biology, agriculture, and medicine. Several of these journals continue today. Periodicals devoted specifically to microbiology did not appear until 1887, when both the *Annals de l'Institut Pasteur* and *Centralblatt fur Bakteriologie und Parsitenkunde* began publication. According to Prutz (1845) , the first authentic abstracting journal appeared in 1714 "to provide the learned with literary treasures hidden in the latest issues of 40 periodicals." This secondary serial was discontinued after 3 years. But by 1830 over 300 primary journals were being published, and abstracting journals were revived.

Indeed, wars also have effect on advancement of science. Many powerful technological inventions started in military bases before they spread to other research institutions. Technological advancements move rapidly during World War II (WWII) when Germans and Allied forces scientists were working round the clock to outsmart one another. Developments of warfare were so fast that within days of either side loss, they will advance their technology to create machines better than what the other have. *Innovations* were happening on a daily basis and torrents of research papers were been produced (Davies and Stammers 1975).

Apart from scientific journals, trade journals were also becoming popular, especially in the US where large amount of state funds are put into research. Bill Gate, the founder of Microsoft in an interview with the Al-Jazeera network in 2011 noted that at the beginning of the 20th century, research activity was at the heart of culture in the US. *Research* and *innovation* was the main focus of the government, private, public and social institution and

they back it up by investing enormously in R&D. Henceforth, the production of large amount of research work calls for the introduction of new journals to manage and report them; activities characterized by progress in science. This allow for new field of research to be explored and the creation of new kind of publications.

Shank (1962) offered more insight into this discussion and pointed that, part of the new kind of publication that were coming out were largely trade newspapers in magazine format. This comes with sections containing news of the industries covered, carefully edited expository, narrative or descriptive articles of important research and development activities. Likewise, brief notes of personnel changes in the industries, and most important, advertisements and offers of literature about products used in the various industries were been produced. At the end of 1960, the roster of American trade magazines had risen to over 2,000 in numbers, covering every conceivable field of research, from macaroni making to missile and rocket manufacturing.

Besides, Biological Abstracts alone has covered 6000 primary journals and reported more than 105,000 abstracts by 1964. Beginning with 1665 and continuing until today, the growth of scientific periodicals has been exponential, with the number of primary journals doubling every 18 to 20 years. As the flower blooms, along the year 1964's, the estimates of the number of scientific and technical serials journals in the world was observed to be in the range of 25,000 to 100,000 and the scientific and technical literature of the world was published in over 60 languages. By the beginning of twentieth century it has increased to about 10,000 journals, which was estimated to have increased to around 90,000 to 100,000 by 1999 (Garvey and Griffith, 1967; Jange and Kademani, 1999; Porter, 1964) .

Mabe (2003) and Mabe (2006) have observed consistency in the growth of scholarly journals which is proportional to the number of researchers in the world. It was reported that, there are approximately one million unique authors producing about 1.4 million articles each year in approximately 21,000 active, peer-reviewed learned journals for roughly 10–15 million readers situated in about 10,000 institutions across the globe. The result is similar with Björk, Roos and Lauri (2009) who reported that in 2006, the total number of articles published was approximately 1,350,000. The number of scholarly journals and articles produced continues to grow. Every year the number of articles increases by 3%, while the number of journals by about 3.5%, a figure that has been relatively consistent over the last couple of hundred years (Mabe, 2003; Mabe, 2006). True, the scientific scholarly communication is the highest achievements of human race.

2.5 Pre-Electronic Age Information Management Tools

As the volume of scientific literature grew, new tools were needed to facilitate access to primary information. This resulted in the first manual abstracting journal, created to assist scientist in identifying the most relevant literature in their field. But this manual technique was time consuming and inefficient because it has to do with lot of comprehensive searches (Jange and Kademani, 1999). Ziman (1969) lamented that the task of abstracting, translating, classifying, and editing publications in his days requires high degree of skill and technical knowledge. He envisioned publications to be stored economically on magnetic tapes and called up for instant perusal by using the right commands or by pressing the appropriate buttons. He likewise dreamed of a machine – a device – a daily alerting service that could inform researchers about the latest papers in

their domain of interest. Later days approach saw the use of punch cards, magnetic tapes, mechanized indexing systems, and computerized typesetting.

Way back in 1945, Vannevar Bush envisioned a device called *The Memex* (a portmanteau of *memory and index*). He believed that the sheer volume of information becoming available to scientists would overwhelm traditional methods of acquisition, storage, and analysis. As a result, new methods would be needed. He proposed that science be put to good use in organizing the vast record of human knowledge (Caspi, Shankar and Wang, 2003).

Inspired by his previous work in microfilm mass storage, Bush envisioned an information workstation capable of storing, navigating, and annotating an entire library's worth of information. Bush also envisioned entire texts being distributed with built-in trails, and scientists sharing custom-made trails by copying the associated pages and links. Bush perfectly predicted the use of the record in laboratory research, business accounting, and law, but could not foresee that it could affect human daily and social life through social network, social media, news, entertainment, sport, recreation, vacation, gaming, advertising and product information.

2.6 Scientific Bodies and Scholarly Communication

The scientific community forms an alliance with members belonging to the same school of thoughts, class, discipline or field of research. They meet occasionally to discuss emerging issues and trends with respect to their field. Sometimes these societies become financially independent through membership charges paid by members. They put together their ideas on different topics and subjects individually or collaboratively in a journal. The journal will normally have a press run of some considerable amount of copies, in addition with a

full-sized brochure describing the articles in each issue and sent with the set of cards to each subscriber. Papers are generally selected for publication by the editor based on his own evaluation or after a review by society members who are experts in various fields (Jange and Kademani, 1999; Porter, 1964; Shank, 1962; Ziman, 1969).

Contributors to the articles published in the journals are primarily, but not necessarily, members of the societies. For the most part, the editors of these journals are unpaid volunteers, sometimes elected, sometimes appointed, from the societies' memberships. Shank (1962) explained that this segment of the scientific press is controlled largely by scientists' themselves through the development of the archival journal publishing activities of their professional societies.

What do scientists aim to achieve? They want to achieve a timely dissemination of findings, in order to reduce the time between the discovery and communication to peers as well as readers. To achieve more on this, scientist often send letters to the editors containing brief announcements of new research results with few details, but somewhat longer than abstracts of articles. This also have become a popular means of quick dissemination of information (Mabe, 2006; Shank, 1962; Ziman, 1969).

The main aim as stated in the address of one of the first published journal (*Journal des Sgavans in 1665*) was to catalogue and to give useful information on books published in Europe; to print necrologies of famous persons and summarize their works; and to make known experiments in physics, chemistry, and anatomy that may serve to explain natural phenomena; to describe useful or curious inventions of machines, and to record

meteorological data; also to cite the principal decisions of civil and religious courts and censures of universities; and finally to transmit to readers all current events worthy of the curiosity of men (Porter, 1964).

The above stated are the main objectives of the early scientific journals. In summary the five main functions of the Oldenburg's journal (Oldenburg was considered the inventor of scholarly journal) are: registration, dissemination, peer review, archival record and bibliometrics. And the functions of scientific publishing is the creation, evaluation and dissemination of scientific knowledge (Campbell and Meadows, 2011; Mabe, 2006; Ponte and Simon, 2011). These main functions are fundamental to the way scientists behave and how journal is organized and managed before the advent of electronic versions. Series of evolution in journal publishing in terms of innovative technologies, publishing models and pricing followed.

2.7 Scholarly Journal Publishing In Malaysia

2.7.1 Brief Historical Background

As at the time in 1660 when the first scientific journal was published in England and France, Malaysia (Malacca) then was under the colonial rule of the Dutch. No scientific documents were circulating at this time until the 1840's during the British colonial rule. Thus, it took almost two centuries before journal publishing was adopted by scientific societies in Malaysia and even so, most of the scientific bodies that were created along with this century were still very much influenced by the culture and tradition of the colonial expeditions, as most research endeavor were devoted to the study and classification of natural resources and the survey of the national territories.

Scientific periodicals publishing in Malaysia started in pre-independent Malaysia in late 1840's with the publication of the *Journal of the Indian Archipelago and Eastern Asia (1847-1862)*, by James Richardson Logan, an erudite lawyer and professional journalist. This was followed years later by the publication of the *Journal of Eastern Asia (1875)*, *Journal of the Straits Branch of the Royal Asiatic Society (1878-)*, *Agricultural Bulletin of the Malay Peninsula (1891)*, *Journal of the Straits Medical Association (1892)* and *Perak Museum Notes (1893)* (Tiew, 1999a).

Noting that the region has been under British rule since the year 1786, the number of scholarly periodicals grew over the years after independence in 31st of August 1957. This was as a result of the emergence of local universities, research institutions, learned associations and societies. Of the ten periodicals in pre-independence Malaysia, five were published by institutions located at Singapore, three in Kuala Lumpur, and one each in Taiping and Kuching. Before the first periodical, *Journal of the Indian Archipelago and Eastern Asia* ceased production; nine volumes of the journal were successfully published.

The next periodical, *Journal of Eastern Asia* started publishing twelve years after the demise of the first. It was published by the Secretary and Librarian of the Raffles Library and Museum, James Collins, from July 1875. Published quarterly and covered subjects in botany, zoology, geology, mineralogy, meteorology, geography etc. The journal could not also maintain publication beyond its year of inception. The third scholarly English periodical is the *Journal of the Straits Branch of the Royal Asiatic Society (JSBRAS)*, now known as the *Journal of the Malaysian Branch of the Royal Asiatic Society* started publishing from July 1878, a year after the formation of the *Straits Branch of the Royal Asiatic Society* in Singapore. The journal centered its publication on subjects in history,

archaeology, natural history, literature, culture and anthropology relating to Malaya and its surroundings.

It is necessary to point that the journal has been published uninterruptedly except for the period 1942 to 1946 during Japanese occupation of Malaya in World War II (Tiew, 1999a). Furthermore, the fourth early pre-independent Malaysian scholarly English periodical focused on agriculture and horticulture in the Malay Peninsula, and it was named the *Agricultural Bulletin of the Malay Peninsula*.

It was first published in April, 1891 by the Gardens and Forest Department, Straits Settlement. The first editor was H. N. Ridley the Director of Botanic Gardens and Forests of rubber fame. Tiew (1999a) pointed that the bulletins were published at irregular intervals due to unknown circumstances. Between 1901 and 1911, the bulletin was known as *Agricultural Bulletin of the Straits and Federated Malay States* planned to be a monthly bulletin. During 1912 to 1921, the Department of Agriculture published it as *Agricultural Bulletin of the Federated Malay States*. In 1922, the bulletin was renamed as *Malayan Agriculture Journal* and identified with that name till 1964. As with all other living Malaysian periodicals at the time, the journal also suffered a setback due to the Japanese's Occupation of Malaya.

Later on, as a result of the formation of Malaysia in 1963, the journal changed name to *Malaysian Agricultural Journal* and published every 3 months by the *Ministry of Agriculture and Cooperatives*. The journal has hitherto aided agricultural development in the country. Similarly, another journal with a long history is the *Medical Journal of Malaysia* published since 1890. It originated as the *Journal of the Straits Medical*

Association (JSMA) (1892 - 1897). The Straits Medical Association was established by a group of medical officers who foresee a necessity to form a professional society for medical practitioners in Singapore to discuss and research on local medical issues and diseases control in Malaya and its environs. The association observed that cooperative research endeavor, learning and dissemination of knowledge was an essential impetus for the medical community and that the tropical climate of the region presented unique perspectives to the study of medicine (Chen, 1982; Chia and Yeong, 2006; Lim, 1995) .

Beside the publication of scientific papers and reports, *The Straits Medical Association* was also influential in the drafting of three ordinances, namely, the Medical Registration Act, the Pharmacy Act and the Poisons Act.

2.7.2 Current State of Malaysian Journals

Currently, most of the titles in pre-independent Malaysia are still in production except for *Journal of the Indian Archipelago and Eastern Asia* (last issue appeared in 1862), *Journal of Eastern Asia* (last issue in 1875), *Bulletin from the Institute for Medical Research* (last issue appeared in 1986) and *Malaysian Agricultural Journal* (last issue 1993) which are now-defunct. Hence, along the years some of the periodicals have experienced modification in titles, directions and while some have even split into several other fields, some have been discontinued.

Nevertheless the numbers started to grow rapidly after independence, basically through the efforts of the *Dewan Bahasa dan Pustaka (DBP)* which was set up after independence. This parastatal was involved in publishing *Jurnal Dewan Bahasa* and other numerous

books and periodicals in the Malay language. Hence, the numbers of journals published rose to 17 in the 1960's, 36 journals by 1970, and by 1974, the numbers have increased to 57 journals, 149 by 1990, and 214 by 1997 (Anyi, 2008; Kalsom and Zakiah, 1990; Lim, 1975; Tiew, 1999b). Latest report shows that the numbers of journals been published in Malaysia is observed to be around 500 titles, among which, only 12 titles are indexed in *Web of Science* database, and 49 in *Scopus* database.

All in all, the number of Malaysian journals observed to be indexed either by the national indexing system *Malaysian Abstracting and Indexing System (MyAIS)* or international indexing databases such as Thomson Reuters' indexes (*Science Citation Index, Social Sciences Citation Index, Arts and Humanities Citation Index*) or subject-based indexes (*Index Islamicus, Compendex, Chemical abstracts*, etc) are 105 (22.6%) titles.

Furthermore, as journal publishing experiences a shift from print to electronic, researchers have observed slow *adoption* rate of electronic journals in Malaysia as they identified only six Malaysian e- journals in year 2000, which increased to eleven in year 2002 (Roosfa, 2000; Zainab and Edzan, 2000; Zainab, Edzan and Ang (2002)., 2002), thirteen by 2005, fifteen by 2006 (Zainab and Abrizah, 2007) and thirty by 2008 (Zainab and Nur Badrul, 2008). This apparently indicates that, the number of journals being published electronically in Malaysia though increasing, but at a very slow pace considering the number of journals published in the country. Meanwhile, Zainab et al. (2012) also observed that in Malaysia, 55.5% of journals are published by universities, followed by the professional or scholarly associations (104, 22.4%) and government and private agencies (103, 22.1%). Additionally, 55.8% are publishing annually, while 36% bi-annually (Walsham, 2012).

Roosfa and Yahya (2011) have discussed the issue of e-publishing within Malaysian scholarly community. They observed some of the problems to be: lack of professionalism among the editors, poor refereeing systems, preference for foreign journals above local ones, bureaucracy, financial problems, This has resulted in lack of quality works been published.

2.8 Electronic Scholarly Communications

With every generation, scientific communications don new robes, this time in electronic form. The birth of the computer machine and the accompanied applications like the word processor and sophisticated software brought about an unprecedented development in the scientific community (Ghani, Suparjoh and Hamid, 2008; Jange and Kademani, 1999; Massad, Brown and Tucker, 2011). In the early days of the computing machines, men of science have strived to create devices to store, manage and organize information and literary materials.

Part of the early effort resulted in the creation of storage devices like punched cards, microfilm, tape-drives, hard-drives, mechanized indexing systems, and computerized typesetting (Caspi, Shankar and Wang, 2003; Jange and Kademani, 1999; Meadows, 1997). Microfilm was developed in 1952 and has served as storage device for lots of information. Computers and magnetic storage devices (magnetic tape, floppy disk, CD-ROM and DVD) was a breakthrough for storing and retrieving information (Jange and Kademani, 1999)

E-journals began on an experimental basis in 1976 and the first peer reviewed e-journal was *Online Journal of Current Clinical Trials* (Turoff and Hitlz, 1982; Keyhani 1993 cited in Zainab and Edzan 2000). Basically, the provision of electronic preprints of articles

started in pre-web days using electronic mail distribution and later was been managed and operated from the website at the Los Alamos laboratory in the USA. The preprints in those days were clearly considered by the scholarly community as more valuable than the old system of distributing hard copy preprints because hard copy distribution could only go to named individuals, where-as the electronic database of preprints can be accessed by anyone who has a networked computer (Meadows, 1997).

The emergence of the internet in the 1970's and the World Wide Web in the 1990's was phenomenal, and impacted on human daily and social existence (Ghani, Suparjoh and Hamid, 2008; Ling, Yaacob and Phang, 1996; Nath and Murthy, 2009). The World Wide Web was originally created at CERN, the European high energy physics laboratory, as a way of handling distributed databases (Meadows, 1997). A large proportion of computers and mobile devices are connected to the internet to communicate, share and receive information and the numbers are growing phenomenally. The WWW and internet opens windows of information and opportunities to the entire world, transforming the world into information traders—everybody have equal chance to get information and reacts to them as they happen. These transformations has allowed for easy ways in getting things done.

The computers today compared to the ones in the 1950s/60s are 2000 times more powerful, which makes works less difficult and timely. Problems in editing, formatting were solved and beyond the editing and accuracy testing task, the new advance machine is also capable of translating foreign languages. Thus, the computer and its associated peripherals have fuelled the rise of electronic publishing.

At the turn of the new millennium, the internet ventured into its second phase of spiral growth and the scientific journal continues to enjoy a profound transformation to electronic format as most of the active commercial publishers race to invest their money in e-publishing. This entrance of the giants in the publishing industry into e-journal publishing brought about new opportunities in the industry and has helped to keep the *innovation* alive. But the same cannot be said of smaller publishers especially in developing nations, due to several limiting factors.

It is clear now that internet networking greatly increases the efficiency of knowledge dissemination. Each new piece of knowledge is published once and shared on demand, rather than published hundreds or thousands of times per user. A fast and searchable network gives the user immediate access to the newest knowledge of the entire (online) record, rather than waiting for acquaintances and publishers to provide copies. The ease of information sharing in turn produces a more comprehensive and fertile public record (Caspi, Shankar and Wang , 2003).

The number of scholarly electronic, newsgroups and discussion forums in the sciences grew from 175 titles in 1991 to 853 in 1995 and then to more than 2,375 in 1996, in addition to 2,107 scientific, technical or medical fulltext sources available from commercial online vendors (Okerson, 1994 cited in Jange and Kademani 1999; Harter and Kim, 1996).

Meadows (1997) explained that many of the early e - journals were accessible for free, as they were free of subscription costs, but the situation changes when learned societies and commercial publishers venture into the business. Today, most academic institutions have licenses offering access to all the titles of major publishers (e.g. Science Direct) and many

publishers also offer pay-on-demand services for the purchase of individual papers (Björk, Roos and Lauri, 2009). The first group of publishers to declare their readiness and commitment to provide web access to electronic journals as: Blackwell, Elsevier, Academic Press, John Wiley, Kluwer, Oxford University Press, and ASLIB (Jange and Kademani, 1999)

2.9 The Structure of Scholarly Journal Publishing Systems

The whole body of scientific knowledge functions in different ways from a typical organization does. The products delivered by the journal publishing industry is knowledge which is not like consumer goods manufactured by machine and distributed on a large scale. It is a system of intellectual synthesis where scientists come together and share knowledge. This makes science a highly cooperative activity; the cooperate product of a vast social institution, rather than a series of individual forays to the unknown (Ziman, 1969). Therefore, it is the ability to embrace difficult realities that makes science expand beyond the limit of what we know.

Apart from publishers, the scientific community also comprises of three other segments (authors, users and libraries) which are very likely to have different perceptions and attitudes towards new publishing technologies. The structure of scholarly publishing system is depicted in Figure 2.1.

The scholarly journal publishing system is made up of diverse group of scholars and academics from various fields that act and react differently based on the customs and research traditions of their discipline and also base on self-attributes. Hahn and Schoch (1997) stressed that different segment of the scientific publishing community have diverse

needs, interests, and resources, which can possibly explain the characteristics of innovation diffusion.

Therefore, for a given system, social structure is necessary within the system to provide regularity and stability. Norms within a given social system provide rules and guidelines for the member's behavior and this also affects innovation diffusion (Yates, 2001). Additionally, Glor (2001) citing Cummings and Huse (1989) observed that corporate culture is "the pattern of basic assumptions, values, norms and artifacts shared by organization members." These cultural elements are "generally taken for granted and serve to guide members' perceptions, thoughts and actions".

Thus, scholarly journal publishing organization has its own unique culture and valued norms. Scholars publish research results in form of journal articles making them visible to the world. The valued norms in the scientific world have influenced the way they communicate and share, which must adhere to scholarly communication values, promote legitimate use of works, protect individual property, copyright, and among others.

2.9.1 The Publishing Cycle

In Figure 2.1, the study presents the scholarly communication structure, conceptualized from review of literatures. It identifies the participation of different entities in the scholarly communication process. Figure 2.2 and Figure 2.3 distinguish between the traditional and electronic publishing cycle. In the traditional publishing cycle (Figure 2.2), the research work created by a scientist from a particular research community, passes through the journal editorial office of the author's chosen journal to its journal publisher, subscribing

institutional libraries, often via a subscription agent, before ending up back in the hands of the readers of that research community as a published scientific paper in a journal.

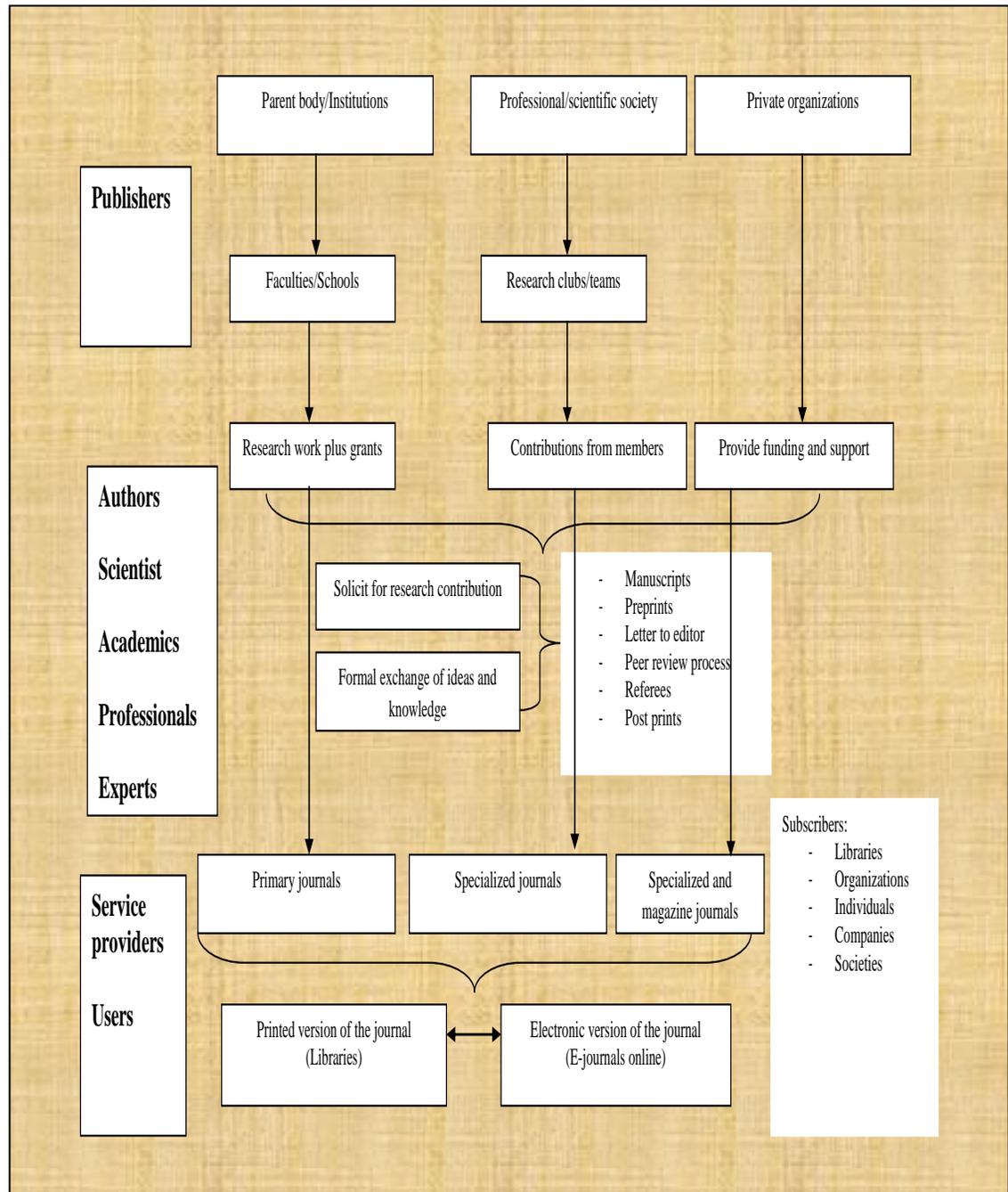


Figure 2.1: Scholarly Communication Structure

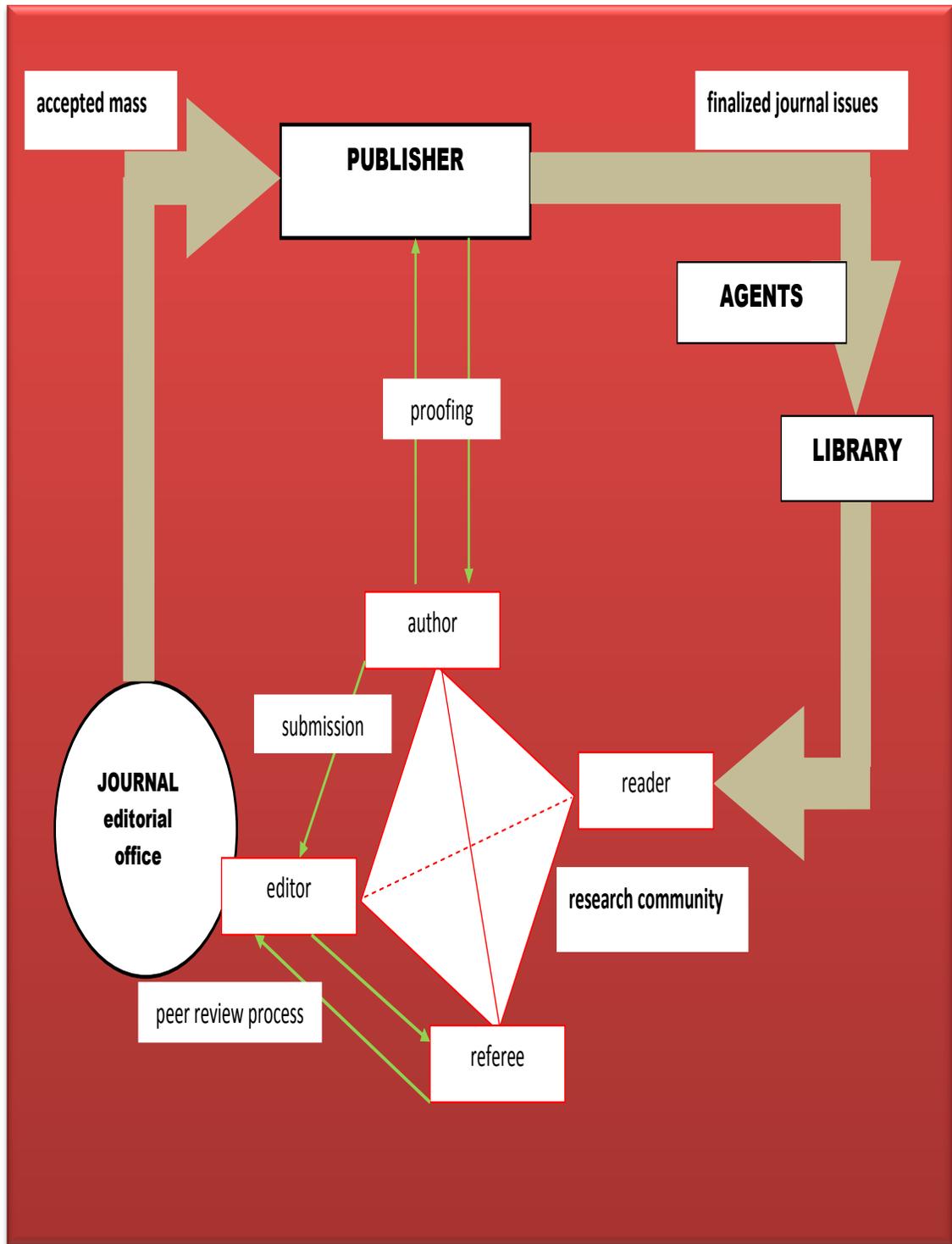


Figure 2.2: The Publishing Cycle (Mabe, 2006)

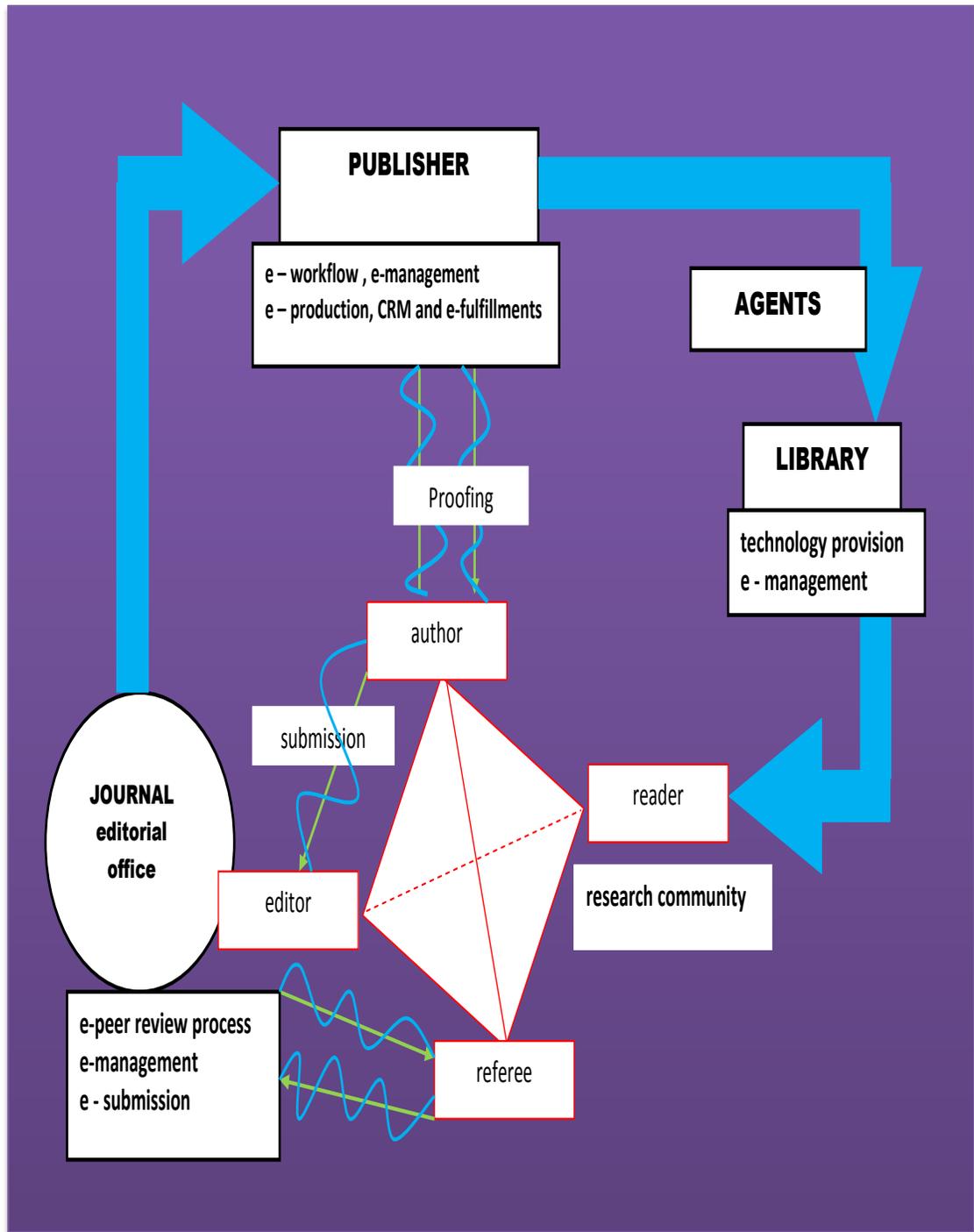


Figure 2.3: The Electronic Publishing Cycle (Mabe, 2006)

The e-publishing cycle is illustrated in Figure 2.3 indicating the main areas of change (in blue) for both the processes and the actors in the traditional publishing cycle after it has gone through the digital transformation (Mabe, 2006)

2.9.2 Authors

About 70% of authors producing scientific articles in journals are researchers based in universities. The remainders are connected to the research departments of teaching hospitals, government institutions and research-intensive corporations (especially pharmaceutical and chemical companies) (Mabe, 2006; Porter, 1964; Sanni and Zainab, 2010; Shank, 1962). Knowledge sharing takes place among authors/peers/the scientific community. Authors most likely will share their research results at an early stage (that is, before peer review and final publication). However, this knowledge sharing is limited and informal. Formal publication in a journal is the final act in the process (Agerbæk, 2010)

2.9.3 Journal Editors

Commonly an editor of a journal is an independent, leading expert in his field, often an academic in a university, who is appointed and sometimes financially supported by the publisher. The function of the editor is to receive articles from authors, judge their relevance to the scope of the journal and to refer them to equally expert colleagues for peer review (usually other researchers in the same field as the author, called referees or reviewers). Practically, each journal will have a single editor, but the expansion of the size

of journals and the increasing specialization of research domains requires that there should be more editors (two or three in most cases) for a journal (Mabe, 2006; Ziman, 1969).

2.9.4 Peer Review Process

The defining practice of scholarly communication has always been open debate, peer review process, and double-blind methods. The peer review process involves the systematic, critical review of a submitted paper by two or more scholars from the same field of expertise as the author(s), in order to prevent the errors and misjudgment to which researchers are vulnerable. These academic peers are selected by the journal editor and are asked to critique the paper in respect of its originality, methodological soundness, the significance and strength of its conclusions, the degree to which the evidence presented supports the conclusions given, and proper attribution of original sources (Mabe, 2006; Ziman, 1969).

Most journals employ 'blind' refereeing system (removal of authors' name) and reviewers can recommend acceptance or rejection of a manuscript, or its acceptance subject to specified revisions. The final decision is made by the journal editor on the advice of the reviewers. This process alone can take from weeks to months, as the reviewers must be appeased with all manners of reformulations and sacrifices of beloved passage of text (Ziman, 1969) before decision is made as regards acceptance or rejection, with a similar delay until publication after the article has been accepted. Delays in the process have been assumed to be extremely reduced by e- publishing technologies but the challenges remains (Mabe, 2006).

2.9.5 Editorial Board Members

Members of a journal editorial board normally comprise of around 20 or 30 recognized authorities in the field of publication who are prepared to lend their name and prestige to it. Any member for that matter would be neglecting his scientific duty if he does not offer valuable insight when necessary. Hence, the editorial members are usually engaged with the task of assisting with policy and provide criteria and insight for assessment of manuscripts and also contribute to research development within their respective coterie. They also discuss issues concerning selection of referees and meets irregularly often not more than once a year at professional gatherings (Mabe, 2006; Ziman, 1969).

2.9.6 Format Of Journal Papers

Journal publishing is the most common form of dissemination of new research results, in particular, field of science and medicine. In some scientific domains, such as computer science, conference publishing is quite important and, in the humanities, book publishing is an important channel (Abrizah and Wee, 2011; Björk, Roos and Lauri, 2009; Massad, Brown and Tucker, 2011). The journal papers are typically 3,000 to 10,000 words in length and are written following long-established conventions in respect to format, style, referencing, figures, tables et cetera. Editorial, reviews, conference papers, book chapters, books and reports are some other types of scientific publications (Björk, Roos and Lauri, 2009).

2.9.7 The Journal Publishers

The journal publisher is responsible for the task of producing, marketing and distributing the journal, in print or electronic format. The task among others involves: copy-editing,

typesetting, printing and binding the journals and with the electronic format, the role has changed quite a bit and it has required a functioning e-mail address, editorial manager, maintenance of an online journal management system – submission and reviewing system. The publishers are also involved with soliciting contributions, advertising, publicizing, marketing, mailing, timely publication, abstracting and indexing the contents of the journal (Johnson and Luther, 2007; Mabe, 2006; Smith, 2004). For e-journals, publishers need more added skill sets to support their capacity, and they also need support from other experts such as: database vendors, engineers, web site developers, lawyers, I.T gurus among others.

2.10 E-Journal Publishing Models

The main modes of online publishing are: Subscription/toll access publishing, open access publishing/open access journals, open access self-archiving/open access repositories, institutional repositories /subject repositories (Agerbæk Kjøller Nielsen, 2010; Björk, Roos and Lauri, 2009; Houghton et al., 2009; Park, 2007; Smith, 2004; Zainab, 2010). Subscription or toll access publishing refers primarily to academic journal publishing, but includes any publishing business model that imposes reader access charges and use restrictions (Agerbæk Kjøller Nielsen, 2010; Houghton et al., 2009; Zainab, 2010). Open access (OA) journals on the other hand are peer reviewed academic journals that are subscription free and accessible to all users (Zainab, 2010). Open access movement are gaining popularity and the benefit of open access is clearly evident covering larger grounds in information accessibility and dissemination because it has reduced the system-wide cost of publishing and increased usage (Pinfield, 2013).

There is a difference between open access and free access, noted, Zainab (2010) that open access imply free to view, use, distribute and the copyright is held by the author, while free access mean free access but with restrictions as regards to use, redistribution and the copyright is often held by the publishers or creators. Moreover, often times there are requirement to register, for statistical or other purposes. This implicitly means that open access material is easily indexed by general purpose search engines and open access can be achieved through *Green open access*, *Golden open access* and *Hybrid open access* practice.

With green open access, authors publish in a journal, and are allowed to deposit their research work in an open-access repository. This self-archiving can take place earlier in the publication process prior to the time in which the final version of the article is published and made available to all (Agerbæk Kjølner Nielsen, 2010). The Green open access is not a business model and it is gaining momentum and already well-established in certain disciplines (Pinfield 2013). Campbell and Meadows (2011) believed that the practice of Green open access may be unsustainable because it is an unpaid access to publisher or society content, nonetheless, Pinfield (2013) argued that for the time being, the Green open access mode should serve as a way of moving forward gradually with the open access agenda.

Golden open access, on the other hand refers to the process whereby authors pay-to-publish through what is known as APC (Article Processing Charges) (Pinfield, 2013) and the article is available free of charge to all and this potentially increase the impact of the article through the number of citations it receives (Agerbæk Kjølner Nielsen, 2010).

However, since the article will go through peer-review process and publication process, there are no specifics on when the article will be available for accessibility, nonetheless Campbell and Meadows (2011) and Pinfield (2013) believed that this practice is rather better and more sustainable economic wise, than for libraries to be paying for post-publications subscriptions. This is because the Gold open access model would require authors to also consider the pricing cost of publishing when deciding in which journal to submit their manuscripts and this would make the publishing market more competitive.

The third option, hybrid OA, refers to a situation whereby authors pay to have their article made available immediately on publication in an otherwise subscription-based journal (Campbell and Meadows, 2011). Meanwhile, there has also been an ongoing discussion among open access advocates as regards the *best color* in the open access frame (gold or green) (Björk, Roos and Lauri, 2009). Open access self-archiving according to Houghton et al. (2009) are works deposited by academics in on-line open access repositories, making it freely available to anyone with the required device to access, and use-restrictions can be minimal.

The work of Houghton et al. (2009) examines the costs and benefits of three alternative models for scholarly publishing (i.e. subscription publishing, open access publishing and self-archiving) and their implication for higher education, scholarly journal and book publishing. Using data from two commercial databases (ISI and Ulrich's Periodicals Directory) and supplemented by sampling and Google searches, Björk, Roos and Lauri (2009) conducted an estimate of the total yearly volume of peer-reviewed scientific journal articles published world-wide. This also includes articles available openly on the Web

either directly or as copies in e-print repositories. Results show that in 2006 the total number of articles published was approximately 1,350,000. Of this number, 4.6% became immediately openly available and an additional 3.5% became available after an embargo period of, typically, one year. Furthermore, usable copies of 11.3% could be found in subject-specific or institutional repositories or on the home pages of the authors.

The study by Ghani, Suparjoh and Hamid (2008) proposed a framework for the development of an online publishing in the University of Malaya (OPUM). The authors seek to identify the online publishing technology and capabilities which could support the development of the online publishing system. Mulligan and Mabe (2011) studied the effect of internet on researchers motivation, behavior and attitudes. It was found that the increase in the number of research published can be explained by the increase in the number of researchers and the issue of over-publication is an exaggeration. Collaboration has increased thanks to the internet and online technologies. Conferences are the most desirable forum for knowledge dissemination and marketing of ideas amongst Computer scientist and Physicists and less desirable by Earth sciences and Chemistry. Publishing in a repository is not a common behavior among respondents. Peer review, it was confirmed, increased the quality of journal papers. The opportunity to *disseminate* findings and *further career* as well as *future funding* are the key motivating factors for conducting research. The result is similar to what was observed in Coles (1993), only that motivation by *recognition* and *establishing precedent* was shown to have clearly increased. Most of the respondents also believed that funding agencies have large influence on what research to be done, especially with research in Life Sciences and Chemistry, but not on what journal to publish in.

2.11 Issues Regarding E-Journal Publishing

There are so many narratives to the idea of publishing e-journals and the debates invoke by this topic is numerous. The influx of various publishing models and tools transported via the internet has increased the dialogue on the future of scholarly communications, as it concerns the academics, the publishers, the library, the service providers, the users and its economies. Some of these issues are discusses below:

2.11.1 E-Journal Publishing and Information Explosion

The sheer volume of information becoming available to scientists as digital materials is overwhelming, and it is a cause of worry amongst scientist. Massad, Brown and Tucker (2011), noted that the consequence of changing reading patterns of scholars and how they affect the evolution of science must be examined critically. Studies have shown that scientist in the digital age read more articles than before, but spend less time reading them (Mabe, 2006) which resulted in researchers asking the following questions: what is lost as a result of scientists knowing less about more? Is the scientific community likely to become less or more fragmented as greater and greater numbers of electronic journals become available? Will fewer scholars become specialists in more narrowly defined areas, or will the opposite occur? Will scientists become more casual about citing works and documenting sources as the breadth of information consulted widens exponentially? Answers to those questions will definitely add to our knowledge of scholarly communication and help to sustain future growth, stability and success in scholarly publishing.

2.11.2 E-Journal Publishing and Reputation

There is a perception in some corner of the scholarly community that the standard and quality of traditional prints are incomparable. Many scientists especially the old-guards are still very reluctant in their acceptance of e-journals, and are been cautious with jumping onto the internet bandwagon; citing academic quality and prestige as the main reason. They are concerned about how research is validated and how it will be validated in the future. Also of concern are the kinds of format in which research should be available and how digital information is stored in the short and long term. Those who harbor these sentiments consider traditional printed journals to be much more rigorous and discerning in every facet. Nonetheless, studies have shown that acceptance and perceived reputation of e - journals is improving among faculties (Johnson and Luther, 2007; Massad, Brown and Tucker, 2011). Hence, e - journal publishers have had to persuade authors that e – formats have the same prestige as print (Meadows, 1997).

2.11.3 E-Journal Publishing and Perishability of Information

As the application of new found information technology has become more widespread, the user's ability to deal with the information outputs has reached a breakdown point and new measures have to be developed to introduce new levels of control, management and organization (Jange and Kademani, 1999). The growth of the internet and other digital materials has resulted in the explosive propagation of electronic journals and some people worry about the long-term durability of e-journals and whether or not the databases will be accessible and stable for the future (Massad, Brown and Tucker, 2011). Since online

records can be easily deleted and people can also seek legal actions for online information records to be removed, therefore, it is important to reconsider keeping publication records in prints and kept in libraries. Likewise, there is a concern that when today's platform on which the current technologies are built becomes obsolete or destroyed e-materials might not be totally reliable for reading and studies. Some people have advocated for a common reliable system for journal publishing that will not fail the scholarly community in the future.

2.11.4 E-Journal Publishing and Research Community

Many studies have (Massad, Brown and Tucker, 2011; Park, 2007; Ponte and Simon, 2011) reported that the advent of the internet and electronic publishing have changed the information seeking behavior of individuals, students, teachers and researchers in all fields of life. Niu et al. (2010) contributed to this discussion by studying academic scientist in the field of science, medicine and engineering of five universities in the United States. It was found that research activities have almost completely changed to electronic communication and the most widely used sources to back up research are journal literature, web pages, and personal communication, while the use of collaborative information sharing technology and social networking like listserv, blogs, wikis, multimedia etc. are still evolving. For many of the respondents, citation/bibliographic is top on the list of their primary search tool, followed by a general Web search engine. There is not much difference in scientist usage of Google search tool compared with their usage of the library homepage interface at the start of information gathering for their research, which indicate that the library is still relevant in the new changing atmosphere of scholarly communication. The study observed a considerable decrease in visitation to the physical library; however utilization of library

electronic resources is on the increase. Also, 36% of the respondents use alert service to keep up with current trends in their field. 85% of respondents still maintain print article collections, and approximately half of them maintain a bibliographic database. Majority of the respondents still fancy reading research materials in hard-copy and are not ready for a complete sweep of the traditional print way of doing things. Most of the changes happened in the information searching, retrieval and delivery, but when it comes to content reading, researchers still desire to do it the old way.

E-publishing is transforming the activities of the scientific research community in an unanticipated fashion. Authors are now more involved with the creation and perfection of their materials than the publishers. With e-publishing, the whole publishing cycle has to be conducted electronically. Authors are expected to submit their manuscript through the online submission system; editors are expected to use the peer review and manuscript management system to select referees from a database, forward the manuscript on to them and receive feedback.

Authors also have to conform to the formatting style of the journal they are sending their manuscript which is a constraint, especially if the manuscript is rejected and they have to try it with another journal which might require a total change in the text formatting and citations. Most of the task that was previously carried out by typesetters, art workshops and the publishers are now done by the authors themselves. This task has been minimized with most publishers of the same journals adopting the same systems thereby allowing quick *familiarity* with the system. Hence, with all its inherent benefit, e-publishing have definitely resulted in the research community mastering new skills (Ghani, Suparjoh and Hamid, 2008; Mabe, 2006).

2.11.5 E-Journal Publishing and the Publisher

The changes brought about by e-publishing are unprecedented in such a way that publishers have had to re-engineer their whole publishing process entirely. There are obvious cost savings for adopting e-only (Ware, 2005), but Johnson and Luther (2007) observed that small publishers are not well positioned financially to afford the technology or to take the risks inherent in the transition to electronic format. This may be the scenario unfolding in Malaysia where the majority of journal publishers are academic institutions and professional societies, who generally fall into the categories of academic publishers as opposed to professional publishers (Walsham, 2012). These Malaysian academic publishers are mostly subject specialists and may lack the expertise to transform their models or re-engineer their production systems to handle the new technique. Their normal day-to-day publishing task they have been used to is now being affected by the new *innovation*, and as such it becomes increasingly complex to discard the traditional method, as the volume of contents managed by publishers continues to expand and increasingly complex.

It has required training of editors, and staff, hiring people with required competencies, adopting new software applications, customer relationship management software, secure archiving and hosting etc. In addition, copyright payment structures are involved, together with the cost of scanning/coding/tagging of content, content hosting costs, crossref membership fees, DOI submission fees, and supplemental materials. Publishers also have to incur the costs of managing and continually developing their systems (Johnson and

Luther, 2007; Ling, Yaacob and Phang, 1996; Massad, Brown and Tucker, 2011). Electronic files have to be converted from its initial form to a common format, changing the structure, special characters, tables, figures and most especially citation and reference format.

In other words, the traditional method of publishing has evolved, but has not finally disappears and publishers find themselves doing things they have always done. However, with the emergence of new publishing models and journal management systems, it would be expected that the financial and technical task of e-publishing is considerably reduced and become effortless. If common systems become popularly adopted, the process of publishing would become relatively simple, easy and cost-effective. Hence, publishers would derive the full cost benefit of e-publishing when libraries cease running a parallel system.

2.11.6 E-Journal Publishing and the Library

Libraries are not unfamiliar with electronic materials thanks to the automation of library internal operations which were previously managed in a manual ways, such as acquisition, serial's control, circulation, searching reference databases, etc. The OPAC (Online Public Access Catalogue) were the first major development to bring the benefits of automation directly to the user. Therefore, in the context of e-journal the speed at which the libraries can shift to e-only or even dual format collections, depend to no small extent on publishers.

Libraries depend so much on publishers on which they subscribed. As long as these journal publishers are unable to enter the dual-format transition zone, it will be difficult for libraries to move out of it. In the age of e-publishing, shelving and space are no longer issues for the libraries. The main issue is to keep computer hardware and software up-to-

date. With prints, subscriptions were normally mailed to the library and processed, however with digital materials, libraries need to go online and check journal issues to ensure fulfillment of subscriptions and also confirm that access to each of the issues of each journal it subscribes to has been enabled and this is not always an easy task (Johnson and Luther, 2007; Ling, Yaacob and Phang, 1996; Mabe, 2006; Schauder, 1993; Schonfeld et al., 2004).

The increasing popularity of bulk purchasing and consortia arrangements means that the act of purchasing is much more complex. This is so because, rather than subscribe to titles one-by-one, a library now has to negotiate and implement licensing agreements for access to an array of titles with varying conditions of access and cost (Mabe, 2006). Moreover, library patrons now depend on libraries to provide training and assistance on using e-journals. The pressure has piled up on libraries as well, especially regarding to cost, training and staff development (Jange and Kademani, 1999).

2.11.7 E-Journal Publishing and the User

With electronic publishing, any user with access to the internet is privileged to explore and exploit the benefit of electronic journals. Unlike the printed journal, the user only has to cater for the means of access, storage and bandwidth, but not all users have the privilege of owning a personal computer or laptop with the appropriate connection and software (Ling, Yaacob and Phang, 1996; Mabe, 2006; Meadows, 1997).

Mobile studying that is encouraged by print, for researchers who study while travelling has also been eroded by the bulkiness of the e-resources although new portable devices like e-

reader, tablets and mobile phones have aided mobile studying but they further expanded the digital divide. More so, is the problem faced by users through limited internet connections or bandwidth that usually affect the display and downloads of e-materials. Even up till date, many communities still face lot of challenges in the electronic age.

The facts remains that some users still fancy print-journals and since most publishers have not done-away with print-journals -- embracing dual-mode, therefore users who desire for prints are still very much happy with the current practice. New *innovations* will demand new attitude and new ways of behavior. As such, researchers are also plying their craft differently than they did in the past as regards e-publishing. Massad, Brown and Tucker (2011) have observed that scientists now read twice as much article as they did thirty years ago due to e-publishing. However, most read less information from each article, while consulting a broader array of sources.

In the study of Brennan et al. (2002), print journal and e-journal were compared in terms of their perceived characteristics and expectation among faculty members through an open-ended questionnaire. The purpose was to show the impact of e-journals and other electronic resources on research libraries, scientist, publishers and organization. Result shows that there is no significance difference in the use and understanding of bibliographic databases, reading of e-journals with respect to research discipline. Most of the respondents are *familiar* with the use of bibliographic databases and are reading e-journals daily or weekly. They believed that peer-review process is an indicator of journal quality and the ability to navigate across different journal articles in various journals enable them to read more articles than in the print era. E-journal has changed their reading behavior as they now patronize the library less often and they relish the benefit of the service provided

by the automatic alerting system in identifying latest resources. E-journals have made life easier for faculty members and allow them to share data and information with colleagues across various institutions and geographical settings. E-journal publishing has also changed faculty teaching habit and results suggest that it *has more impact on research than teaching*.

2.11.8 E-Journal Publishing and Its Economics

There has been an ongoing discussion on the economics of scholarly publishing and alternative publishing models which has focused almost entirely on costs (Houghton et al., 2009; Jange and Kademani, 1999). Scholars have argued that the goal of scholarly publishing of the future should be centered on achieving the most cost-effective system, not (necessarily) the cheapest from the economic perspective. Regarding to this, Mabe (2006) cautioned that cost-reduction or cost-effectiveness of e-publishing might turn out to be an illusion. Most people are equating the physical printing and space to be the main cost in the traditional system, which has been eliminated thorough e-publishing, however this isn't so. Noteworthy, is the fact that *e does not equal free*. By going e-only, the variable cost that will probably be eliminated are the cost of paper, ink, printing, binding, postage, shipping (Johnson and Luther, 2007; Ling, Yaacob and Phang, 1996; Mabe, 2006; Massad, Brown and Tucker, 2011). However, most journals are still in the hybrid format and not yet completely e-only and even with e-only, some cost still remains unchanged. Besides, the work of publishing have moved further forward and has included experts from diverse disciplines; computer scientist, engineers, web designers, legal and policy experts and social media gurus (Chi, 2014).

For most printed journals the variable costs represent about 10–20% of the total. For electronic journals, although the variable costs are essentially eliminated, the change in technology and work processes (the need for electronic peer review systems, file transfer mechanisms, file workflow management, electronic fulfillment, and customer relationship management, electronic hosting, disaster recovery and specialized staff, for example) increase the fixed costs over those that applied in paper. Consequently any saving in costs of digital publication is largely eaten up by the costs of new activities. Savings potentially range from 0 – 10% at most. For such economies to apply across the board, all journals would have to be produced as e-only.

The fact remains, however, that most subscribers still wish to have the printed version along with the electronic one (Johnson and Luther, 2008; Mabe, 2006; Schonfeld et al., 2004). Consequently, publishers are bearing a dual cost structure, having to maintain dual mode with all the attributes of the traditional and new techniques. This now becomes even more expensive than the traditional print mode and this is unlikely to change unless print itself disappears. In essence many observers have noted that the potential economies of online journals will not be achieved if dual formats are sustained, advocating for e-only journals (Johnson and Luther, 2007; Mabe, 2006; Schonfeld et al., 2004). Apart from its benefit to users, the new process of journal publishing is also in line with the global mission to save the green resources of the earth which has been accepted worldwide (Dewiputri and Mohamad, 2011).

2.12 Studies on Technology Adoption

It would be expected that diffusion of technology innovations generally will lead to significant economic development. This appears not to be the case in many developing countries, instead the unfolding scenario has tended to increase regional inequalities and widen the disparities between social economic classes. It seems like only the powerful and the connected are gaining the benefit of innovative technologies.

For Malaysia to be an active participant in the emerging electronic world, information about Malaysian internet users' motivation and concerns with respect to online materials need to be known. As regards, Suki (2001) identifies factors that motivate the use of internet in Malaysia. The users' browsing or purchasing behavior through the internet was examined together with factors that affect online buying. The author found seven motivating factors that accounted for 61.402% of the total variance in internet usage. According to their level of importance, these factors are: *accessibility, reliability, convenience, distribution, socialization, searchability, and availability*. The author concluded that electronic transactions should provide a secure, reliable and trusted environment in order to attract and maintain existing users of the internet to shop online.

Transition from print to e-journals has been considerably slow in developing countries. A study on Bangladesh by Islam and Chowdhury (2006) observed that very few private universities and research libraries subscribe to e - journals in Bangladesh, noting that e-journals are not widely used in libraries and information centers in this country. The authors went further that even in cases where e-journals have been adopted, the whole transformation process have not been properly implemented. In the case investigated by

Islam and Chowdhury (2006), the barriers to the *adoption* or proper *implementation* of e-journal publishing are basically lack or low internet accessibility and electronic infrastructure and proper awareness knowledge on subscription process. However, the authors have hopes that the situation will be improved due to the efforts been made by the government and libraries to improve infrastructure, training and awareness programs and also to encourage and establish consortia or buying clubs which will not only ensure e-journals subscription at reduced a rate, but also give a suitable platform to share knowledge, conduct joint survey, and training programs

Rani and Zainab (2006) carried out a study that examines users perception about four electronic journals published in a hosting system called *EJUM (Electronic Journal of the University of Malaya)*. Results have it that about 50% of respondents rated the journals as *good*, while 20.6% rated it as *fair*. Most users employ the e - journals to support research and teaching needs. Most respondents actually stumbled upon the e-journals serendipitously as they were browsing the internet, while others found out from a conference paper, and some others leant about it from information in article. Moreover, about 41.8% of respondents access the e - journals via Google or Yahoo search panels. The next most selected option was from *specific journal hosting system* (21.8%), followed by from *my library web portal* and from *citation links found in another resource*. *Keywords* (28.9%) and *title* (24.3%) searches were chosen by a third of respondents respectively, 70% of respondents indicated preferring retrieving articles in *PDF* or *HTML*. Most respondents scan the abstracts first to check relevance before downloading the articles. Most respondents believed that electronic journals will co-exist with print journals (46.2%). The rest believed that electronic journals will replace the print journals (25.5%)

or will supplement it (25.5%). The features indicated as in order of importance based on respondents ratings are: *speedier submission to publication time, prompt publication time, e-mail alerts to currently published articles; personalized web pages; submission templates; and email alert of referee evaluations.* Due to realities resulting from the study pertaining to the visibility and accessibility of the hosting system, the developers of EJUM have applied strategies that allows Google crawler to harvest article contents of the e-journals making them accessible via Google scholar as the latter system can provide citation information for articles published in the journals.

There is a popular notion that the technology student's use must be multi-dimensional and consistent with the emerging social trends aligned with ubiquitous computing. Murphy (2011) studied early *iPad adoption* in tertiary institutions, the author observed that many people although considered *iPad* to be an e-text reader but some tertiary institutions are now using the *iPad* in a teaching and learning capacity. The study identify worldwide trends in *iPad adoption* and *use*, within the tertiary sector by developing six-point typology of post-PC devices : *Ubiquitous Access to Course and Subject Materials; Enrolment and Administration; Peer-to Peer and Peer-to-Educator collaboration; Content generation; Research/material yielding; Productivity enhancement.* Some universities see the *iPad* as a logical extension of their already extensive e-learning and blended learning program and some have reported extensively on their *adoption* of the *iPad* into the classroom, but appear to have concentrated purely on the delivery of course materials. The author likewise observed that universities are under pressure to provide the infrastructure for the use of PPDs

Scott et al. (2008) believed that understanding factors that could influence the *adoption* of new ideas is an important step in efficient dissemination of potential *innovations*. The authors studied the *adoption of Canadian Heart Health Kit (HHK)* amongst Canadian family physicians in the province of Alberta. The aim was to determine if the *attributes of the innovation* as well as contextual and situational factors are associated with physicians' intention and actual usage of the HHK kit; and also to determine if any contextual and situational factors are associated with individual or environmental barriers that prevent the *adoption of the HHK* among those physicians who do not plan to use the kit. Results show that use of the HHK was associated with *intention to use the HHK, relative advantage, and years of experience*. *Relative advantage* and the *observability* of the HHK benefits were also significantly associated with physicians' *intention to use the HHK*. Physicians working in solo medical practices reported experiencing more individual and environmental barriers to using the HHK. The results, thus suggests that the *attributes of an innovation, contextual factors, and situational factors* play important roles in *innovation diffusion/adoption*.

Zakaria and Rowland (2006) examined the prospects of publishing online scholarly journals amongst Malaysian scientists, managers of university presses and other not-for-profit publishers in Malaysia. They discussed from their findings that academics who published frequently in printed scholarly journals especially those who published in international journals and in English language have more positive attitudes towards *adoption of publishing online journals*. Respondents who made more use of ICT generally, and of electronic information resources in particular have more positive attitudes towards *adoption of publishing online scholarly journals*. They found no correlation between *age, gender, length of service in current job, ethnic group and attitude towards adoption*. The

authors also observed that there is a cultural trait among Malaysians, and particularly perhaps among younger, less experienced and less Westernized authors and these traits must be removed for effective *adoption* of online scholarly journals.

Moore and Benbasat (1991) embarked on an extensive scale development process to measure *perceptions of using an information technology innovation* by individuals working in an organization. The authors employed existing instruments and created new items to achieve their objectives. The result is a 34-item instrument, comprising seven scales, all with acceptable levels of reliability. The researchers tested the instrument in the context of *individual adoption* of PWS (personal work stations) in organization work. Results suggest that the best predictors for distinguishing the adopter categories are *relative advantage, result demonstrability, and visibility*. *Trialability* and *image* appear to be weak in their analysis. The researchers concluded that the perceptions of using an *innovation* do affect ones decision to adopt or reject it. Some of the scale items used to probe responses for RELATIVE ADVANTAGE are: *Using a PWS enables me to accomplish task more quickly; Using a PWS improves the quality of work I do; Using a PWS makes it easier to do my job; Using a PWS enhances my effectiveness on the job*. For COMPATIBILITY: *Using a PWS is compatible with all aspects of my work; Using a PWS fits into my work style; Using a PWS is completely compatible with my current situation*. For COMPLEXITY: *My interaction with PWS is clear and understandable; I believe that it is easy to get a PWS to do what I want to do; Overall, I believe that a PWS is easy to use; Learning to operate a PWS is easy for me*. For OBSERVABILITY: *In my organization, one sees PWS on many desks; PWS are not very visible in my organization; I have seen a PWS in use outside my firm; I have seen what others do using their PWS*. For

TRIALABILITY: *I have a great deal of opportunity to try various PWS applications; I know where I can go to satisfactorily try out various uses of PWS.*

Toole, Cha and González (2012) studied the *adoption of Twitter*: a new generation micro-blogging platform. The study focus on the accumulation of *Twitter* users in cities across the United States over a three year period and the researchers obtained some fascinating results. For *Early adopters* geographic location was a key factor to for the innovation to reach a critical mass, whereas at later stages the influence of mass media was more important. They identified the 408 locations in the United States where more than 1,000 users had signed up during the first three-and-a-half years of *Twitter*'s existence. The *Twitter* history of each of these places was distinctly different. The first hotspots were not a surprise, they are locations close to large universities and technology centers around the United States — places with a young, tech-savvy population likely to adopt social web applications early. Just as individuals adopters are characterized into groups depending on how early they adopt, cities were also classified into categories according to when they reached critical mass relative to the entire population. At the early stage, the conventional word-of-mouth recommendation within local networks mainly accounted for the growing user base, afterwards the *Twitter* 'virus' spread to major metropolitan areas, and later to suburban and rural areas. Besides, measurement of the mass media effect is an important aspect of the study. To measure the media influence, the researchers captured relevant news and search volumes from Google. They observed a direct correlation between the growth of *Twitter* and the number of search queries and news reports on Google. Other factors that contributed to the rapid growth of *Twitter* are *celebrities' endorsement*; *demonstrations* and *revolution campaign* with the media reporting on the increasing *adoption* of tweeting while they themselves, driving it. The study highlights that traditional

contagion and diffusions models need amendment if they are to capture processes of modern information networks. The researchers however cautioned that their model is best applied to goods and services that are very low cost, very easy to tell someone about, and display large positive externalities.

Cho, Hwang and Lee (2012) investigated the role of *opinion leaders* in the diffusion of new product. Using a social network theory and threshold model, the investigators tries to determine the best *opinion leaders* for marketing a product in terms of diffusion speed and maximum cumulative number of adopters. The assumption was based on five centralities to ascertain the best opinion leadership characteristics: sociality, send-nomination, rank-nomination, distance, and receive-nomination centralities. When sociality centrality is selected, the peak time is the earliest for *opinion leaders* as initial adopters, whereas it is latest when distance centrality is selected. When distance centrality is selected, it is the best for cumulative numbers of adopters and the second best is rank-nomination centrality. When receive nomination centrality are chosen, the result is worse than that of the random choice case. When the product is not risky to adopt, the most important people for marketing will be one who can send information to far-off places. When adopting the product is risky, rank-nomination and nomination-send centralities will become more efficient for innovation diffusion. The implication for marketing firm is that they must consider centrality when the proportion of initial *opinion leaders* is large enough, whereas when the proportion of *opinion leaders* is less, those who have longer nomination or more send-nominations should be the focus. Since the deviation is too large, when the proportion of initial adopters are small, so any send nomination centrality, rank-nomination centrality, or distance centrality may sometimes be superior. The study concludes that it is difficult to

ascertain that a specific centrality is the best when the percentage of initial *opinion leaders* is insufficient, however irrespective of the kind of centrality measure applied, the larger the average sociality, the faster the diffusion speed will be.

Meanwhile, Nabih, Bloem and Poiesz (1997) have lamented that most diffusion studies only consider the dichotomous *adoption/non-adoption* decision in a social system. That it is necessary to also look into *non-adoption* of the *innovation*. Most *innovation adoption* research focuses on the factors that enhance *innovation adoption* rather than the factors that inhibit this decision. Thus, in order for marketers to formulate effective marketing strategies for *innovations* based on a profound understanding of the drivers of *innovation adoption*, the antecedents of *non-adoption* have to be addressed. Potential adopters in a given social system may have actively decided to reject the *innovation*, they may have passively decided to reject, or they may have not progressed through certain stages of the *adoption process* yet (Nabih, Bloem and Poiesz, 1997). So therefore, it will be interesting to understand the rejection criteria of individuals of an innovation.

2.13 Theoretical Background of the Study

2.13.1 Diffusion of Innovation Theory

Although, several works have been done on innovation diffusion, however Everett Rogers (1962, 1976, 1983, 1999, and 2003) works have been the bedrock through which the research on *innovation diffusion* and *technology adoption* has swirled over the years. Therefore Rogers's *diffusion of innovation theory* is made the centerpiece of the framework employed in this study.

Theory has a place in quantitative, qualitative, and mixed methods research. Researchers use theory in a quantitative study to provide an explanation or prediction about the relationship among variables in the study. Thus, it is essential to have grounding in the nature and use of variables as they form research questions and hypotheses. A theory explains how and why the variables are related, acting as a bridge between or among the variables. Theory may be broad or narrow in scope, and researchers state their theories in several ways, such as a series of hypothesis, if-then logic statements or visual models. Using theories deductively, investigators advance them at the beginning of the study in the literature review (Creswell, 2009).

Rogers discussed the four elements in innovation diffusion: *The innovation itself; the communication channel; the nature of the social system; and time*. Table 2.1 represents different elements in innovation diffusion according to relevant literature. An *innovation* is any idea, practice, or project that is perceived as new by an individual or other unit of *adoption* (Rogers, 2003). The *innovation* might have been created long time ago, but if individuals perceive it as new in their social system, then it is considered an *innovation* to them. The *innovation* studied in this research is *e-publishing publishing* which has been extensively discussed in the previous section together with the *communication channel* through which the *innovation* is spread.

Communication in innovation diffusion is the process in which members of a social system create and share information with one another in order to reach a mutual understanding. This communication occurs through channels between sources and includes communication elements such as: the *innovation*, two individuals or other units of *adoption*, and a communication channel. Communication channels can be through: mass

media or interpersonal communication. While mass media channels can be a mass medium such as TV, radio, or newspaper, interpersonal channels on the other hand, consist of a two-way communication between two or more individuals (Rogers, 2003).

Table 2.1: Elements in Innovation Diffusion

Elements in innovation diffusion	Variables	Dependent variable that is explained	Reference sources
Perceptions about the attributes of the innovation	Relative advantage	Adoption of the innovation/ Rate of adoption of the innovation	(Brown 1981; Moore and Benbasat 1991; Premkumar, Ramamurthy and Nilakanta, 1994; Higa et al. 1997; Frambach and Schillewaert 2002; Hu et al. 2002; Wejnert 2002; Rogers 2003; Kim and Galliers 2004; Park 2007; Scott et al. 2008; Al-Ghaith, Sanzogni and Sandhu, 2010; Massad, Brown and Tucker, 2011; Deligiannaki and Ali 2011)
	Compatibility	Adoption / Rate of adoption / implementation of the innovation	(Brown 1981; Moore and Benbasat 1991; Premkumar, Ramamurthy and Nilakanta, 1994; Higa et al. 1997; Frambach and Schillewaert 2002; Rogers 2003; Kim and Galliers 2004; Park 2007; Al-Ghaith, Sanzogni and Sandhu, 2010)
	Complexity	Adoption / Rate of adoption / implementation of the innovation	(Brown 1981; Moore and Benbasat 1991 Premkumar, Ramamurthy and Nilakanta, 1994; Higa, Sheng et al. 1997; Rogers 2003; Kim and Galliers 2004; Zakaria and Rowland 2006; Park 2007; Al-Ghaith, Sanzogni and Sandhu, 2010)
	Observability	Adoption of the innovation	(Brown 1981; Moore and Benbasat 1991; Higa et al. 1997; Rogers 2003; Kim and Galliers 2004; Park 2007; Scott, Plotnikoff et al. 2008; Al-Ghaith, Sanzogni and Sandhu, 2010)
	Triability	Adoption of the innovation	(Brown 1981; Moore and Benbasat 1991; Higa et al. 1997; Rogers 2003; Kim and Galliers 2004; Park 2007; Scott, Plotnikoff et al. 2008; Al-Ghaith, Sanzogni and Sandhu, 2010)
Communication channels	Mass media Interpersonal Peer network	Innovativeness Level of awareness of / familiarity with the innovation Adoption / rate of adoption of the innovation /Implementation of the innovation	(Brown 1981; Rogers 2003; Singh 2004; Sanni et al 2014)

Nature of the social system	-Size of the organization -Age of the journal -Governance that support change -Opinion leaders -Decision makers -Change agents	Level of awareness of / familiarity with the innovation Adoption of the innovation Level of implementation of the innovation	(Mytinger 1968; Brown 1981; Higa et al. 1997; Mustonen-Ollila and Mustonen 1998; Chicochan, Lindley and Dunn, 2000; Wejnert 2002; Rogers 2003; Kim and Galliers 2004; Zakaria and Rowland 2006; Deligiannaki and Ali 2011)
Demographic variables	-Age -Years of experience -Field of expertise etc.	Innovativeness Level of awareness /familiarity with the innovation Adoption / implementation of the innovation	(Brown 1981; Premkumar, Ramamurthy and Nilakanta, 1994; Wejnert 2002; Rogers 2003; Zakaria and Rowland 2006)

The *internet communication* can be positioned as both a mass medium and interpersonal channel depending on the internet platform in which the communication is taken place. Interpersonal channels appears to be more powerful to create or change strong attitudes held by an individual and in the case of e-journal publishing, interpersonal communication would be more effective in spreading information about the *innovation* than mass media channels.

The *nature of the social system* is the nature of Malaysian journal publishing system unit. The social system is a set of interrelated units engaged in joint problem solving to accomplish a common goal (Rogers, 2003). The diffusion of any *innovation* takes place in the social system and it is influenced by the social structure of the social system. The nature of the social system affects individuals' awareness knowledge which is an influence to individual *innovativeness*.

The *time* element is represented by the e-journal publishing adopter categories which are discussed in the subsequent sections. All these four elements are very important in the

diffusion rate of any *innovation* and the impacts of these four elements in the *adoption* of e-journal publishing are examined and discussed in this research. The theoretical ramification of Rogers's model is profound. It provides useful insight into the different aspects of the diffusion process through the *Innovation Decision Process* (IDP): *Knowledge, Persuasion, Decision, Implementation* and *Confirmation*.

The newness characteristic of *innovation adoption* is more related to the first three steps: *knowledge, persuasion, and decision*. The *innovation-decision process* represents an information-seeking and information-processing activity, where an individual becomes motivated to reduce uncertainty about the *relative advantage* and disadvantages of the new *innovation*. These stages typically follow each other in a time-ordered manner.

Beside the Rogers Diffusion Model, series of well-known and new models have been applied to study innovation diffusion. Examples are: *Bass Diffusion model, Technology Acceptance Model (TAM), Social Learning Theory, Theory of Reasoned Action, Theory of Planned Behavior*, among others.

2.13.2 Diffusion of Innovation Research Methods

Research methods are procedures designed to exploit opportunities for measurement (Paisley, 1990). In most innovation diffusion research, this involves the collection of quantitative data. Alternatively, some innovation diffusion research employ panel studies, longitudinal studies, point-of adoption studies - using data gathered at the time respondents

adopt innovations, the use of archival records, quasi-experimental designs and integrated qualitative methods (Meyer, 2004; Rogers, 2003; Savery, 2005).

In social science, information & library science research, the main focus is what or who to be described or analyzed. Researchers study various elements, units or cases which include individual people, social roles, positions, and relationships. It can be a broad categories of social clusters such as families, organizations, and cities, as well as various social artifacts such as books, journals, periodicals, documents and even buildings (Singleton Jr and Bruce, 1999).

In doing this, researchers utilize different approaches to collect and analyze data. Islam and Chowdhury (2006) gathered their data through questionnaires, interviews and observations. Survey questionnaires were used by Al-Ghaith, Sanzogni and Sandhu (2010) to investigate factors that influence adoption and usage of e-service in Saudi Arabia. Johnson and Luther (2007) have conducted interviews amongst academic librarians and journal publishers concerning their views on the transition from print to e-publishing. Kim and Galliers (2004) develops a model to assess the diffusion of web based shopping system WBSS. Factors that impact WBSS diffusion are identified and analyzed as the basis for empirical testing.

Higa et al. (1997) constructed a factor model for organizational adoption decision making and derive research hypotheses on organizational innovation adoption and diffusion for subsequent studies. There are many studies on individuals and also on organizations. Frambach and Schillewaert (2002) studied innovation adoption in an organizational context, two types of organizational adoption decisions was identified, the decision made

by an organization to adopt an innovation and the decision made by an individual within an organization to make use of an innovation.

Creswell (2009) observed that in the scientific method, the accepted approach to research by post-positivists is for an individual to begin with a theory, collects data that either supports or refutes the theory, and then makes necessary revisions before additional tests are made. The methodology employed is informed and guided by the peculiarity of the research problem presented in this work and the category of participants. The procedure is quantitative research method (non-experimental design using survey method). The purpose of the research is to identify factors that influence e-journal publishing *adoption* or to understand the best predictors of e-journal publishing *adoption*. For this kind of endeavor, noted Creswell (2009), a quantitative approach is the best.

Certain types of social research problems call for specific approaches. For example, if the problem calls for (a) the identification of factors that influence an outcome, (b) the utility of an intervention, or (c) understanding the best predictors of outcomes, then a quantitative approach is the best. It is also the best approach to use to test a theory or explanation (Creswell 2009).

The collection of quantitative data is the methodology employed in this study on the adoption of e-publishing amongst Malaysian journal publishers. The research questions is answered by identifying factors that influence e-journal publishing adoption through a questionnaire that was administered to a population sample of Chief Editors or managers of Malaysian journals. The scale items in the questionnaire were formulated according to the framework created for the research. The formation and strategy is to collect useful data

from the questionnaire and apply it in testing elements from Rogers's theory of innovation diffusion. In similitude with physics; the idea is often to find the smaller particle to explain larger structures and therefore the rationale for applying survey research method is to be able to generalize from a sample to a population so that the researcher can make inferences about some attribute of the population studied.

The current study has adopted a quantitative research method to objectively test the Innovation Diffusion Model on the adoption of e-publishing amongst Malaysian journal publishers. The study examines the relationship amongst a set of variables in the Innovation Diffusion Model. The variables are measured on a newly created e-journal publishing adoption survey instrument, so that the data collected can be analyzed using statistical procedures. The main aim is to test the theory deductively, build protection against bias and to be able to generalize from sample to population.

This study on *e-journal publishing adoption* has developed relevant, true statements in the survey questionnaire, ones that have serve to explain the behavior and decision making of Malaysian journal publishers. The study advanced the relationship amongst a set of variables formed in the research framework and poses them in terms of research question and hypothesis. To facilitate accurate operationalization of variables in the survey instrument, Conklin (2006) noted that existing constructs, instruments and measures should be examined for potential use. But if the research is specific to topics not previously directly studied in the same manner, it would be better to create new constructs and instruments. Accordingly, the researcher has created a new instrument for e-journal publishing adoption research.

The approach to exploiting scales item and the operationalization of constructs to solicit responses from respondents in innovation diffusion studies sometimes differs and it is dependent upon the kind of innovation been studied (Arts, Frambach and Bijmolt, 2011; Fennell, 1984; Frambach and Schillewaert, 2002; Kim and Galliers, 2004; Mahler and Rogers, 1999; Moore and Benbasat, 1991; Mytinger, 1968; Rogers, 2003; Singh, 2004; Zaltman, Duncan and Holbek, 1973). Irrespective of the segment of which an organization belongs, the innovation been studied and the unit of adoption, these scale items that has been previously created and validated can be adopted and revised to suit a specific innovation and any specified unit of adoption as done in this study.

2.13.3 The Nature of the Social System

There are four important elements in the diffusion of innovations: The innovation itself, the communication channels used to spread information about the innovation, the nature of the social system and time. The innovation studied in this research is e-journal publishing which has been extensively discussed in the previous section along with the communication channels that is associated with spreading the innovation. The nature of the social system is the third element in innovation diffusion and the social system that is discussed is the scholarly journal publishing system.

By most accounts, the decision making process towards accepting or rejecting a new idea is linked to the culture, norms and values of the social system of which the *innovation* is been introduced. Culture and norms are concept which represents the shared beliefs and symbols of a group of individuals in their social system (McDonald, 2000). They provide the very foundation for human communication and interaction and likewise a source of

domination (Deligiannaki and Ali, 2011). The norms and values of the journal publishing system may have a great impact on their decision and attitudes towards any *innovation*.

Most Malaysian journal publishers are by not-for-profit organizations mostly affiliate of government funded universities. Majority of the practitioners in the journal publishing units are scholars who are the producers and managers of human knowledge with scientific rules and standards values they hold dearest. Knowledge advancement is their aim, prestige is what they look for, discipline their watchword and career promotion their gain.

It is acceptable that the unit of analysis in this study agreed to the definition of an organization – defined as a stable system of individuals who work together to achieve common goals through a hierarchy of ranks and a division of labor. Additionally, an organization should have a structure which is obtainable through: predetermined goals, prescribed roles, authority structure, rules, regulations, and informal patterns. In this undertaken, it is considered that scholarly journal publishing system fit to the defined structure of an organization.

Innovation diffusion research is conducted with the individual, group, organization or national politics as the unit of adoption (Arts, Frambach and Bijmolt, 2011; Moore and Benbasat, 1991; Wejnert, 2002). In the case reported here, the organization is the unit of analysis or unit of adoption with individual characteristics also reported. Swanson (1994) categorizes innovation in organization into three distinct types: an innovation that occurs within the information system functions; at the level of individual user or work group; and at the organization level. The focus here is innovation at the level of organization.

Rogers (2003) explains that innovations that requires an individual-optional innovation-decision are generally adopted more rapidly than when an innovation is adopted by an organization. The more people involved in making an innovation - decision, the slower the rate of adoption. This might also explains the rate of adoption of e-journal publishing amongst Malaysian journal publishers.

Indeed, the journal publishing system in Malaysia does not function per se like a typical self-sustainable organization, because few journals are produced by professional societies and multinational companies. Majority of Malaysian journals are not-for-profit and most are under the management and financing of government universities. The journal publishing sector is quite different from that of an organization, having different principles, different norms and altogether different standards of practice. This is why the candidate has adjusted and differentiates the variables that were included in the research framework to suit the unit of adopters and innovation characteristics under study.

Apart from the culture, norms and values that influence behavior in organization decision making, *motivation* is another important factor that can stimulate, drive and sustain human behavior in a particular social system. According to Glor (2001) motivation is an idea normally used to illuminate changes in behavior in the workplace, in addition to the degree of the effort put into the behavior and likewise the direction and quality of it. Variables affecting motivations can be: personality traits, work environment, job, external environment, career setting, financial incentive et cetera. Journal publishers may not adopt e-journal publishing if there is not any motivation in doing so and it is therefore assumed that motivation may affect the *rate of adoption* of e-publishing amongst Malaysian journal publishers.

An innovation presents itself to members of a particular social system as either a *challenge* or an *opportunity* or both (Glor, 2001). The inherent challenges presented by an innovation could be refer to as *risk*. Challenges and opportunities come in many forms. At the personal level, challenges are found in the amount of money, time, work and psychic energy that would be dissipated or received to implement an innovation. There might be profits and losses which might be personal, involving loss of power, money, status, dignity and respect, or they can be public, involving failure, career consequences, et cetera (Glor, 2001).

The degree of *change* as further noted by Glor (2001) involved in the *innovation* also presents a challenge to employees. Change, especially those that affects an employee personally, is often disruptive. Hence, in the context of this research, it is believed that there is some kind of risk that comes with *early adoption* of e-journal publishing such as financial, technical, operation risk et cetera and that might have affected the *rate of adoption* of e-publishing amongst journal publishers.

General risk tolerance relates to the individual reaction to *risk* in general and is correlated to adopter categories (Conklin, 2006) as *Innovators* are more willing to take greater risk than the rest of the adopter categories (Rogers, 2003). By reducing the risks associated with a particular innovation, its adoption can be speed up (Frambach and Schillewaert, 2002).

For any new *innovation* been introduced to a social system, there is also an *uncertainty* aspect surrounding it at the initial stage. Uncertainty may create a delay in *innovation* diffusion. It refers to the lack of clarity or understanding of how an *innovation* functions,

and of the internal and external forces at work in a social system. If an *innovation* is associated with a high level of *uncertainty*, it will record a slow *adoption*.

Rogers (2003) distinguishes three types of uncertainties: Technical, financial and social uncertainties. *Technical uncertainty* represents the extent to which it is difficult to determine how reliable an *innovation* is and how well it will function. *Financial uncertainty* on the other hand is the extent to which there is difficulty predicting whether the *innovation* has financial benefit. *Social uncertainty* refers to the extent to which in the immediate environment of potential adopters, there may exist some conflict with regard to the procurement and *implementation* of an *innovation*.

As highlighted, uncertainties as regards the technicality of the *innovation* might be a key variable in understanding scholarly journal publisher's *adoption* decision with respect to the Malaysian context because scholars are keen on reward in form of professional advancement and prestige which comes from publication productivity and not financial benefit. Similarly, *social uncertainty* may have little impact on their decision to adopt an *innovation* due to the peculiarity of their discipline base. Meanwhile, an *innovation* can also experience high rate of acceptance if it specifically target a user group in a particular social system (Frambach and Schillewaert, 2002). Focusing primarily on potential adopters that in many ways will benefit from adopting the *innovation* can definitely be a good strategy that influences *adoption*.

To this end, it is clear that the nature of the social system can influence the *adoption* decision of any unit of analysis. Although diffusion variables may be analyzed independently for the sake of clarity, but in reality they have an interrelated effects on the overall process of diffusion. The interaction between variables can be either potentiating or

mitigating, and the relative strength and influence of each variable may change with a new unit of *innovation* been studied (Wejnert, 2002). Therefore the candidate has been able to identify the most important variables for the explanation of the *adoption* of e-journal publishing amongst Malaysian journal publishers.

2.13.4 Perceptions about the Five Attributes of Innovation

Given a set of innovation diffusion across time in a particular social system, the innovations are likely to possess five attributes: *Relative advantage, compatibility, complexity, observability* and *trialability*.

It is the receivers' perceptions of the attributes of innovations, not the attributes as classified by experts or change agent, that affect their rate of adoption. Like beauty, innovations attributes exist only in the eye of the beholder. And it is the beholder's perceptions that influence the beholder's behavior (Rogers, 2003).

To examine and measure these five attributes in innovation diffusion research, researchers either conduct an interview or create a survey questionnaire to collect valuable information from the element or character been studied. In the latter, researchers create scale items to identify and measure these attributes after confirming the reliability and validity of the scale by statistical methods. Therefore, a lot of studies have confirmed the relevance of these 5 attributes in innovation diffusion, especially the attribute of *relative advantage, compatibility* and *complexity*. while some studies like Moore and Benbasat (1991) have added more attributes to the list; others like Pankratz, Hallfors and Cho (2002) have merged some attributes as one.

The way each attribute is interpreted is relatively dependent on the kind of innovation being studied as explained by Rogers (2003) when he discussed the element of an innovation. Deligiannaki and Ali (2011) argued that, *relative advantage* alone does not guarantee the acceptance of technology or new innovation. There have been reported cases where technologies with a clear *relative advantage* have failed, sometimes because they do not have the expected impact on the targeted market, some examples given are: electric cars, 3D televisions, iridium telephone by Motorola to mention just a few.

Moore and Benbasat (1991) have noticed that in some diffusion studies, the scale measuring *compatibility* tends to be confused with *relative advantage*. So in order to resolve this, scales measuring *compatibility* must not be making references to the needs of the potential adopter. Similarly, Pankratz, Hallfors and Cho (2002) found that attributes of *compatibility* and *relative advantage* appear to be one construct in the study of the diffusion of a federal drug prevention policy (principles of effectiveness).

According to Pankratz, Hallfors and Cho (2002) *observability* has not always been significantly associated with *adoption* in health education, but *observability* was however found to be an important predictor of *adoption* in a federal drug prevention policy. The authors explained that when respondents perceived that teachers and parents would notice changes upon implementing the *innovation*, they were more likely to fully adopt it. It was assumed by Pankratz, Hallfors and Cho (2002) that *trialability* as a variable is not often significant in health education research and the authors did not find *trialability* to be a significant predictor for the *adoption* of a federal drug prevention policy (principles of

effectiveness). The reason as explained by the authors is that it is a difficult construct to measure, particularly when assessing a process. Likewise *trialability* was found by Moore and Benbasat (1991) to be weaker than other attributes in their study of *adoption* of PWS (personal workstations) by employees. The researchers therefore admonish that studies investigating consumer behavior should consider this factor but studies investigating organization should drop this scale rather than trying to measure it.

Moore and Benbasat (1991) included some other variables as perception of adopting an innovation. The researchers identified *perceived voluntariness* to be measuring variables of freedom of choice. The authors felt that the issue of compulsory versus voluntary *adoption* was significant. It refers to the degree to which the use of the *innovation* is perceived as being voluntary. *Image*: the degree to which the use of an *innovation* enhances ones image or status within the social system; *Measurability*: the degree to which the benefits of using the *innovation* are measurable. Rogers (2003) has also contended that the desire to gain image or social status is one of the most important motivations to adopt an *innovation* and the author has included *image* as an aspect of *relative advantage*, however Moore and Benbasat (1991) have distinctly measured the construct of *relative advantage* and *image* separately.

Most studies have found *relative advantage* and *compatibility* to be consistently and positively correlated with *innovation adoption* and negative correlation has been reported for *complexity* (Al-Ghaith, Sanzogni and Sandhu, 2010; Rogers, 2003; Tornatzky and Klein, 1982), however, the significance of the last two attributes of *observability* and *trialability* have been found to be inconsistent in most studies. As Hausman and Stock

(2003) documented in their study of EDI adoption, it is still not clear whether prior experience with technology *innovation* increases the probability of future *adoptions* of these *innovations*.

Pankratz, Hallfors and Cho (2002) examined the perception of the diffusion of a federal drug prevention policy amongst Safe and Drug Free Schools (SDFS) coordinators. Three underlying constructs representing *relative advantage/compatibility*, *complexity* and *observability* were revealed through *factor analysis*. The constructs found were internally consistent with a Cronbach's alpha ranging from a high of 0.89 for *relative advantage/compatibility* to a low of 0.71 for *observability*. Each of these constructs was correlated with a district's *adoption* of the policy in predictable ways. The highest mean scores were found for items assessing *relative advantage/compatibility*. Moderate mean scores were found for the items assessing *complexity* and *observability*. The study concludes that, the construct of *relative advantage/compatibility* appears to be especially useful in assessing policy adoption.

Perceived *complexity* was found to be the most significantly related factor affecting e-service *adoption* in Saudi Arabia, followed in turn by *privacy* and *compatibility*. *Quality* of the internet and its *relative advantage* also had a notable effect on e-service usage and *adoption* in Saudi Arabia (Al-Ghaith, Sanzogni and Sandhu, 2010). However, the study did not address the issue of gender differences in *adoption* rate bearing in mind the conservative nature of the Saudi society. The study did not give a report on whether there are significant differences between the behavior of men and women on most of the variables measured. The main reason for e-service *adoption* in Saudi Arabia is that Saudi

people have a good income level and people with more income are more likely to adopt or use new technology *innovations*.

Moore and Benbasat (1991) explained the concept of perception by making a distinction between individual perception of *innovation* and individual *adoption* of it. The authors specifically noted that *innovations* diffuse because of the cumulative decisions of individuals to adopt them and that, it is not the individual perceptions of the *innovation* itself that impact on the decision to adopt, but rather their perceptions about *using* the *innovation*. In other words, individuals or organization perception about what impact, if the *innovation* is put into use is the key factor.

All these elements may be causes of *innovation* and some others may be involved with *innovation* in cycles of reciprocal causality through time. Researchers also found that *adoption* or rejection may be caused by external factors

Another important concept of an *innovation* is the concept of *reinvention*. *Reinvention* is important because it tells us that no product or process can rest on its laurels: continuous improvement is the key to spreading an *innovation* (Robinson, 2009). The guy who invented the 'can container' forgot to provide the opener; a separate guy invented the opener. Tim Berners Lee was known as the innovator of the WWW but he did not put contents on it, other guys did. So an innovation is never a finished article, it's always a continuous process. Khomeni uses cassette tapes, modern revolutionaries' uses Facebook and twitter. Online music stores of apple closes business for music shops and cassette stores. The foremost photographic company Kodak became a casualty to the digital revolution because it failed to adopt digital innovation and later filed for bankruptcy in

January 2012. Yahoo was the biggest Internet company at a time. Samsung and Apple are now the leaders in Smartphones & iPhones business. Who might have predicted that Nokia and Sony Erikson will be playing catch-up in the Smartphones & iPhones race?

2.13.5 Adopter Categories and the S-Shaped Diffusion Curve

Provided the overall effect of external influences are held constant across the unit of *adoption*, variations among adopters in time of *adoption* of a specific *innovation* should be highly dependent on individual characteristics or individual threshold of *adoption* (Wejnert, 2002). This variation in *adoption* time is used in the classification of adopter categories which should result in a *bell shape* diffusion curve.

Rogers (2003) explained that the normal frequency distribution has several characteristics that are useful in classifying adopters. One characteristic or parameter is the mean (x) or average of the individual in the system. Another parameter of a distribution is its standard deviation (sd) a measure of dispersion or variation about the mean which indicates the average amount of variance from the mean for a sampled respondent. These two basic statistics, the mean and standard deviation are used to divide a normal adopter distribution into five categories (Figure 2.5).

In essence, Rogers (2003) uses *innovativeness*, which is operationalized as *time of adoption*, to determine the adopter categories. The non-cumulative adopter distribution is assumed to take the form of a *bell shaped* curve (Fig 2.4), indicating the percentage of *Innovators*, *Early adopters*, *Early majority*, *Late adopters* and *Laggards*. Therefore, using the two basic statistical parameters of the normal adopter distribution: mean time of adoption (t) and its standard deviation (sd) as a method of segmentation will result in the

five adopter categories (Agarwal et al., 1998; Mahajan, Muller and Srivastava,1990; Rogers, 2003).

Vertical lines are drawn to mark off the standard deviation on either side of the mean so that the normal curve is divided into categories with a standardize percentage of respondents in each category. Figure 2.4 shows the normal frequency distribution divided into five categories and the approximate percentage of individuals included in each are located on the normal adopter distribution in the figure.

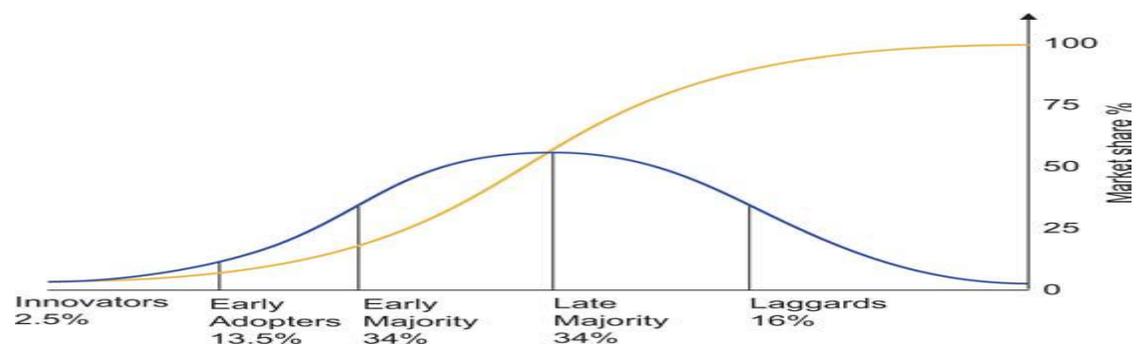


Figure 2.4: Adopter Categories (Rogers, 2003)

The area lying to the left of the mean time of adoption minus two standard deviation includes the first 2.5% of the individuals in a system to adopt an innovation, the *Innovators*. The next 13.5% are included in the area between the mean minus one standard deviation and the mean minus two standard deviation; these are the *Early adopters*. The next 34% of the adopters called *Early majority* are included in the area between the mean date of adoption and the mean minus one standard deviation. Between the mean and one standard deviation to the right of the mean are the next 34% to adopt who are the *Late majority*. The last 16% to adopt are refers to as the *Laggards*.

The benefit of Roger's categorization scheme is that it is not difficult to apply, because it offers mutually exclusive and exhaustive standardized categories, which means that results can be compared, repeated, and extrapolated. Also due to the assumption that fundamental diffusion curve is normal, continued acceptance of the innovation is predictable and is linked to the adopter categories (Mahajan, Muller and Srivastava, 1990).

Rogers's diffusion model is founded on the classical *bell shaped* normal distribution curve, where the curve represents the frequency of adopters over time. The result would be an S-curve portraying diffusion over time if the cumulative number of adopters is plotted. Wright and Charlett (1995) explained that the adoption curve is normally distributed because of an awareness effect due to individual personal interaction within the social system. As the number of adopters in the system increases so does the level of interpersonal influence on non-adopters. The result of this influence on adoptions is held to follow a binomial expansion, a mathematical function that follows a normal curve when plotted over a series of successive periods.

Many human traits are normally distributed, whether the trait is a physical characteristic, such as weight or height, or a behavioral trait such as intelligence or the learning of information. Hence, a variable such as innovativeness might be expected to be normally distributed (Rogers, 1983).

However, Brown (1981) presented another view of the S-shaped diffusion curve. The author explained that there are several alternative explanations for the flatness of the S-curves left tail representing the period prior to the onset of some sort of bandwagon effect. The *adoption* perspective would attribute this to *innovativeness* characteristics or resistance

to *adoption*. The market and infrastructural perspective would attribute this to propagator and diffusion agency strategies. Researchers on the diffusion of technology *innovations* among firms would cite profitability conditions as an explanation. Finally the economic historians would argue that the slow initial rate of diffusion reflects the time needed to improve the *innovation* and adapt it to a variety of potential markets or users, as well as delays and caution in *adoption* in expectation of such improvements.

A similar set of explanation might be employed to account for the bandwagon effect itself or differences in the rates of diffusion of different *innovations*. That is, the *adoption* perspective might attribute the bandwagon effect to a lowering of resistance to *adoption* through demonstrations effect, social interactions and other communications, and the variance in diffusion rates to different resistance level for each *innovation*

The ability to characterize adopters of new products and services has theoretical and practical relevance and the main reason why the diffusion literature has proliferated in the field of marketing is due to the reported high failure rate of new products and the consequent need to improve the marketing strategy and decisions concerned with the introduction and diffusion of such products (Agarwal et al., 1998; Chao, Reid and Mavondo, 2012; Hoffmann and Soye, 2010; Wright and Charlett, 1995).

As researchers adopted Rogers model in various field of research they discovered some drawbacks. For example, Wright and Charlett (1995) argued that in marketing, consumers are *Innovators* not because of some underlying general trait of *innovativeness*, but merely because they are one of the first 2.5% of first purchasers, regardless of their demographic,

socio-economic, or personality characteristics, and regardless of their *adoption* behavior in other circumstances. A similar argument was put forward by Peterson (1973) and Mahajan, Muller and Srivastava (1990) who noted that despite its theoretical appeal, Roger's assumption that all (or most) new products follow a normal distribution diffusion pattern is questionable, that, in spite of the method's simplicity, Rogers provides no empirical or analytical justification of why the size of the adopter categories should be the same for all new products. That is, why should *Innovators* constitute the first 2.5% of adopters and why should *Laggards* be the last 16% of adopters? (Mahajan, Muller and Srivastava, 1990)

This reality was also acknowledged by Rogers (2003) - that adopter categories may be product specific, but it stop short of providing methods for predicting the variation in these five adopter categories across *innovation* types. Rogers's generalizations have been used as the basis of a prescriptive guideline for speeding up the diffusion process by using *differential communications programs to reach Innovators versus Later adopters* and Hawkins et al (1989) has described this strategy as a moving target market approach. In this approach, once overall target market for the *innovation* or new product is selected, the firm should specifically target the *Innovators* and *Early adopters* in this market. As the product gains acceptance, the focus of attention should shift to the *Early* and *Late majority*, who are now more disposed to adopt the *innovation* because of word of mouth reports from *Innovators* and *Early adopters*. But the question is what happens in markets where interpersonal communications are very limited, such as markets that receive little word-of-mouth where individual influence does not occur?

Wright and Charlett (1995) further noted that as the model is based on a distribution about the *mean time of adoption*, calculation of the mean and standard deviation and the identification of adopter categories cannot take place until the process of diffusion is complete. Thus, the marketer cannot predict who the *Innovators* in a given market are, or what characteristics they are going to have. From the author's point of view, once the process of diffusion is complete, it will be hard to see why the classification of adopters into groups would still be useful. Wright and Charlett (1995) therefore concluded that both Rogers's approach and the Bass model combine the effect of innovation from external influences with the effect of interpersonal communication to model a sigmoid cumulative adoption curve.

Neither Rogers nor Bass provides a method of modeling diffusion of *adoption* in markets where interpersonal influence is absent. Wright and Charlett (1995) argued that Rogers's approach suffers from empirical evidence that membership of the *innovator* and *early adopter* categories cannot be reliably predicted. Although Rogers attempted to identify common traits for each adopter category, the empirical evidence has demonstrated that there is no consistent link between the trait of *innovativeness* and other personality characteristics. For example, late adopters are characterized as being more dogmatic, but while 17 studies have found a negative correlation between dogmatism and *innovativeness*, another 19 studies have found no relationship between these two variables (Rogers 1983). Similarly, while 203 studies have found a positive correlation between *innovativeness* and years of education, a further 72 studies have found no such relationship (Rogers (1983) cited in Wright and Charlett (1995)). Wright and Charlett (1995) therefore, concluded that

generalizations on which the adopter profiles are based do not hold in different industries, and an individual may be an innovator for one product category but a laggard for another.

A similar observation was reported in Brennan et al. (2002) study of electronic journal *adoption* by faculties. Some of the respondents were conversant with the use of multimedia technologies; they however lack proper awareness about different aspects of electronic journal publishing clusters. This makes them to be in the class of *Innovators* or *Early adopters* for one product but a different class of adopters for another product.

Mahajan, Muller and Srivastava (1990) further argued that amongst all the diffusion model used in marketing, Bass model is the one that clearly considers the communication process in innovation diffusion. The authors suggested that since the Bass model yields a category structure in which the size of adopter categories is not assumed to be identical for all innovations, therefore it should be considered for adopter categorization. That is, categories reflect the groupings of adopters that are unique to a particular innovation and are not based on the amount of time-series diffusion data available for clustering the adopters.

Systematic differences among Rogers' adopter categories was analyzed by Agarwal et al. (1998). The authors observed that while empirical support has been established for some generalizations in Rogers's diffusion theory, others have not produced expected results, especially in the field of *IT innovations*. Generalizations in Rogers's diffusion theory focus primarily on demographic differences among the adopter categories and less on their beliefs and attitudes. The authors then draw upon the Theory of Planned Behavior (TPB),

an extension of the Theory of Reasoned Action together with Rogers's diffusion theory to analyze differences between Rogers's adopter categories by studying the adoption of a web registration system amongst university students. The authors divided the adopters basically into *Early adopters* and *Late adopters*. The former a representation of Rogers's two categories of *Innovators and Early adopters* while the later, a representation of Rogers *Early majority, Late majority and Laggards*.

The authors justify their two classification which is mainly based on the nature of the innovation been studied and the time in which the data was collected which was few weeks after the launch of the innovation. They found that *Early adopters* exhibited significantly greater personal *innovativeness* in the domain of IT and significantly more positive attitudes toward use of the *IT innovation* than *Late adopters*.

Notwithstanding its limitations, Rogers's diffusion model has been well grounded in *innovation diffusion, technology adoption* and marketing literature.

2.13.6 Innovativeness

There has been no precise definition or real consensus on the meaning, interpretation or measurement of *innovativeness*. Innovation diffusion research wishes to measure *innovativeness* so that individuals or other *adoption* unit can be assigned to a single adopter category (e.g *innovator, early adopter, early majority, late majority, or laggard*) or in order to determine relationships between the measure of *innovativeness* and other variables (Agarwal et al., 1998; Goldsmith and Hofacker, 1991; Mahajan, Muller and Srivastava, 1990; Roehrich, Valette-Florence and Ferrandi, 2003).

Rogers (2003) defined *innovativeness* as the degree at which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of his/her social system. Some authors have described it as early purchase of a new product (Cestre, 1996) or a tendency to be attracted by new products (Steenkamp, Hofstede, and Wedel, 1999). It has been coined *personal innovativeness* which refers to an individual tendency to adopt an innovation within a product class, independent of peer network influence (Frambach and Schillewaert, 2002) or *consumer innovativeness* (Goldsmith and Hofacker, 1991; Midgley and Dowling, 1978; Muha, 1974; Summers, 1972) which represent the proportion of an active group of satisfied early purchasers who have the tendency to buy new products more often and more quickly than other members of their social system.

It has also been defined as *product innovativeness*, or *possession of newness* which refers to the degree of newness of a product an individual or a certain unit of adoption possessed (Danneels and Kleinschmidt, 2001). *Innovativeness* has been explained in relation to *firm innovativeness*, or *creation of newness* which refers to a firm's ability to develop and launch new products at a fast rate (Hurley and Hult, 1998). Some researchers have considered it a *de – factor* trait which affects individual's decision making on new products since an essential aspect of resistance is an individual's general propensity to move, change and adopt new ideas. Meanwhile, Massad, Brown and Tucker (2011) have explained that *self-efficacy* is the term that predicts whether an individual would be more or less likely to adopt new technology early. *Self-efficacy* refers to an individual's belief in his own capabilities to organize and execute a course of action (Bandura, 1977) and this is also related to *innovativeness* and whether this is domain or product specific is still subject of discourse.

There is no consensus in the definition of innovativeness. From “inherent novelty seeking,” which may have consequences other than new product buying behavior, to “predisposition to buy new products,” which defines the concept by its main consequence, through “independence in innovative decisions,” which could not be empirically validated, various authors have given different views of the concept. There is no consensus either on the roots of innovativeness. Of the need for stimulation, novelty seeking, independence in judgment and the need for uniqueness, which are true antecedents of innovativeness? Analysis of existing innovativeness scales may provide insights into these questions (Roehrich, 2004).

It might also be argued that a firm who possess the ability to develop and launch a new product might also likely to have the tendency and the ability to buy new product more often and more quickly than other firms, thereby making *innovativeness* a general concept. In any case, the current study is interested in measuring journal publisher’s *innovativeness*, conceptualized as the predisposition to develop and launch a new product and their ability to buy new product more often and more quickly than other people in their social system.

It is expected that individual’s personal attitudes towards technology *innovations* in general, are essential to organization *innovativeness*. New information and communication technologies like the e-mail service, social networking sites, smart phones, iPads, iPhones et cetera have an impact on human social existence and people’s attitudes towards those technologies may reflect their *innovativeness* which can play a part at the organization level. It can be expected that journal publishers who are innovative to technology product in generally, will be enthusiastic to adopting new publishing technologies or platforms.

The characteristics of participant's *innovativeness* as it relate to the *familiarity* with and the *adoption* of e-journal publishing is investigated in this research. This study seeks to know if the perception of been an innovator and visionary in general circumstances is extended to the *adoption* of e-journal publishing.

Researchers generally use one of three strategies: *time-of-adoption*, the cross-sectional method or some form of self-report to measure *innovativeness* (Kohn and Jacoby (1973) cited in Goldsmith and Hofacker (1991)). The *time-of-adoption* approach is achieved by taking a measure of the time since introduction of the *innovation* until *adoption*. The *time of adoption* can also be used to assign unit of *adoption* to the adopter categories. This approach was however criticized by Goldsmith and Hofacker (1991) as follows:

The basic theoretical criticism is that time-of-adoption is a temporal concept that equates time-of-adoption with the construct innovativeness, but bears no isomorphic relationship with this latent constructs it supposed to operationalize (Goldsmith and Hofacker, 1991).

The cross-sectional method on the other hand seeks to study *innovativeness* by determining how many of a pre-specified list of new products a particular individual has purchased at the time of the survey. Another approach to *cross-sectional method* is to ask participants to select 1 brand out of a set of brand alternatives which included an innovative brand in each of varying product categories (Kohn and Jacoby, 1973). By and large, this approach, however, would seem to suffer from many of the criticisms directed toward *time-of-adoption* and would be difficult to develop and cumbersome to administer. One may ask, which product categories would be selected? Which products in these categories and how the respondents accurately recall the *time of adoption* of previously adopted products. How

will the researcher determines which products are new would also present difficult problems for researchers and render the resulting measure of questionable value.

Furthermore, Goldsmith and Hofacker (1991) and Roehrich (2004) have noted that each of these three methods has its theoretical and methodological strengths and weakness, and observed a lack of a universally accepted measure of *innovativeness* which has hampered diffusion research in many ways. Accordingly, Goldsmith and Hofacker (1991) proposed and developed a 6 items *self-report scale* to measure domain specific consumer innovativeness which is considered to be highly reliable and valid and can be easily applied within a specific domain of interest familiar to the consumer.

2.13.7 Adoption and Implementation

Adoption of a new product is one step; the implementation aspect is the giant leap. *Adoption* refers to the decision to make full use of an *innovation* as the best course of action available (Rogers, 2003), while *implementation* is “the transition period during which individuals ideally become increasingly skillful, consistent, and committed in their use of an *innovation* (Klein and Knight, 2005). The *implementation* of e-journal publishing refers to the extent in which the journal publisher was able to put the *innovation* into a good, adequate, and successful use.

The use of new technologies should potentially lead to efficiency, effectiveness and productivity. When the technology is not properly utilized, the benefits anticipated might not come to bear. To gain full benefit of new technologies, it must be adopted, adapted and implemented fully and appropriately (Agarwal and Prasad, 1997). *Implementation*

represent the infusion stage in the diffusion process, and therefore, adopters cannot just close the book on any *innovation* after *adoption* (Klein and Knight, 2005).

It has been reported that many adopters faces a lot of challenges during *adoption* processes basically due to *implementation* problem, which makes *innovation adoption* unbeneficial in some cases. According to Klein and Knight (2005) the key reason is not *innovation* failure but *implementation* failure—the failure to gain targeted employees’ skilled, consistent, and committed use of the *innovation* in question. The failure of an *innovation* to achieve the gains expected by the adopting individual or individuals—often reflects not the ineffectiveness of the *innovation* per se but the ineffectiveness of the *implementation* process (Klein & Sorra, 1996).

Implementation failure occurs when, despite making decision to adopt or despite having adopted, adopters or employees use the product less frequently, less consistently, or less assiduously than required for the potential benefits of the *innovation* to be realized. An individual or organization's failure to achieve the intended benefits of an *innovation* it has adopted, may thus, reflect either a failure of *implementation* or a failure of the *innovation* itself (Klein and Sorra, 1996).

When e-journal publishing is perfectly implemented in the way it is intended to be, it should bring about productivity, quality, and efficiency to the journal publisher. The success of e-publishing adoption depends on how well it evolves to meet the particular needs of the publisher. This is where the idea of *reinvention* come to bear, which refers to

the extent to which an *innovation* is changed or modified by an adopter in the process of its *adoption* and *implementation* (Rogers, 2003).

Various social systems have unique needs and unique pattern of functions. As far as e-journal publishing is concerned, modification can improve and enhance *adoption*, since scholarly communication, although generally follows a common process, but the pattern of service delivery often differs across publishing industries. Therefore, the management and dissemination systems often times can be modified to fit peculiar needs of a field or specialty. Meanwhile, there is still conflicting arguments about who should be responsible for the *implementation* of the *innovation*. According to Hausman and Stock (2003) the firm who desires to implement a particular *innovation* (the focal firm) may need as well to convince relational partners (recipient firms) to implement it.

A study by Premkumar, Ramamurthy and Nilakanta (1994) have examined the relationship between various *innovation* characteristics (*complexity*, two forms of *compatibility*, *costs*, *relative advantage*, and *communicability*) and various attributes of diffusion (*adaptation*, *internal diffusion*, *external diffusion*, and *implementation success*) of Electronic Data Interchange in organizations. The researchers surveyed 201 firms in the United States that have implemented EDI. Two senior executives, one from information systems (IS) and the other from the sales/purchase function, provided matched responses to the questionnaire that measured the various research constructs. Findings revealed that *relative advantage*, *costs*, and *technical compatibility* were the major predictors of adaptation. While *relative advantage* and *duration* were important predictors of internal diffusion. Technical *compatibility* and *duration* were found to be important predictors of external diffusion.

Both forms of *compatibility* (technical and organizational) and *costs* were found to be important predictors of *implementation* success in EDI.

A study by Hausman and Stock (2003) on the *adoption* and *implementation* of Electronic Data Interchange (EDI) in hospitals suggests that the *implementation* stage still lagged far behind the *adoption* decision. Amongst those hospitals that have adopted the technology, the average percentage of transactions completed electronically was only 66% for the most frequently implemented component of EDI. *Implementation* levels for two other components of EDI were less than 20% and implementation for the other components was negligible. The amount of time necessary to achieve this level of implementation was, on average, over 4 months (4.28 months). The high standard deviation (4.09) showed a wide variation in the ability of firms to implement EDI. The result of Hausman and Stock (2003) implies that there are distinct differences between factors affecting adoption of technology innovations and those affecting their implementation.

Nordin, Othman and Che Mat (2008) studied barriers to technology *implementation* within Malaysian herbal industry. The findings suggest that although they are still able to meet local and overseas demand but they employ medium-level technology due to lack of technical specialists and financial aid commitment from top management, low wage rate, and future demand uncertainties. The authors reported that the technology level in Malaysian manufacturing firms is at their maturity stage. This is also applicable to local herbal manufacturing of which none of those studied which are categorized as SMEs had adopted advanced manufacturing technology (AMT) but likely to adopt in the future.

Small sized industries (SMEs) are less likely to adopt *innovations* before the larger sized according to the report.

2.13.8 Demographic Variables in Innovation Adoption

Many diffusion studies have confirmed the relationships between organization, demographic or socio-economic variables and *innovations adoption* but Deligiannaki and Ali (2011) have noticed that most of these studies often fail to explain exactly how these variables affect *adoption*. The impact of organization or demographic variables in organization adoption decision may have high correlation with other elements like: *organizational structure, technical expertise, total resources, slack resources, strategy and culture*. Factors determining the perception of the value of an *innovation* and the actual feasibility of *adoption*, such as an actor's *economic situation, social position, or personal characteristics* can be influential in the *adoption* of the *innovation*.

A study of Electronic Data Interchange (E.D.I) *adoption* in hospitals by Hausman and Stock (2003) find no correlation between demographic variables, especially with respect to *size and adoption or implementation of the innovation*. Glass and Li (2010) investigated the relationship between technology acceptance model factors, social influence factors and demographic factors and *adoption* of instant messaging in the workplace. Result of factor analysis of the data, shows that subjective norm and perceived critical mass loaded on one factor. This suggests that in organization work the difference between the influence of subjective norm and critical mass may not be crystal clear. Social influence (subjective norm and perceived critical mass combined) was found to be a more important factor in determining IM (Instant message) *adoption* than perceived usefulness and perceived ease of use. *Gender and age* does not have any impact on the *adoption* of the technology and as

oppose to non-adopters, adopters perceived IM to be more useful (*perceived usefulness* or *relative advantage*) and free of physical and mental effort (*perceived ease of use* or *simple*) for use in their work. The study therefore suggests that measures of social influence should be included in new *technology adoption models* such as TAM.

Massad, Brown and Tucker (2011) found *age* and *gender* to be related with the tendency to regard electronic journals as equivalent to print journals. Younger respondents and women were found to be more likely to regard electronic journals favorably than older and male respondents. There are no correlations between tenure and accreditation with respondent's perception about electronic journals. When making *adoption* decisions, an organization needs to consider not only the *innovation* attributes but also the organizational characteristics including needs, structure, members' attitudes and decision making practices. An internal champion, convenient access, member involvement and rewards are essential in diffusing adopted *innovations* in organizations. Furthermore, comprehensive adoption decision making may be a necessary but not sufficient condition for effective organizational innovation diffusion (Higa et al., 1997). Therefore, this study also examine whether there is a relationship between respondents organization or demographic variables and adoption of e-journal publishing.

2.13.9 Peer Network and Change Agent Influence

The influence of *peer network* and *change agents* is also very crucial in the diffusion of *innovation* as these influences can speed up the *adoption rate* of an *innovation*. The *peer network influence* is highly dependent on the communication channels used to transmit the

innovation. The choice of communicating the *innovation* will largely depend on the kind of *innovation* been diffused. Some *innovations* are communicated successfully through mass media and some through interpersonal communications (Brown, 1981; Rogers, 2003). The *peer network* and *change agent influence* are at the interpersonal level of the communication process irrespective of the role of the Internet communication.

Scholarly communication technology *innovations* are often not communicated through the traditional mass media: TV, radio, newspapers. Scholars become aware of new inventions formally through the scholarly journals itself or conferences, workshops et cetera, and informally through peer interpersonal discussions and networking. Frambach and Schillewaert (2002) have observed that supplier communication strategy will most likely create awareness of the *innovation* and probably shape the potential adopters perceptions about the *innovation*. It is also important to differentiate between source of information and channel. Source is an individual, agency or institution of which the information originates from, while channel is the means by which the information is transmitted to the receiver. Therefore the source of the information in this regards will be the *change agents* who acts like opinion leaders in the social system.

The degree of *peer network influence* can also be determined by social or environmental factors. Social and environmental factors represent factors outside the control of the organizations management. Chieochan, Lindley and Dunn (2000) cited Yap (1990) and Yap and Walsham (1986) to explain that these outside factors are of two levels: *general* which comprises social, economic, political, legal, cultural and *specific* which comprises customers, suppliers and competitors. In addition to other elements, there is a possibility

for a social system to adopt an *innovation* in order to have competitive edge over other competitors.

It was noted by Frambach and Schillewaert (2002) that individuals or group may derive an intrinsic utility from the fact that business partners or competitors within their network have previously adopted an *innovation* which may influence their decision to adopt. *Environmental influences* and *Network externalities* as stressed by the authors are variables that can influence *innovation adoption*. *Network externalities* claims that the value of the focal *innovation* and, hence, its *adoption* probability, is intrinsically determined by the number of other users (Frambach and Schillewaert, 2002).

This means that Malaysian journal publishers can be influenced to adopt e-journal publishing if the *rate of adoption* has reached a critical mass. It was explained by Frambach and Schillewaert (2002) that *adoption* of a new product or service by a focal individual's peers (e.g. superiors, colleagues, customers, et cetera.) may signal the need and benefit of the *innovation* and motivate the individual to imitate and accept the *innovation*. The authors make an example of the WWW to illustrate that if individual peers are relying on the WWW for information and communication, the individual may decide to engage with it just to keep up with his peers. This similar situation may occur in the adoption rate of e-journal publishing amongst journal publishers.

Thus, information sharing between or amongst journal publisher's network can create awareness about e-journal publishing and stimulate *adoption*. Such a collaborating network as noted by Frambach and Schillewaert (2002) may either connect organizations within the

industry or organizations in different industries. In the scholarly world, Scientist customarily identifies and associates with different professional bodies locally and internationally. The extent to which these scientific bodies share information amongst members can play a part in their awareness and acceptance of new scholarly communication technology innovations. These *peer networks* can be people of the same socio-economic status, field, discipline, faculty or educational level.

Change agents on the other hand, can be people, teachers, consultants, librarians or even publishers in the social system who endeavored to influence journal publishers to adopt e-journal publishing. *Change agents* may also serve as opinion leaders in the social system. However, innovation diffusion literature separate the influence of *change agents* from that of the opinion leader, because the former comes from the outside while the latter is part of the immediate organization organ.

Opinion leaders are people who have a large influence on the members of their social system network in the *diffusion* or *adoption* of new technologies (Cho, Hwang and Lee, 2012). Moreover, opinion leaders tends to protect and support the values of the social structure, thereby influencing *innovation adoption*, acting like role models by providing advice and information about the *innovation* through interconnected *peer network* (Yates, 2001). Both *change agents* and opinion leaders can also intervene in cases where their knowledge is needed. Therefore it is essential to find out whether Malaysian journal publishers have had contacts with *change agents* during the *diffusion* or *adoption* process of e-journal publishing.

In essence, the scale items in the e-journal publishing survey questionnaire endeavor to collect information on whether efforts were made by *change agents* to spread the e-journal publishing *innovation*. The efforts of *change agents* can also explain the characteristics of *innovation adoption*.

2.13. Summary

This chapter detailed the historical foundation of the research study. The chapter went down memory lane, section by section to relay and understand how far the scholarly community has come regarding the propagation of information, research and knowledge. The chapter reviewed several literatures on scientific communication, traditional journal publishing, the rise of journal as a medium of scientific exchange of knowledge, the technological development of the twenty first century and its impact on scholarly communication. There were sections that discussed the birth of the Internet and its effect on information propagation, information exchange commerce, society, and journal publishing. The chapter also presents literature that studied electronic information and electronic journal publishing. It also presents review of literature on innovation diffusion and technology adoption as it relates to the phenomenon under investigation. The section that follows focused on the theories that are popularly adopted in social science, library science and information science research. It explains why the theory of innovation diffusion is more applicable to the subject of the current investigation.

CHAPTER 3

THEORETICAL FRAMEWORK

3.1 Introduction

This chapter describes the research framework designed for the study of adoption of e-journal publishing. It explains the theory from which the model is framed and explains the different elements that constitute the e-journal publishing adoption research framework.

3.2 Diffusion of Innovation Theory

Across bodies of literature, studies on *innovation adoption* or *technology acceptance* have been anchored around Rogers' *diffusion of innovation theory*. The Innovation Diffusion Model has been applied in different context as a basis for investigating the phenomenon of introducing a new idea into a population or social system (Arts, Frambach and Bijmolt, 2011; Frambach and Schillewaert, 2002; Massad, Brown and Tucker, 2011).

Research is the process of making claims and then refining or abandoning some of them for other claims more strongly warranted. Most quantitative research, for example, starts with the test of a theory (Creswell, 2009).

The relevant body of literature that explains and predicts the process of something new being introduced into a social system and becoming accepted over time is known as diffusion/adoption. While the two terms are often used interchangeably, there is a

distinction between the two. The term *diffusion* refers to the process of introducing some innovation to a social system and the innovation becoming accepted over time. The term *adoption* refers to the process by which individuals/society are accepting a new *innovation*. Massad, Brown and Tucker (2011) described this concept using a chocolate – milk analogy. *Diffusion/adoption* might be thought of as a drop of chocolate into a glass of milk. *Diffusion* describes the process from the view point of the chocolate, while *adoption* describes the process from the view point of the milk.

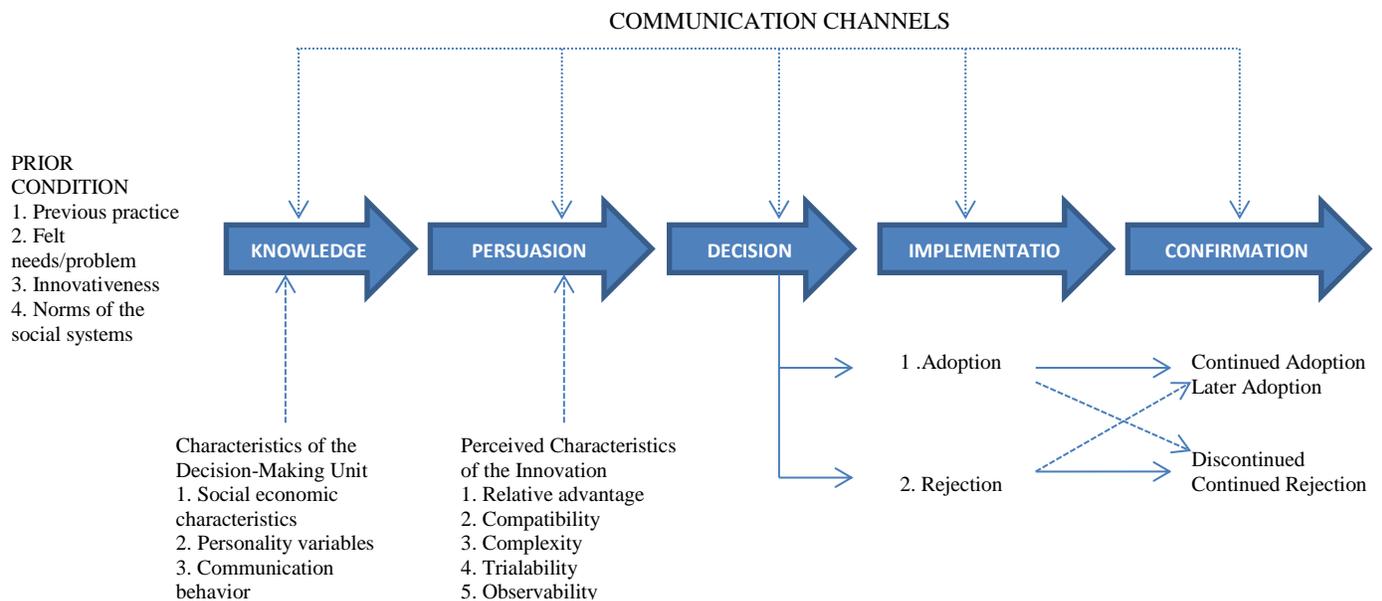


Figure 3.1: Innovation Diffusion Model (Rogers, 2003)

Other related theories that were formulated to predict the acceptance or continuous acceptance of a particular technology and also explain the relationships between individual perceptions, attitudes and adoption of innovations are : the Bass diffusion model (Bass, 1969), Theory of planned behavior (Ajzen, 1985) which represent an extension to the Theory of reasoned action (Fishbein and Ajzen, 1975), and the Technology Acceptance Model (TAM) (Davis, 1989) which is also based on the Theory of reasoned action.

Theory of planned behavior (Ajzen, 1985) is a general theory that can be applied in varieties of domains to explain individual intention, behavior or preference of one technology over another. It posits that behavior is driven by a normative component (Subjective norm), an affective component (Attitude toward behavior) and a control component (Perceived behavioral control). The Technology Acceptance Model (TAM) (Davis, 1989) on the other hand was specifically developed to suit the domain of I.T and has some commonality with that of Rogers as they were both set out to explain users acceptance behavior.

The TAM model suggest that the fundamental determinant factors that influence potential adopters decision in adopting a new technology are (1) Perceived usefulness and (2) Perceived ease of use. The two factors are conceptually similar to the attributes of *relative advantage* and *complexity* in the Rogers (2003) *Innovation Diffusion Model (IDT)*. One popular theory in the field of psychology that mirrored some central ideas in the Innovation Diffusion Model is the social learning theory (Bandura, 1977) which explain the significance of different level of communication with other individuals as an influence to behavioral change amongst those individuals in a social system

Rogers (2003) believed that individual perception about using an innovation are most salient to their decision making about whether to accept the innovation. Individual's perception about a new technology in the spotlight is very crucial to their attitude, behavior and actions towards it. Many research on *innovation* diffusion and *adoption* conducted on farm seed and fertilizers among farmers (Rogers 1995), web registration system at a

university (Agarwal et al., 1998), media literacy programs among school teachers (Yates, 2001), information security adoption amongst pc users (Conklin, 2006), open access publishing among scientists (Park, 2007), electronic journals among business academicians (Massad, Brown and Tucker (2011) et cetera suggest that the five most important elements in innovation diffusion described by Rogers is pivotal to the adoption behavior of a social system and towered above all other seen, unseen, perceived or unperceived variables.

This present study test some set of variables propounded by Rogers (2003) in the context of *e-journal publishing adoption* amongst Malaysian journal publishers. Hence, Rogers's theory serves as the calling card and a cause of action that propel the current study.

3.3 E-Journal Publishing Diffusion Model

The e-journal publishing diffusion model is based on the *Rogers Innovation Diffusion Model*. It is constructed to explain the variables influencing the adoption decision of Malaysian journal publishers in the adoption of e-journal publishing. The e-journal publishing diffusion model consists of the five stages in the innovation diffusion process (IDP): Knowledge, persuasion, decision, implementation and confirmation (Figure 3.2).

There are different variable constructs representing elements in each of the five stages in the *e-journal publishing diffusion model* and the variables that are explained and measured in this study are depicted in figure 3.3 representing the theoretical research framework of the variables affecting the adoption of e-journal publishing amongst Malaysian journal publishers. The variables highlighted in Figure 3.3 are chosen based on review of past literature (Chapter 2) on innovation diffusion, technology adoption, e-journal publishing, the characteristics of the adopters and the innovation under study.

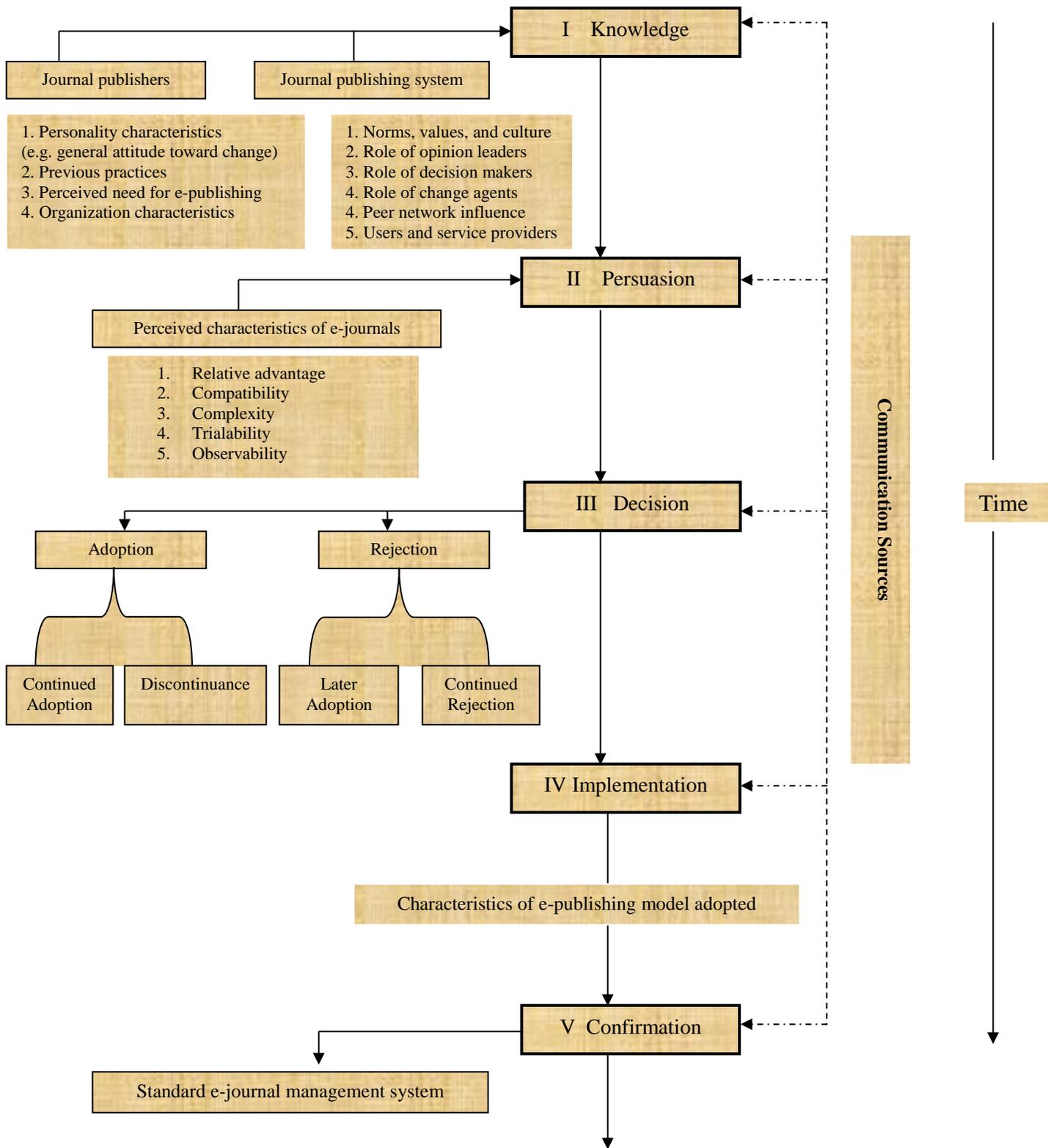


Figure 3.2: E-Journal Publishing Diffusion Model (Adapted from Rogers, 2003)

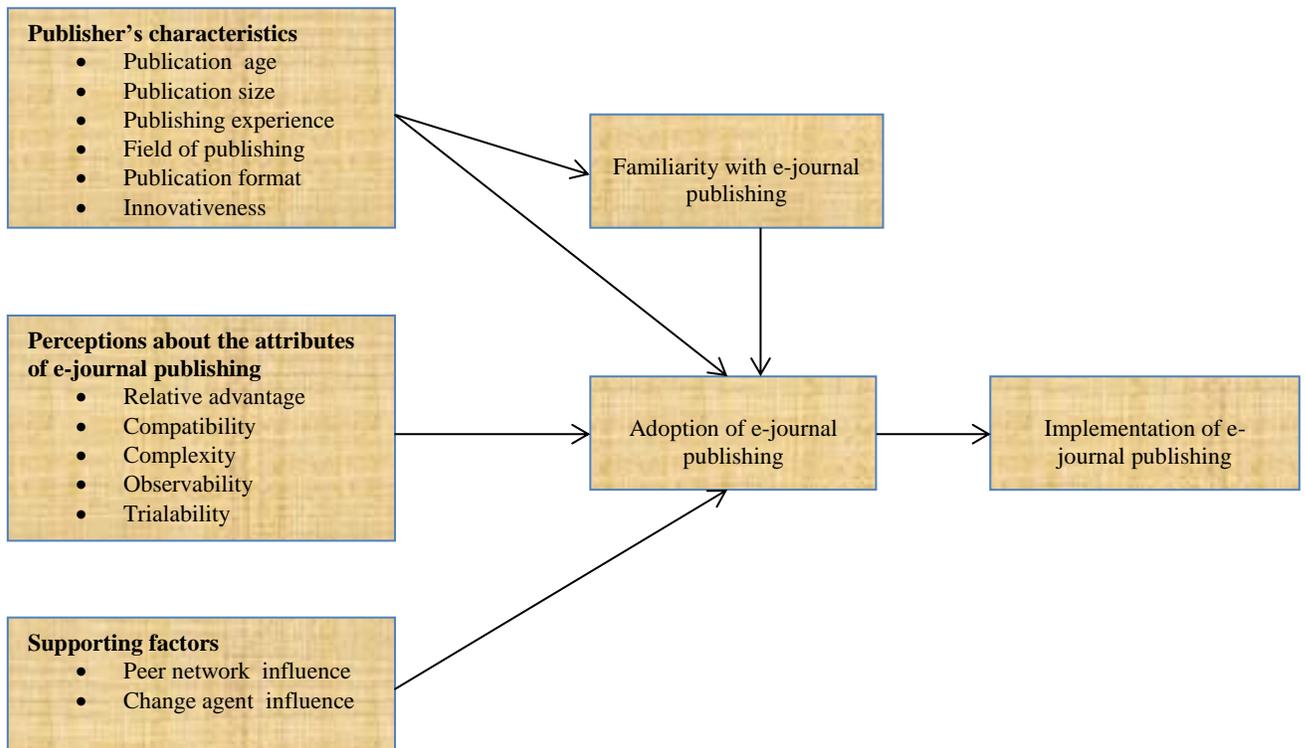


Figure 3.3: Theoretical Research Framework

The measurement variables at the knowledge stage of the e-journal diffusion model for this current research are: *adopter characteristics*, *peer network influence*, *change agent influence* and *familiarity*. The organization characteristics explained are: *publication age*, *publication size*, *publishing experience*, *field of publishing*, and *publication format*. At the persuasion stage, the five attributes of innovation represents the variable constructs: *relative advantage*, *compatibility*, *complexity*, *observability* and *trialability*. At the decision stage, the *adoption decision* represents the variable constructs. At the *implementation* stage, the *characteristics of the adoption* which is operationalized as the *level of implementation of e-publishing* represent the measurement indicator while the last stage is the confirmation of the *adoption* which is not studied in this research.

3.4 Measurement Indicators of E-journal publishing Adoption

3.4.1 Dependent Variables

In the studies of innovation diffusion or technology adoption, the key variable in which the researcher is interested is the dependent variable. In about 60% of all diffusion research, this usually means that the independent variables lead to *innovativeness* or *adoption* (Rogers, 2003).

In most of the studies on innovation diffusion in organization (Al-Ghaith, Sanzogni and Sandhu, 2010; Bingham, Freeman and Felbinger, 1984; Bingham and Frenndreis, 1980; Brown, 1981; Fennell, 1984; Hu, Chau and Sheng, 2002; Kim and Galliers, 2004; Moore and Benbasat, 1991; Rogers, 2003) the dependent variable is *adoption* or *innovativeness*, however in other works, such as Zaltman, Duncan and Holbek (1973) the main dependent variable is *implementation* rather than *innovativeness* or *adoption*. In the former, the researchers observed that many problems are encountered in an attempt to implement an innovation, hence the need to study the *implementation* of the *innovation*.

The *implementation* stage underscores the importance of putting an *innovation* into adequate use. *Implementation* according to Chen and Tsou (2007) represents the stage at which the organization adopted and adapted the *innovation*, and starts to use it in a comprehensive and integrated manner to support the activities in the organization. In clarifying the difference between *adoption* and *implementation*, Klein and Knight (2005) gave an example of an exercise machine. According to the authors, when an individual buys the machine, s/he has adopted it. When the individual use it regularly, that is *innovation implementation*. When s/he use it regularly, in a skilled, consistent, and committed manner, then s/he has excelled at *implementation*. Thus, *innovations* fails not

because of its ineffectiveness but due to the fact that it is not used with the consistency, skill, and care required to achieve its expected benefits (Klein and Knight, 2005).

In the studies where *implementation* was the main dependent variable, explained Rogers (2003), they identify the main sequence of decision, actions, and events in the process. Data about the *innovation* process are obtained through recallable perceptions of key actors in the innovation process, written records about the adoption decision and other key sources. For the present study, it is difficult to measure the sequence of decision or actions in the process of implementing e-journal publishing and the method used in measuring the level of *implementation* is to identify the formats, modules and platforms of the e-journal publishing systems in which the participants have been able to implement into their journal publishing systems. Therefore, for the present study, the result of *implementation of e-journal publishing* is described and explained and not correlated with other indicators.

Innovativeness has been measured in this study as an independent variable, rather than a dependent variable (Figure 3.3). The aim is to evaluate whether respondents perception about their own *innovativeness* is directly proportional to their actual behavior, that is their *adoption decision*. The main dependent variable in this study is *adoption* which refers to the *decision to use*, accepting with approval or having favorable reception to e-journal publishing.

Meanwhile, it has been observed that there are very few studies reporting the *outcome/ consequences* and *sustainability* of innovation (Conklin, 2006). Consequences refer to the changes that occur to an individual or social system as a result of the adoption or non-adoption of an innovation, while sustainability refers to the capability or hope of an

innovation standing the test of time. Sustainability is considered the bottom line for every new idea been adopted.

Regarding the state of Malaysian journal publishing system, the study focus attention on the dependent variable of *familiarity with the innovation*, and *adoption of the innovation* and further describes and explains the *implementation of the innovation*. The *confirmation*, *consequences* and *sustainability* of the innovation can be researched in the future. This is so because the adoption and implementation of e-journal publishing is still at its early state in Malaysia and publishers may not be fully aware of all its consequences at this point in time.

There has been no study yet that focus on the characteristics of *innovation adoption* for this unit. The present study will serve as a stepping stone and catalyst for further research in scholarly communication technology adoption. The outcome of this study will assist decision making process for stakeholders debating the current role of e-journal publishing. The result of the study will also shed more light on the characteristics of the social system which will be a ladder to study the confirmation, consequences and sustainability of the innovation in the future.

3.4.2 Independent Variables

The variable of adoption decision represents the measuring qualities of e-journal publishing and also relates the various elements in the *e-journal publishing diffusion model* (Figure 3.2). The determinants that are explained here are variables from literature that have generally been identified to stimulate innovation adoption decision of an individual or social system.

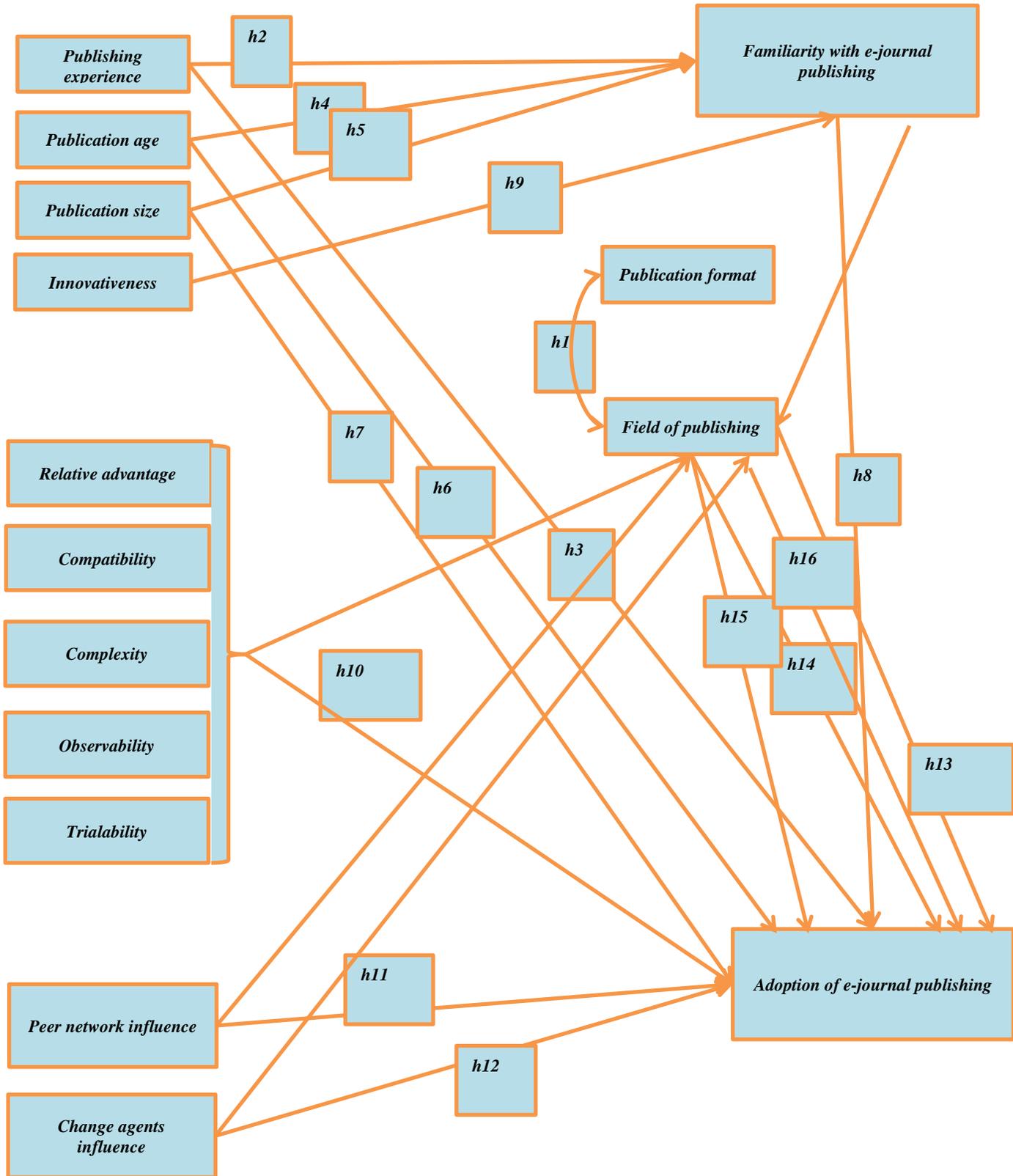


Figure 3.4: Hypothesized Links in the Adoption of E-Journal Publishing Study

This research is concerned about identifying and describing the variables important to making a decision about e-journal publishing adoption and as such the researcher has integrated the variables into one framework, showing the links between the variables measured and the pattern in which the hypotheses are formulated (Figure 3.4).

The independent variable (IV) must have a cause on the dependent variable (DV). In order for the IV to be the cause of the DV (1) The IV must precede the DV in time-order, (2) Both the IV and the DV must be related, or co-vary, and (3) The IV must have a forcing quality on the DV meaning that the IV must have a theoretical basis for affecting the DV (Rogers, 2003).

A. Adopter Characteristics

The adopter characteristics that are studied and measured in this research are Organization age - operationalized as *publication age*, organization size – operationalized as *publication size*, *respondent's age*, *gender*, *field of publishing*, *publication format*, and years of experience - operationalized as *publishing experience* (Figure 3.3). The study seeks to measure the relationships that exist between the hypothesized variables. It is important to examine if publishers *field of publishing* is related to the journal format they are currently adopting.

H1: There is a statistically significant relationship between field of publishing and publication format.

The years of experience of individuals in journal publishing can also be essential in their *familiarity* with e-journal publishing and *adoption* of e-journal publishing

H2: There is a statistically significant relationship between publishing experience and familiarity with e-journal publishing.

H3: There is a statistically significant relationship between publishing experience and adoption of e-journal publishing.

Organization age or in this case, *publication age* stress the importance of an already established journal publication in *innovation adoption*. Older journals are supposed to have predefines rules, policies and procedures lasting the test of time. Therefore, they tend to emphasize following certain procedures in publishing function and this can largely affect their behavior towards *e-journal publishing adoption*.

H4: There is a statistically significant relationship between publication age and familiarity with e-journal publishing.

H5: There is a statistically significant relationship between publication age and adoption of e-journal publishing.

One of the best predictors of *innovativeness* at the organization level is *size*. The reason for this as posited by Rogers (2003) is that; size is a variable that is not difficult to measure and often times its evaluation is precisely correct. In essence, size is generally included in diffusion study of organizations (Frambach and Schillewaert, 2002; Higa et al., 1997; Mahler and Rogers, 1999; Mytinger, 1968; Pinfield, 2013; Rogers, 2003). Another point raised by Rogers (2003) is that size is probably a surrogate measure of several dimensions that leads to *innovativeness*. Specifically relevant is whether an *innovation* benefits large or small scale operations (Brown, 1981; Nah and Saxton, 2013). Journal publishers with large *publication size* will feel more need to adopt new inventions to aid their productivity.

H6: There is a statistically significant relationship between publication size and familiarity with e-journal publishing.

H7: There is a statistically significant relationship between publication size and adoption of e-journal publishing.

Furthermore, in most diffusion studies, *level of awareness* has been considered to be an independent variable and a good indicator of *adoption*. Rogers (2003) is of the opinion that many people have the awareness knowledge of an *innovation* and have yet to adopt. According to Conklin (2006), for an individual to perceive certain degree of importance associated with any kind of *innovation*, s/he must have some level of awareness about it. Awareness leads to an evoked set of alternatives based on the information sources that an individual or other unit of adoption is exposed to (Frambach and Schillewaert, 2002). Knowing about a new idea is quite different from been familiar with it. It was therefore conceived that instead of *level of awareness*, *familiarity of the innovation* should be investigated in this current study. This is because, in the digital age, almost everyone is aware of Internet technologies, even in the underdeveloped countries of the world, people are aware of the Internet phenomenon. Likewise it is expected that journal publishers are well aware of e-journals. Therefore, it was observed that the journal publishers are aware of Internet-related technologies such as e-publishing, but they may be less familiar with them. *Familiarity* with e-journal publishing is a step-up from awareness, as this stage is likely to erase many of the uncertainties and confusion regarding the *adoption* of e-journal publishing.

H8: There is a statistically significant relationship between familiarity with e-journal publishing and adoption of e-journal publishing.

The study also measure *innovativeness* which is operationalized as individual's propensity to adopt *innovation* in general. It is believed that some individuals possess innovative tendencies towards technology *innovations*.

H9: There is a statistically significant relationship between innovativeness and familiarity with e-journal publishing.

B. Perceived Attributes of E-Journal Publishing

The perception of Malaysian journal publishers about the attributes of e-journal publishing can explain the adoption of e-journal publishing. In a review of several researches on innovation diffusion discussed in the Chapter 2 of this thesis, the five attributes that was found to be a likely determinant of the e-journal publishing adoption are: *Relative advantage, Compatibility, Complexity, Trialability, and Observability*. Each of these attribute of e-journal publishing are somewhat interrelated empirically with the other four, but they are conceptually distinct. Amongst the five attributes, the attributes of *relative advantage* and *compatibility* are most highly priced. These variables are characteristics that distinguish the adopter categories in most innovation diffusion studies (Massad, Brown and Tucker, 2011; Yates, 2001). Almost all founded studies on innovation diffusion have used these variables to investigate the diffusion of the specified innovation. All these five variables are considered in this current experiment with the belief that respondents' perception of e-journal publishing is related to the acceptance of the innovation.

H10: There is a statistically significant relationship between perception about the five attributes of innovation and adoption of e-journal publishing.

- i. ***Relative advantage of e-journal publishing:*** This refers to the extent in which Malaysian journal publishers perceives e-journal publishing to be better or superior to print journal publishing. The benefit of a new product or service over the ongoing or current capacity is a significant predictor. In the case of scholarly journal publishing, it goes by saying that a new idea like e-journal will be considered for use only if it offers some benefit than publishing in print. There is a relationship between perceived *relative advantage*, *intention* and *adoption* that is directly causal in nature (Conklin, 2006). *Relative advantage* of e-journal is quite evident; the ease of production and distribution, likewise the benefit of been more visible thereby attracting more contributors and readership. In essence, the greater the perceived *relative advantage* of an *innovation*, the more rapid its *rate of adoption* (Moore and Benbasat, 1991; Rogers, 2003).
- ii. ***Compatibility of e-journal publishing:*** This relates to the extent in which Malaysian journal publishers perceives e-journal publishing to be consistent with their values, past experiences, and needs. Individuals would like to see whether the innovation fit with their needs or existing program in their workplace before making a decision. Innovation that is incompatible with publishers work behavior or practice will experience low adoption. As regard, *compatibility* is positively related to *adoption* of an *innovation* (Brown, 1981; Deligiannaki and Ali, 2011; Kim and Galliers, 2004; Massad, Brown and Tucker, 2011; Premkumar, Ramamurthy and Nilakanta, 1994). Since our contemporary society now depends largely on the Internet for social interaction, information and education, it is easier to understand why *compatibility* is

very important in *e-journal publishing adoption*. It implies that adopters would have positive attitudes towards e-journal publishing if it adheres to the norms and values of scholarly communication and consistent with their way of life.

iii. ***Complexity of e-journal publishing:*** This is considered to be the extent to which Malaysian journal publishers perceives e-journal publishing to be difficult to understand and use. *Complexity* as an attribute, addresses the perceived difficulty related with the *adoption* of a particular *innovation* (Conklin, 2006). It is therefore assumed that a rapid adoption of simple, easy to use and understandable innovation is probable. Frambach and Schillewaert (2002) noted that *complexity* is a multidimensional constructs within a given organization. In the *unit of adoption* been investigated in this thesis, it can be said that publishers would be more willing to adopt new technology that are less complicated to adopt, implement and use.

iv. ***Observability of e-journal publishing:*** Refers to the degree at which the result of publishing e-journals is visible to Malaysian journal publishers. It is believed that people would change their behavior as a result of seeing other people doing something new. The easier it is for people to see the results of the new technology been introduced, the more likely they are to adopt it (Rogers, 2003). In the case of e-publishing, publishers would be more likely to adopt e-publishing if they are able to observe how other publishers have been able to embrace, use and implement e-publishing. Visible results reduced uncertainty and also provoke peer discussion about the new innovation. It can be argued that the more an individual can see positive

outcomes from the innovation and the more the individual is exposed to it, the more likely he is to adopt it (Moore and Benbasat, 1991; Scott et al., 2008).

- v. ***Trialability of e-journal publishing:*** This refers to the extent to which Malaysian journal publishers have been able to try or experimented with e-journal publishing on a limited scale before making a decision on *adoption*. It is believed that an *innovation* that has been tried by potential adopters will create less uncertainty to the potential adopter (Rogers, 2003). This provides a kind of assurance or guarantee that using the technology meets certain expectation. In the e-journal environment, *trialability* will involve the ability to be able to access or browse the e-journal website or database interface with ease, and also the ability to understand the structure of e-publishing system and how they functions. Scott et al. (2008) explained that due to the fact that a new *innovation* requires investing time, energy and resources, innovations that can be tried before being fully implemented are more readily adopted. The potential adopter wants to know if the good claimed by the innovation can be found. This is a very important factor in the scholarly journal publishing context as scholar's experimentation about a new product or service could influence adoption.

According to Rogers (2003) all these five attributes explained 49% to 87% of most of the variance in the *rate of adoption* of *innovation*. Hence, as more publishers perceive e – journal to embody lot of benefit and consistent with their values, the *rate of adoption* is likely to increase. The following paragraphs highlight other important variables in the study of e-journal publishing adoption.

C. Peer Network and Change Agent Influence

Peer network emphasizes the role of communication in behavioral change. Malaysian journal publishers are more likely to adopt e-journal publishing if one or more of the other individuals in their personal network have adopted previously. Collaborations among groups or social system can also influence innovation adoption (Frambach and Schillewaert, 2002; Mahler and Rogers, 1999; Rogers, E. M., 2003; Zaltman, Duncan and Holbek, 1973). It goes by saying that journal publishers may find it necessary to adopt e-journal publishing because every other publisher in their network is doing so.

H11: There is a statistically significant relationship between peer network influence and adoption of e-journal publishing

- vi. ***Change agent influence in e-journal publishing adoption:*** *Change agents* can be professional publishers, librarians, consultants, teachers, sales men etc that have made efforts to consult and influence Malaysian journal publishers on e-journal publishing adoption. It is very important to understand the role of *change agents* in the adoption-decisions of Malaysian journal publishers in the adoption of e-journal publishing. This is because *change agents* can facilitate the flow of the *innovation* to target the individuals intended for it. Also *change agents* are assumed to possess valuable knowledge about e-publishing and can be able to explain the functionalities and aspects of the *innovation* to journal publishers and this effort can speed up the rate of *adoption*.

H12: There is a statistically significant relationship between change agent influence and adoption of e-journal publishing.

3.4.3 Adopter Categories

All prospective adopters of an innovation do not adopt at the same time and while some individuals or unit will readily adopt certain innovations, some others will reject it (Frambach and Schillewaert, 2002; Mahajan, Muller and Srivastava, 1990). The same situation applies to the adoption of e-journal publishing amongst Malaysian journal publishers. While some publishers adopted e-journals earlier at the immediate creation and introduction of the innovation, it took some other publishers a lot of years before deciding to adopt and even some journal publishers are yet to adopt it. According to Rogers (2003), for any kind of *innovation*, there exist five adopter categories: *Innovators*, *Early adopters*, *Early majority*, *Late majority*, and *Laggards*. A *bell shape* curve is often used to illustrate the percentage of individuals that adopt an innovation.

The first category are the *Innovators* (the first 2.5% of the population). These are likely to be journal publishers who are prolific researchers, always interested in new ways of doing things, risk takers, generators and transformers of ideas who lead the way for others and are among the very first to use e-journals before its use is widespread. The second category belongs to the *Early adopters* (the next 13.5%). These are likely to be journal publishers who are recognized as opinion leaders or *change agents* in the social system, and they help to spread information about the prospect of e-journal publishing. The third category are the *Early majority* (the next 34% after the *Early adopters*). These are likely to be journal publishers who adopt after several efforts by the *Innovators* and *Early adopters* to establish the benefit and usefulness of the *innovation*. The fourth category are the *Late majority* (the next 34% after the *Early majority*). This group is likely to contain journal publishers who wait until they are certain of the benefit of e-journal publishing before making a decision to

adopt, while the last category belongs to *Laggards* (the last 16% of the population). These would be journal publishers who are always suspicious and skeptical about new technologies. The *Laggards* only adopt when they have no choice and only when it is very necessary, and even in most cases they never adopt (Rogers, 2003).

In categorizing these adopters, Hahn and Schoch (1997) understand that, *Innovators* and *Early adopters* are ahead of their peers in the social system in *adoption* and in the case of this study, these category of people would be publishers who have great influence in their social system and possess greater ability to absorb loss than the *Late majority*. *Innovators* and *Early adopters* are believed to show positive attitude to change. They enjoy great social participation and show more interconnectedness. *Innovators* and *Early adopters* are likely to have more contact with *change agents*, and are more exposed to *peer network* and *interpersonal communications*. They are likely to be information seekers, and are considered to be opinion leaders in the social system unit (Hahn and Schoch, 1997).

In this study, the researcher has used the *time-of-adoption* approach to classify the adopter categories. This approach has been used in many innovation diffusion studies. The *time-of-adoption* approach is achieved by taking a measure of the time since introduction of the innovation until the time each publisher adopted it. The revelation from characteristics of adopters would shed light on the rate of adoption of e-journal publishing amongst Malaysian journal publishers.

One major significance of the diffusion of innovation curve is it bolsters the belief that the most efficient strategy in innovation diffusion is to identify the *Innovators* and *Early adopters* and try to diffuse the *innovations* through them (Goldsmith and Hofacker, 1991; Mahajan, Muller and Srivastava, 1990). This implies that it might be inefficient attempting

to speedily and massively convince the social system of a new *innovation* without first identifying and focusing attention on the *Innovators* and *Early adopters*.

3.5 Summary

This chapter presents and discusses the theoretical framework and the research model adopted for the study. The chapter highlights and explains all the variables that are studied in this research through the perspective of the Innovation Diffusion Model and the Innovation Diffusion Model. The chapter further presents the e-journal publishing diffusion model and the e-journal publishing adoption framework indicating the hypothesized relationship between the independent variables and the dependent variables in the study. Both the independent variables and dependent variables were identified and discussed and the explanation of the adopter categories was also presented.

CHAPTER 4

RESEARCH METHODOLOGY

4.1 Introduction

This chapter highlights the research method adopted for this study, with discussions on the strategy chosen for the data collection purpose, and the operationalization of constructs in the creation of the data collection instrument. The e-journal publishing diffusion model is empirically tested using a survey instrument developed for the study. The chapter highlights the construction and validation of the instrument used for the data collection. The population sample and participants of the study are discussed. The results of the pilot study are presented, which guided the standardization of the final survey questionnaire. The plan for the technical analysis of the data is also presented.

4.2 Population

The purpose of the study is to investigate the characteristics of e-journal publishing adoption decision of Malaysian journal publishers through a quantitative research methodology. The population sampled and surveyed is publishers or Chief Editors of Malaysian journals. In most of the diffusion studies that focus on organization, data were collected from single individuals (usually top executives in the organization) (Rogers, 2003). In essence each Malaysian journal that is candidate for analysis is reduced to the equivalent of an individual. The participants in this research are the Chief Editors or

publishers of Malaysian journals in their individual capacity as the leader, manager or decision maker responsible for the management and publication of a journal. On that front, each journal title is treated as a single unit of analysis and the research carries on by adapting the Innovation Diffusion Model created for individuals to explain journal publisher's characteristics and behavior towards e-publishing adoption.

Survey research provides a quantitative or numeric description of trends, attitudes or opinions of a population by studying a sample of that population. It includes cross-sectional and longitudinal studies using questionnaires or structured interview for data collection, with the intent of generalizing from sample to a population (Babbie, 1990 cited in Creswell, 2009)

The researcher identified close to 500 journals that have been published in Malaysia, some of which have ceased and some which have undergone a change of name. The study of Zainab et al. (2012) provided a master list of Malaysian journals and was very helpful in the population sampling. To identify and confirm the current name of Publishers or Chief Editors of these journals, the researcher simultaneously double checked the published report with information obtained from the website of *Malaysian Citation Index, Malaysian Abstracting and Indexing System*, and the parent bodies of the respective journals, such as the various *Malaysian higher institutions, professional societies, private and public organizations* et cetera. Some that were not available online were searched in the *University of Malaya main library*. The library's journal list and collection is the most current in the country and the result of the information gathering, from varying sources, database indexes, library indexes, sent postal mails, sent e-mails, and phone calls, shows that roughly 250 journals are still actively in publication at the time of doing this research.

The Malaysian citation center was very helpful in providing information about the list of Malaysian journal publishers with their respective postal address. Some of the addresses were updated in cases where it is incomplete or outdated. Several of the journals have ceased while some carry new names and address. Henceforth, only publishers with functioning postal and electronic mail address could participate in the research.

The population sampled in this study is considered to be at the level of organization. According to Rogers (2003), most innovation adoption studies conducted at the level of organization are generally quantitative and often have mostly 100 or more organizations included in the sample size. The questionnaire was carefully and generously distributed to avoid an over concentration of participants in one demography or amongst group of like-minded people.

4.3 Sample and Sampling Technique

The sampling technique adopted for the *adoption of e-journal publishing* study is stratified systematic random sampling and every single Malaysian journal that is still active in publication has a chance to be selected in the examination. The sampling frame which represent the list of eligible Malaysian journals was constructed from five sources which are accessible online: (a) List of Malaysian journals as reported in Zainab et al. (2012) (b) List of Malaysia journals indexed in *Malaysian Citation Index* (<http://mycc.my/en/>) and *Malaysian Abstracting and Indexing System* (<http://myais.fsktm.um.edu.my/>) (c) List of Malaysian higher institutions in Wikipedia (http://en.wikipedia.org/wiki/List_of_universities_in_Malaysia) (d) List of Malaysian professional bodies (<http://www.mycen.com.my/malaysia/association.html>) (e) List of

Malaysian journals in the University of Malaya library. Each higher institution and professional body's website was visited to check and collect information on the list of journals they produce with the contact information of the Chief Editors. All these information was imported and organized into Microsoft Excel spreadsheet and was later filtered in order to eliminate duplication of journal names.

The population size represents the number of Malaysian journals obtained from the above sources which was approximately 500 unique journal names. The researcher thereafter made effort to confirm the numbers of journals that are still in publication by contacting the journal managements through phone calls and e-mails and also by checking the year of the most current issue of the journals. The list of the journals were organized in Microsoft Excel spreadsheet and the researcher made a random selection of 250 journal titles which serves as the sample size for the study.

The sample was stratified based on *field of publishing* comprising 150 journals from *science/technology* and 100 journals from *social science/arts/humanities* which is a representative of the list of Malaysian journals as a whole. The number sampled in each group is proportional to its population size. According to Krejcie & Morgan (1970) standard sample size, the numbers of journal publishers needed to participate in the study is approximately 220 journal publishers and the method used to randomly select the participants is stratified systematic random sampling. The formula adopted for the sampling fraction $K = N/n$, where $N = 500$ is the population size and $n = 250$ is the sample size and $K = 2$ is the sampling fraction. Each journal title is given a tag number and the tag number is used to represent the journal in the Microsoft Excel spreadsheet before the journals were randomly selected for examination. Using the value of the sampling fraction

$K = 2$ as the strata, the researcher selected every second journal on the list and this exercise resulted in 250 journal titles that serve as the sample size for the study.

Therefore the quantitative sample taken from the population of 500 journal titles was 250. The numbers of responses received was from 156 publishers with 95% confidence level and +/- 5% margin of error. This means that between 85% (90%-5) and 95% (90%+5) of the entire Malaysian journal publishers would possess the same behavior as the outcome of the experiments and in 95% of the time between 85% and 95% of Malaysian publishers populations would have the same behavior as reported in the outcome of the study. The number of response received in this e-journal publishing adoption research constitute 62.4% response rate which is considered very high in survey research.

Table 4.1: Description of the Population Sampled

Population	500
Sample size	250
Responses	156
Response rate	62.40%

4.4 The Survey Instrument

The stages involved in instrument development are literature review, elicitation study, pilot testing (test for reliability and validity) and administration of the final questionnaire. The candidate initially conducted an elicitation study amongst selected Malaysian journal editors to extract information and useful tips about the attributes that are most important for e-journal publishing adoption and to find out if the questions will be meaningful to participants. The themes discussed in the elicitation study were pivotal in questionnaire development and in the process of formulating the item statements. The discourse centered primarily upon information regarding the characteristics of journal publishers, opinion

leaders, change agents and network links amongst journal publishers. The insights from the elicitation study allow the researcher to determine which variables would be included in the pilot study to test the validity and reliability of the proposed instrument before the final questionnaire was standardized.

The survey questionnaire was used to collect information in form of scores in order to confirm or reject the adopted theory. The items in the survey instrument are worded in order to gain useful insight about the research questions. The study adopted a combination of both closed and open-ended questions in the survey questionnaire. This combination of closed and open-ended questions was particularly useful in the early stages of research (especially at the pilot stage) as it gives an indication of whether the defined response categories adequately cover all the responses that respondents wish to give (Pallant, 2011).

The choice and definition of constructs precede and govern the formulation of each scale item. Content validity was achieved by making sure the scale items selected represent the concept about which generalizations are to be made. The questionnaire was well structured, tested and standardized, and each construct definition is assumed to have the same meaning and interpretation to all participants. In essence, the researcher created unique scale items that match the definitions of each of the attributes and other independent variables for the innovation been examined. A sample of the pilot questionnaire is given in Appendix B. The total number of items that were derived for the pilot study was eighty three, comprising seventy four scale items and nine other questions involving organization characteristics and demographic information.

The items that were derived all together after pilot study were 68 scale items plus 10 organization characteristics and demographic questions. The survey questionnaire is

divided into seven sections. Section 1 seeks data about the *familiarity with e-journals*. Section 2 seeks data about *innovativeness*. Section 3 solicits data on *perceptions about the five attributes of innovations*. Section 4 is about contributing factors such as *peer network influence* and *change agents' effort*. Section 5 seeks information about the dependent variable, *adoption*. Section 6 solicits information about the *level of implementation of e-journal publishing* while section 7 deals with information about respondent's *organization characteristics* and *demographic information*.

4.4.1 Operationalization of Constructs

The researcher draws upon *Rogers theory of innovation diffusion* to interpret the operational definitions of the variable constructs highlighted in the e-journal publishing diffusion model (Figure 3.2). The dependent variables measured from the research model are: *Adoption and familiarity* (*familiarity* serves as both IV and DV), while the independent variables measured are: *publication age, publication size, respondent's age, gender, field of publishing, publication format, publishing experience, time of adoption, innovativeness, relative advantage, compatibility, complexity, observability, trialability, peer network influence, change agent influence* in relations with the *adoption of e-journal publishing*.

The researcher pooled a set of Likert-type scale items that has been previously defined and validated by these researchers: Bayerl (2008); Conklin (2006); Gardner and Amoroso (2004); Goldsmith and Hofacker (1991); Moore and Benbasat (1991); Pankratz, Hallfors and Cho (2002); Park (2007); Robertson (2009); Rogers (2003); Savery (2005); Scott et al (2008); and Singh (2004)

These items were integrated to measure the highlighted constructs and the links between them. The researchers cited above have investigated different forms of innovations across various disciplines and therefore the scale items created for each investigations differs in their operationalization and vocabularies, but they were nonetheless coined with similar concept. For example the focus of Moore and Benbasat (1991) was on *information technology adoption* while Pankratz, Hallfors and Cho (2002) studied *adoption/diffusion of a federal drug prevention policy* et cetera.

Therefore, the operationalization of the variable constructs for the *adoption of e-journal publishing study* passed through expert evaluation before the pilot testing. The researcher randomly selected scholars from the University of Malaya to appropriate the scale items. The definition as given by Rogers (2003) of each of the attributes was written on top of each section and sub-section in the preliminary questionnaire for the expert to determine whether the scale item fit well with the definition of the attributes it is intended to measure. The selected scholars were able to make corrections and recommendations on the proper definition and operational meaning of each of the items in the questionnaire.

i. Dependent Variables

The dependent variables measured in this study are *Familiarity and Adoption* which are positioned at the section 1 and section 5 part of the survey questionnaire respectively. With the scale items created for *Familiarity*, the study solicits information about respondents' *familiarity* with e-journal publishing. Respondents were asked to indicate the extent in which they agree or disagree with seven statements which was reduced to six statements after pilot testing scored on a five point Likert scale from Strongly disagree to Strongly

agree. The measures of *familiarity* are operationalized in the form of : “*I am familiar with the access and pricing policy of e-journals*”, “*I am familiar with e-journal reviewing process*” et cetera. Respondents’ *familiarity* with issues, policies, and pricing aspects of e-journals could affect their decision to adopt. For the operationalization of *Adoption*, participants were asked to respond to statements asking about if they have already made the decision to produce their journals in electronic format, in this form: “*We have decided to produce our journal in electronic format*”; “*We have decided to archive the full-text of our journal via the internet/web/online portals*” etc. This scale item was used to separate the adopters from the non-adopters and correlate the scores with the independent variables.

ii. Independent Variables

The independent variables measured in this study are: Adopter characteristics: *publication age, publication size, respondent’s age, gender, field of publishing, publication format, publishing experience* and *time of adoption* which are positioned in the section 7 of the survey questionnaire; *innovativeness* at section 2; five attributes of innovation: *relative advantage, compatibility, complexity, observability, trialability* at section 3; supporting factors: *peer network influence and change agent influence* at section 4.

The *publication age* represents the number of years the journal publication has been in existence and the participants were asked to indicate the year their journal was established. Participants were asked to indicate the number of issues they published per year and this represents the value of the *publication size*. *Respondent’s age* is the real age of the respondent. *Field of publishing* is the field or area of discipline of the journal which is later

grouped into *Science/Technology* and *Social science/Arts/Humanities*. *Publication format* is the current format of the journal publication which can either be in e-only format, hybrid-format, or print only format. *Publishing experience* is the number of years the journal publisher has been involved in journal publishing. *Time of adoption* is the year the adopters amongst the publishers adopted e-journal publishing and this would be the determinant of the adopter categories. Some of these approaches in operationalization has also been used by Savery (2005), Zakaria and Rowland (2006), and Scott et al (2008).

The scale items measuring *innovativeness* is positioned in section 2 which measures respondent's perceptions about their receptiveness to *innovations*. This is operationalized as journal publisher's general attitudes towards *innovation* and the study has used the *self-report scale* that has been created and validated by Goldsmith and Hofacker (1991) to measure *innovativeness*. Respondents were asked to indicate the extent in which they agree or disagree with 10 statements which was later reduced to four statements after pilot testing concerning *innovativeness*, scored on a five point Likert scale from Strongly disagree to Strongly agree. Journal publisher's general attitude towards *innovation* can play a role in their attitudes towards *e-journal publishing adoption*. The items ask if publishers perceive themselves as an innovator or early adopter. This is determined from the backdrop of their earliness in adopting a new product or service, whether they adopt instantly, whether they encourage others to adopt, wait till someone encourage them to or wait to see how it works, or reject it if they can. The items are written as follows: "*In general, I am the first among my peers to purchase a new product or service when it is launched*" ; "*I generally do not adopt new products and services*" etc.

The scale items measuring the five attributes of e-journal publishing: *relative advantage*, *compatibility*, *complexity*, *trialability*, and *observability*.are positioned in the *section 3* of

the survey questionnaire. For the accurate operationalization of these attributes, the study adopted the scale items created and validated by Bayerl (2008); Conklin (2006); Gardner and Amoroso (2004); Moore and Benbasat (1991); Pankratz, Hallfors and Cho (2002); Park (2007); Robertson (2009); Savery (2005); and Scott et al (2008).

For *relative advantage* respondents were asked to indicate the extent in which they agree or disagree with ten statements which was later reduced to seven statements after pilot testing, scored on a five point Likert scale from Strongly disagree to Strongly agree as follows : “*E-journals are easier to produce than print journals; E-journals increase the quality of journals than print journals*” etc. For *compatibility*, respondents were asked to indicate the extent in which they agree or disagree with six statements which was later reduced to four statements after pilot testing scored on a five point Likert scale from Strongly disagree to Strongly agree as follows: e-journal publishing “*complies with all aspects of our publishing work ; Suits the way we like to publish our works*” etc. For *complexity*, respondents were asked to indicate the extent in which they agree or disagree with 5 statements scored on a five point Likert scale from Strongly disagree to Strongly agree as follows: “*Adoption of e-journal publishing is very challenging ; Implementation of e-journal publishing is difficult*” etc. For *observability*, respondents were asked to indicate the extent in which they agree or disagree with five statements scored on a five point Likert scale from Strongly disagree to Strongly agree as follows: “*I have no difficulty communicating to others about how to implement e-journal publishing ; I have seen how other publishers handle e-journal publishing*” etc. For *trialability*, respondents were asked to indicate the extent in which they agree or disagree with three statements scored on a five point Likert scale from Strongly disagree to Strongly agree as follows: “*I have a great deal of opportunity to try various e-journal applications; I have experimented with e-journals on a number of publishing platforms such as open journal systems*” etc

The scale items measuring *peer network influence* and *change agent influence* is operationalized to find out the influence of *peer network* and *change agents* on e-journal publishing *adoption*. Respondents were asked to indicate the extent in which they agree or disagree with four statements concerning the *communicated experience* of others in their social system on their decision making scored on a five point Likert scale from Strongly disagree to Strongly agree as follows: “*Information we share with other publishers helped us to incorporate new innovative ideas in our organization; The support we receive from other publishers helps us to incorporate new innovative ideas in our publishing practices*” etc. The statements worded for *change agent’s influence* are five statements which was reduced to three statements after pilot testing in this form: “*Recommendations made by specific individuals/organizations helped us in making decisions about our publishing practices*” etc.

The scale items measuring *implementation* of e-journal publishing is presented in section 7. The study seek to know the publishing mode been adopted, whether publishers are adopting e-only or hybrid, in addition to this is to collect information about interactive features that characterize the web-user interface of each e-journal website. This illuminates on the level at which the e-journal publishing is been implemented. The result from this section was also helpful to understand how much of resources users and subscribers can actually obtain from the e-journal publishing website. These includes resources like: old issues of the journal, links to related articles and organizations, the possibility of purchasing article online if it is not “open access”, editorial information, information about reviewers, as well as the kind of services and application been supported by the e-journal publishing system. The findings from this section reveal the stage of Malaysian e-journal publishing in the *Innovation Diffusion Process*.

4.5 Administering the Survey

The study employed both web-based and postal survey to administer the survey questionnaire. This is to ensure that the study achieve a wider potential complete population coverage for sampling. The postal survey was delivered through *POSMalaysia* postal services with addressed envelopes, personalized cover letter, including postage paid return envelope. This approach affords the respondent time and space to reflect and think through the questions before answering. It also enables them to make corrections and also provides privacy.

The postal survey method, however suffered from some setbacks which was majorly due to a change of address of many of the journal publishing offices. The web based option was able to rectify some of the problems with the postal survey because the participants that the candidate was unable to reach through the postal service were reachable through the Internet. Although the Internet platform also suffers from some setback due to change of e-mail and website address but unlike the postal service method, it is easier to identify incorrect or invalid address online.

The web-based survey provider used for this research is *Survey Monkey* which charged the researcher 600rm for a year license of the survey software. However, the web-based approach is still more cost effective and faster than the postal service. It is faster to design and administer and provides automatic coding of responses for the researcher (instead of manual coding). The web based survey also allow for automatic tabulations and analysis of data.

4.6 Handling the Non-Response Bias

In order to ensure a no non-response bias, the study adopted both online survey and postal survey method in the data collection. This is due to the fact that Internet-service adopters have been perceived generally to be comfortable with the Internet environment of doing things, and the non-adopters perceived to be less familiar or comfortable with online platforms. Some participants might be comfortable with online survey and some might not. Therefore, it was necessary to consider individuals who are less familiar with Internet environment in the data collection process to avoid non-response bias.

The postal survey questionnaire was sent at once to all participants and the process of reminding them started two weeks after the post was sent. Whereas, the online survey was sent batch by batch, 3 to 4 e-mails at once in some instance, due to the fact that multiple e-mail sent, results in delivery failures and junk mails. Therefore, phone call follow up was used to identify delivered and un-delivered e-mails.

To avoid non-response bias, respondents that were contacted through e-mails received reminders every 3 days till they acknowledged they have responded and this was done consistently for 3 months. Similarly, the respondents that were contacted through postal service received phone calls reminders until they acknowledged they have responded and this was also done consistently for 3 months. Most of the non-respondents that were contacted through phone calls indicated (some through their secretary) that they have been extremely busy, or not in office or on vacation or on sabbatical leave and promised to respond whenever they are free or back in office. Since most of the participants are academics and the pattern of office workloads, leave and vacation is not peculiar to a

particular institution, field, or demography, it can be assumed that the pattern of data collection is not bias to non-respondents.

Information generated from follow up phone calls and e-mail conversation with the members of the population sampled indicated that there is no much difference in the characteristics of respondents: early and late responders, compared to the non-respondents.

The high response rate achieved in the study is also an indication of a no non-response bias

Additionally, the characteristics of the respondents with respect to age, gender, areas of specialization, current journal format, years of experience is also an indication of a no non-response bias in the sample. This is because the demographics and characteristics of respondents is not concentrated along a particular section or categories or amongst groups of likeminded, like-status individuals.

4.7 The Pilot Study

The pilot study was conducted to test the validity and reliability of the instrument designed for data collection. Pilot testing of the e-journal publishing survey instrument is a very essential aspect of this research because it allows the candidate to be able to eliminate bias and reach objective conclusion in the interpretation of the findings.

The survey questionnaire was carefully designed to make sure participants accord accurate meaning to each statement. Also the theoretical definition of each variable construct was highlighted above each section so that respondents would be able to understand and interpret the questions correctly. This extremely reduced errors in lexical terminologies. Initially, the researcher developed a web-based survey using a free survey tool known as *Survey pro*. The survey link was sent to publisher's personal e-mail, and in some cases, to

the journal's official e-mail, accompanied with a cover letter indicating the purpose of the study. Using *Survey pro tool* ended up being ineffective, as there were very few responses received from the online survey. This might show that *Survey-pro* is not a very friendly tool for this kind of survey because respondents complained of the non-friendliness of the Survey-pro interfaces especially with respect to page navigation.

In addition to the web-based survey, the researcher also carried out a pilot study among Malaysian journal publishers at the *international conference on journal citation systems in Asia Pacific Countries, 22nd of May 2012, at the Pan Pacific KLIA, Malaysia*. The participants at the conference were journal editors and publishers mostly from Malaysia and South-East Asia. It was a one day conference and the pilot questionnaire was administered at the morning session and collected at the end of the evening session. The researcher also had the opportunity to interact with the participants and provide clarifications when needed.

The sample size for the e-journal publishing survey instrument was kept at minimum since it was not the final questionnaire. The pilot survey with a total of 200 questionnaires was administered, of which 90 were filled while only 82 responses were usable. A sample of the pilot questionnaire is provided in Appendix A. Respondents commented on the length and wording of the items and also gave some useful insights regarding the questionnaire and the research. This enables the researcher to determine whether the respondents understand the questions and if the time taken to answering the questionnaire was reasonable. It also enables the researcher to understand any kind of difficulty respondents might face when completing the final questionnaire.

The data from the pilot testing was also analyzed for reliability, item-item correlation and item-scale correlation. The internal consistency of each scale was measured using Cronbach's Alpha and each of the scale in the e-journal publishing survey questionnaire exhibit adequate reliability with Cronbach's alpha being close to or above the recommended 0.70 level. The study also collected a descriptive statistical summary for each construct and examines them for normality to determine which kind of inferential statistics to be applied.

4.8 Changes Made After the Pilot Study

After the pilot study, many changes were made to improve the questionnaire. The result of the e-journal publishing pilot study suggests that there is need to drop some items from the scales and there is need for corrections and rewording of some items, after which it was deemed safe to proceed with final data collection.

The heading of section 1 was changed from AWARENESS OF E-JOURNAL PUBLISHING to FAMILIARITY WITH E-JOURNAL PUBLISHING. In section 2 the heading was changed from RECEPTIVENESS TO INNOVATIONS IN GENERAL to INNOVATIVENESS which previously includes 10 items in total, formulated to classify the five adopter categories. However after running factor analysis and reliability text, it was conceived and deemed necessary to transform this section to explain INNOVATIVENESS alone using four items only (Appendix B). Therefore six items were deleted due to inconsistency of result and unreliable answers while four items were retained to explain INNOVATIVENESS.

One item in section 5 was deleted for inconsistency and the pilot data in this section was analyzed through descriptive statistics using measures of central tendency. Each item describing the *level of implementation of e-publishing* was analyzed descriptively separately. Some items in section 6 were also improved, while some items were also added for the final data collection.

Section 6 of the pilot questionnaire contains information concerning *publisher's characteristics* and *demographic variables* which were analyzed descriptively. This section was subjected to lot of changes. Respondents were asked to select the type of affiliation their journal publication falls under, given six options and a chance to add theirs if it is none of the options provided. Likewise they were asked to select their journal's area(s) of expertise, with option for *Others* if theirs is not in the list. This resulted in a lot of discrepancies as some respondent's selected more than one option, in some cases 3 or 4 options were selected which leads to problem with classification, categorizations and analysis. However, the analysis shows that majority of the respondents publish only academic journals but the analysis couldn't reflect much on the areas of expertise. In the final questionnaire for these reasons, only two options were provided for affiliation (Academic / Non-academic) and no option was given for areas of expertise as respondents were asked to write it in their own word. The written responses for area of expertise were then categorized into two groups, science/technology in one, social science/humanities in the other.

The final questionnaire also went through expert review which has to do with correction of grammatical or lexical errors and the structure of the questionnaire. Experts also gave advice on the strategy for instructions and distributions. The cover letter in Appendix B explained the purpose of the study and why the participants were selected to take part. The

letter also includes return instructions and promise of a gift voucher in appreciation of their time and effort. The task of postal survey questionnaire administration involved cutting, addressing, pasting, and stuffing paper survey questionnaires along with a returned addressed postage-paid stamped envelope into the envelope carrying each publishers address. While the task of online survey questionnaire through *Survey Monkey software* involved sending e-mails and repeated reminders to participants consistently for 3 months with the hope of acknowledging receipt and potential response.

Due to ethical concerns, no personal identification of participants was recorded or retained on response sheet or the computer that would allow participants anonymity to be compromised.

4.9 Data Analysis

IBM SPSS software version 21 was employed to manage the data. A code book (Appendix C) was developed to code each variable prior to entry into the software. After data entry, a descriptive statistical summary was prepared so that the analysis would be meaningful even at a glance. This enables the researcher to identify if the data were properly coded and to ensure that every variable has a unique code. Descriptive analysis also aid to develop sufficient knowledge about the data and to understand the levels of measurements to be chosen, their distribution, characteristics, spread and shape.

Quantitative research tradition was followed in this process. The data from section 1 – 4 of the pilot study was subjected to factor analysis test using IBM SPSS version 21. Factor analysis is a reduction technique commonly conducted to refine and reduce a large set of items to form a smaller number of coherent sub-scales in order to be able to run inferential

test with them. It is also used to reduce a large number of related variables to a more manageable number, prior to using them in other methods. Hence, factor analysis seeks the least number of factors to account for the largest amount of common variance of a set of variables (Hair et al 1995). The study seek to know how much of the scale items in the e-journal publishing survey questionnaire can explain respondents *familiarity, innovativeness, perceptions about the attributes of innovation, peer network* and *change agent influence* as related to the *adoption* of e-publishing.

Therefore, the larger the recorded variance the better it is for the validity of the study. This is because if the variance is large, 60% and above, it will explain more about the variables, however, if the variance is small, 20% or less, then the scale would be considered not to be good since it will not be able to explain much about the variables. A value of 0.4 and above of multi-co linearity is required and considered strong. A value of 0.2 is considered weak and if this is the case, recalibration of the scale is advised.

Moreover, to verify that the study data set is suitable for factor analysis, two statistical measures were employed : Barlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (Kaiser, 1970). For the factor analysis to be considered appropriate, Barlett's Test of Sphericity should be significant at ($p < .05$) and values of Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy must be between 0.6 and 1.0 which is an indicator of a good factor analysis (Malhotra, 2008).

For this study on adoption of e-publishing amongst Malaysian journal publishers, scale items that recorded factor loading of less than 0.40 are not accepted and have been dropped. Although according to Hair et al. (2010), factor loading of +/-0.3 to +/-0.4 are minimally acceptable, however values greater than 0.50 are generally considered necessary

for practical significance. For this study, only scale items that recorded factor loading of 0.40 or higher are accepted.

For the hypothesis testing, the study seeks to find out the degree of relationship that exists between the independent variables: *publisher's characteristics, organization characteristics, attributes of e-journals and other supporting factors* with the dependent variables, *familiarity and adoption*. In this analysis as most research in social science, a p-value of 0.05 is taken as the standard value. A p-value of 0.05 would indicate that there is only a 5% chance of obtaining the result of the calculated correlation value (r / rho value) if the study samples were not from the same population. In another word, a p-value of 0.05 would indicate that there is only a 5% chance that the researcher would be wrong in concluding that what is true of the sample is also true of the population. Practically this means that the researcher has a 95% confidence of making a right decision with the study sample. Therefore the researcher looks for *p*-values to be less than 0.05 which is the commonly used significance level in social science research.

4.10 Summary

This chapter discusses the methods and approach that was used in carrying out this research. It discusses the research methods commonly used in social science studies and how it will be applied to this current study. The chapter presents the step by step approach of data collection and analysis process, the statistical procedure that was adopted for the study, the creation of instrument for data collection, and the outcome of the pilot testing phase of the research. The chapter then explained the standardization of the final questionnaire used for the study.

CHAPTER 5

DATA ANALYSIS AND FINDINGS

5.1 Introduction

This chapter presents the data analysis and findings. The data analysis process is divided into three main parts. The first part deals with the determination of the validity and reliability of the scale items presented in the questionnaire. The second part deals with normality test for the continuous variables. The third part has to do with the presentation of result by applying relevant statistical methods to tests the research hypothesis as a result of the outcome from the first and second part of the data analysis.

5.2 Test of Validity and Reliability

The study applied the statistical method known as factor analysis to test for the validity of the scale items and the reliability coefficient, Cronbach's alpha to test for the reliability of the scale items. With factor analysis, the study attempts to identify the amount of variance explained in the respective scales in the e-journal publishing survey questionnaire that can explain respondent's *familiarity, innovativeness*, perceptions about the 5 attributes of innovation: *relative advantage, compatibility, complexity, observability and trialability*, the supporting factors: *peer network and change agent influence* and the dependent variable : *adoption*. To achieve this, principal factor analysis (PFA) method (commonly used by researchers for scale development and evaluation) is applied and no rotation technique was used because each of the variables strongly loaded on one component and each component is represented by a number of strongly loading variables. For an adequate

factor analysis test, it was suggested by Pallant (2011) that the sample size should be above 150 and there should be at least a ratio of five cases for each variable.

The assumption underlying the required sample size is met in this study. However some of the variables have less than five cases because some of the items have been dropped after the first pilot study. Another important assumption for the suitability of conducting factor analysis is the Bartlett's test of Sphericity, which should be significant at $p < .05$ and the Kaiser-Meyer-Olkin measure of sampling adequacy value which should be between 0.6 and 1. This assumption is also met in this study as shown in Table 5.1 which represents the summary of the exploratory factor analysis, with result of the reliability analysis. Only scale items that recorded factor loading of 0.40 or more are retained and items that recorded lesser values have been dropped.

Table 5.1: Summary of the Factor Analysis and Reliability Analysis

	Factors extracted	No of loaded items	No of unloaded items	No of items dropped	Variance explained	Measure of sampling adequacy (Kaiser-Meryer)	Test of sphericity (Barlett's Test. Sig.)	Cronbach's alpha
Familiarity	1	6	0	0	76.358	0.914	$p = .000$	0.938
Relative advantage	1	9	0	0	47.26%	0.844	$p = .000$	0.848
Compatibility	1	4	0	1	75.99%	0.768	$p = .000$	0.909*
Complexity	1	4	1	1	46.50%	0.731	$p = .000$	0.731*
Observability	1	5	0	0	59.72%	0.75	$p = .000$	0.828
Trialability	1	3	0	0	77.42%	0.73	$p = .000$	0.853
Peer network influence	1	4	0	0	66.50%	0.707	$p = .000$	0.828
Change agent influence	1	3	0	0	81.30%	0.71	$p = .000$	0.883
Innovativeness	1	4	0	1	61.67%	0.737	$P = .000$.807*
Adoption	1	3	0	0	89.59%	0.770	$p = .000$.941

*The value of Cronbach's alpha after one item is deleted

It has also been recommended that only factors with an eigenvalue of 1.0 or more should be retained. By using this rule therefore, this study has retained one factor for each variable explaining 76.35% of the variance in *Familiarity*, 47.26% of the variance in *Relative*

advantage (Table 5.1) and so on. Each of the scale in the e–journal publishing survey questionnaire exhibit adequate reliability with Cronbach’s alpha being close to or above the recommended 0.70 level (Table 5.1). Therefore the resulting numbers of items are valid and reliable for each of the constructs and they are used for inferential statistics in subsequent analysis.

Table 5.2: Factor Loadings of the Ten Constructs Examined

Familiarity	Loading
I am familiar with the rules and policies concerning e-journals	.916
I am familiar with the management process of e-journals	.898
I am familiar with the access policy of e-journals	.892
I am familiar with e-journal reviewing process	.864
I am familiar with the format type of e-journals	.863
I am familiar with the pricing policy of e-journals	.808
Innovativeness	
In general, I am the first among my peers to adopt a new product and service when it is launched	.747
If I hear that a new product and service is available I would be the first to adopt	.680
I generally adopt a lot of new products and services and influence my peers to do so	.712
My opinion about new products and services is respected by peers	.804
Relative advantage	
E-journals enhance productivity than print journals	.754
E-journals make journals more visible than the print journals	.748
E-journals attracts wider readership than print journals	.742
E-journals are easier to disseminate than print journals	.737
E-journals are faster to publish than the print journals	.732
E-journals attract more authors to submit than print journals	.707
E-journals give authors more recognition than print journals	.600
E-journals increase the quality of journals than print journals	.580
E-journals are easier to produce than print journals	.548
Compatibility	
Complies with our publishing values and norms	.946
Complies with all aspects of our publishing work	.905
Is consistent with our practice of journal publishing	.858
Suits the way we like to publish our works	.768
Complexity	
Implementation of e-journal publishing is difficult	.851
E-journal publishing is too demanding	.798
Adoption of e-journal publishing is very challenging	.662
E-journal publishing requires technical skills/technologies which are difficult to	.650

understand E-journal publishing requires many difficult tasks	
Observability	
I can communicate to others about the consequences of publishing e-journals	0.823
I have seen how other publishers handle e-journal publishing	.802
I have observed e-journal websites and see how they work	.785
The outcome of publishing e-journals is clear to me	.744
I have no difficulty communicating to others about how to implement e-journal publishing	.703
Trialability	
I have experimented with e-journals on a number of publishing platforms such as open journal systems	.891
I have a great deal of opportunity to try various e-journal applications	.885
I have great deal of opportunity to submit or review papers in e-journals through the online submission system	.863
Peer network influence	
Information we share with other publishers helps us to incorporate new innovative ideas in our organization	.844
Conferences, workshops or seminars organized by peer network have great influence on our publishing practices	.836
The support we receive from other publishers helps us to incorporate new innovative ideas in our publishing practices	.807
Overall, our peer network has a large influence on our publishing practice	.774
Change agent influence	
The support we receive from specific individuals/organizations help us to incorporate innovative technologies in our publishing practices	.933
Recommendations made by specific individuals/organizations helped us in making decisions about our publishing practices	.916
Contacts we had with specific individuals/organizations has an influence on our publishing practices	.854
Adoption	
We have decided to produce our journal in electronic format	.951
We have decided to disseminate our journal through the internet/web/online portals	.949
We have decided to archive the full-text of our journal via the internet/web/online portals	.939

5.3 Test of Normality

The candidate also collected information on the distribution of scores (normality test) from the e-journal survey instrument, prior to running inferential statistical analysis. The most important indicator used in the normality test is the skewness and kurtosis. The former provides an indication of the symmetry of the distribution while the latter provides information about the peakedness of the distribution. The graphical techniques adopted in

this study are: histogram, scatterplot and boxplot which are very useful in inspecting the shape of the distribution and the determination of normality.

For a distribution to be considered normal on the histogram, most of the scores must be concentrated at the center, tapering out towards the extremes in each direction. To be considered normal on the scatter plot, the plot of scores must produce a straight line and for the boxplot, the distribution must be symmetric with the median line in approximately the center of the box and with symmetric whiskers somewhat longer than the subsections of the center box (Elliott and Woodward, 2007; Muijs, 2010; Pallant, 2007). The extreme values (outliers) observed to be visible from the boxplot in each cases were carefully examined and modified or deleted depending on how the extremity would affect the result of the inferential statistical analysis. This enables the researcher to understand and employ the most appropriate statistics.

Basically, this research, as with most survey research is more interested in the strength of relationships between the continuous variables examined, therefore the relevant test applied is either the *Pearson product moment correlation coefficient* or *Spearman correlation*, depending on whether the distribution of scores in each variable is normally distributed or not. The correlation analysis indicates the degree or strength and direction (positive or negative) of association between each IV (independent variable) and the DV (dependent variables) in the *e-journal publishing research framework*. A positive correlation between a specified IV and DV indicates that as one of the variable increases, so does the other. A negative correlation indicates that as one of the variable increases, the other decreases. The covariance “r” varies between -1.0 and +1.0. A correlation of 0 will specify no relation at all; a correlation of 1.0 will indicate strong positive correlation, while

a value of -1.0 will indicate strong negative correlation (Hair et al., 2010; Malhotra, 2008; Pallant, 2010; Pallant, 2011).

Lot of information is generated from the normality test. For each of the variable, the information generated presented the summary of each case in Table 5.3 which indicates the number of valid and missing values, mean, median, variance, std. deviation, skewness and kurtosis for each variable.

The skewness and kurtosis which provides information about the distribution of scores are very useful in assessing normality for continuous variables. A skewness and kurtosis value of 0 will indicate that the distribution is perfectly normal. Going by the result of the generated descriptive statistical summary in Table 5.3 and the assumption which stems from result of skewness and kurtosis, it can be said that that the distribution of scores in all the 10 cases is not perfectly normal.

Result of the skewness shows that the distribution of scores in *Familiarity* (-.562), *Relative advantage* (-.133), *Trialability* (-.386) and *Adoption* (-.647) indicates a clustering of scores at the right end towards the right-hand side of the graph which result in negative skewness (Table 5.3) (Figures 5.1 – 5.10). On the flipside, *Compatibility* (.226), *Complexity* (.199), *Observability* (.360) and *Change agent influence* (.195) all have positive skewness value with the distribution of scores clustered to the left-hand side of the graph towards the low values, while *Peer network* (.001) and *Innovativeness* (-.042) have skewness value that is approximately 0 – an indication of normality (Figure 5.3). On the other hand, the distribution is said to be highly peaked and clustered in the center with long thin tails when it has a positive kurtosis values and it is said to be flat with the data spread out with too many cases in the extremes when it has negative kurtosis values.

Table 5.3: Descriptive Statistical Summary for the Ten Variables

	Valid	Missing	Total	Mean	Median	Variance	Std. Deviation	Skewness	Kurtosis
Familiarity	150	6	156	22.57	23.00	22.26	4.71	-0.562	0.252
Relative advantage	147	9	156	35.89	36.00	25.68	5.06	-0.133	-0.229
Compatibility	149	7	156	11.81	12.00	3.23	1.79	0.226	-0.384
Complexity	148	8	156	14.09	14.00	12.48	3.53	0.199	-0.662
Observability	147	9	156	18.72	19.00	6.709	2.59	0.360	-0.155
Trialability	147	9	156	10.87	12.00	6.53	2.55	-0.386	-0.405
Peer network influence	146	10	156	15.76	16.00	4.462	2.11	0.001	-0.223
Change agent influence	145	11	156	11.79	12.00	3.04	1.74	0.195	-0.302
Innovativeness	150	6	156	9.26	9.00	5.57	2.36	-0.042	-0.716
Adoption	146	10	156	11.41	12.00	12.98	3.60	-0.647	-0.884

The result shows that only *Familiarity* (0.25) has scores clustered around the center which resulted in highly peaked curve and positive kurtosis value. While *Relative advantage* (-.229), *Complexity* (-.662), *Compatibility* (-.384), *Observability* (-.155), *Trialability* (-.405), *Peer network* (-.223), *Change agent influence* (-.302) *Innovativeness* (-.716) and *Adoption* (-.884) have a distribution of scores spread out with negative kurtosis values (Figures 5.1 – 5.8) leading to the conclusion that the distribution is not normal due to negative kurtosis values.

Table 5.4: Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Familiarity	.123	150	.000	.945	150	.000
Relative advantage	.074	147	.049	.978	147	.018
Compatibility	.252	149	.000	.871	149	.000
Complexity	.129	148	.000	.972	148	.004
Observability	.147	147	.000	.928	147	.000
Trialability	.173	147	.000	.932	147	.000
Peer network influence	.202	146	.000	.924	146	.000
Change agent influence	.253	145	.000	.873	145	.000
Innovativeness	.108	150	.000	.954	150	.000
Adoption	.202	146	.000	.860	146	.000

a. Lilliefors Significance Correction

To further examine the normality strength of the ten variables, Kolmogorov-Smirnova and Shapiro-Wilk test (Table 5.4) was employed. Result shows that the ten variables are not normal. A non-significant result (if value is more than .05) will indicate normality while a significant result (if value is equal to .000) will indicate a non-normal distribution.

In order to have enough evidence to support the decision on the normality test, a further assessment of normality is done by considering the shape of the distribution of scores on the histogram (Figures 5.1 – 5.10) which is a very useful graphical technique. It illustrates the actual shape of the distribution of scores for each construct. Analyzing each variable using the histogram plot allows the researcher to justify whether their distribution can be considered normal or not. Figure 5.1 properly indicate that *Familiarity* is not normally distributed because the shape of the histogram is skewed to the right.

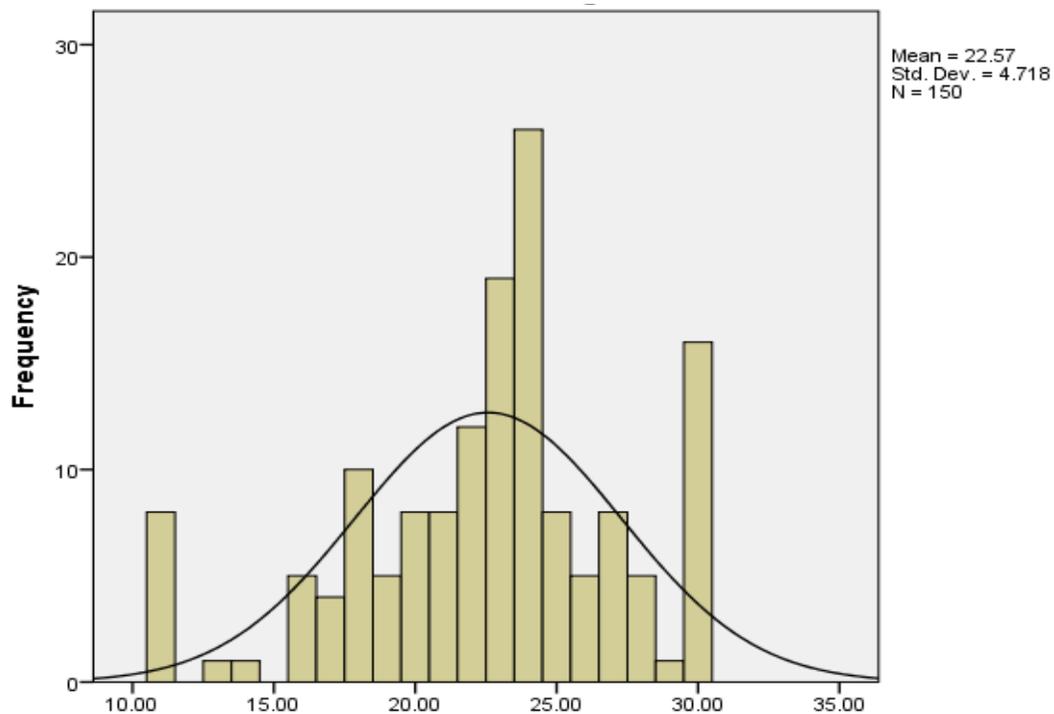


Figure 5.1: Histogram of Familiarity

Figure 5.2 indicates that the distribution of scores for *Relative advantage* is not perfectly normal, although the scores are highly concentrated at the center, however there are reasonable amount of scores that tends towards the right hand side of the chart. Therefore, it is assumed that the distribution of scores for all cases in this sample for *Relative advantage* is not normally distributed. Figure 5.3 shows that the distribution of scores for *Compatibility* is not normally distributed because the shape of the graphs tends largely towards the left-hand side of the graph. Figure 5.4 indicates that the pattern of distribution of scores from *Complexity* is approximately normal.

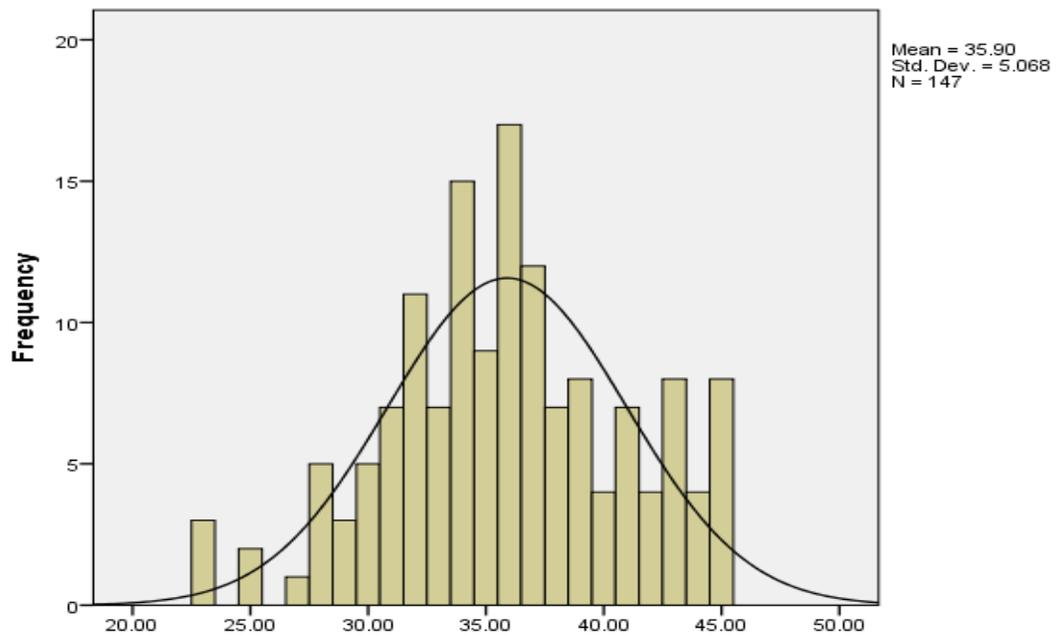


Figure 5.2: Histogram for Relative advantage

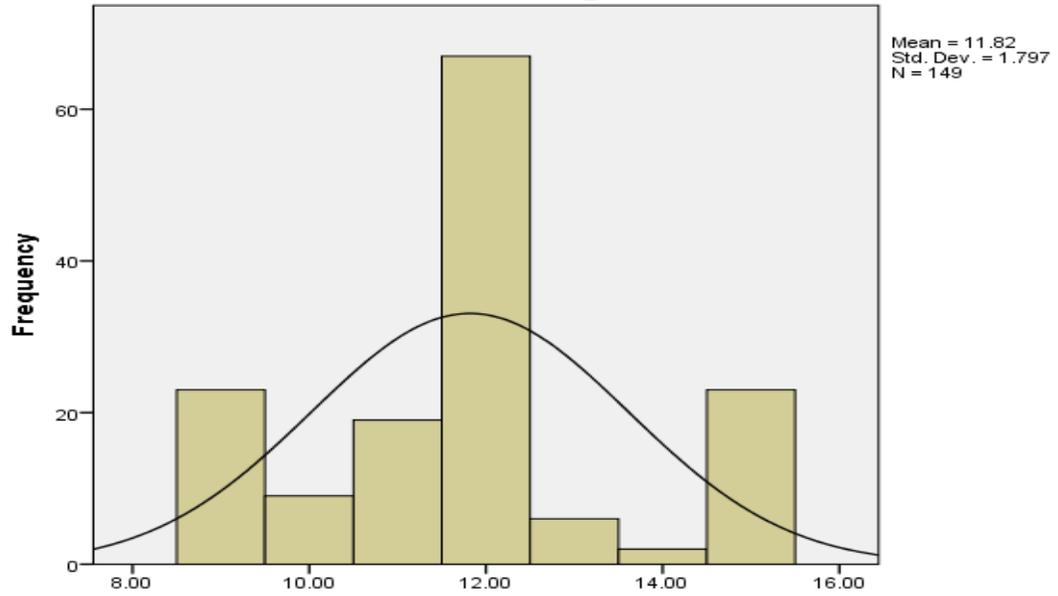


Figure 5.3: Histogram of Compatibility

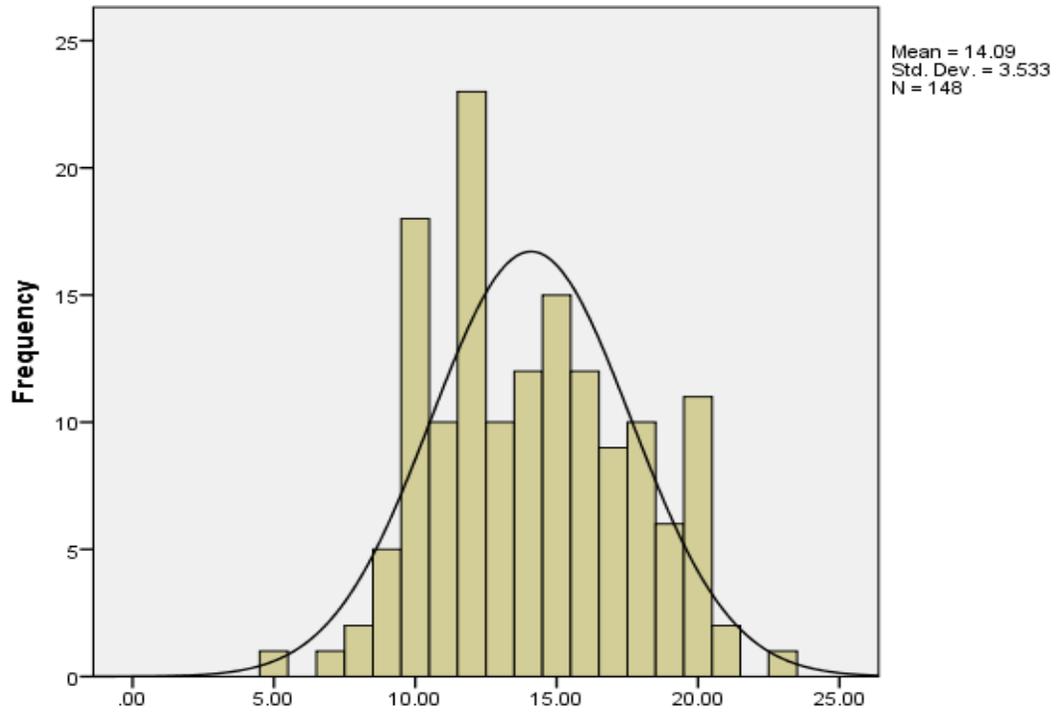


Figure 5.4: Histogram of Complexity

Figure 5.5 represents the histogram plot for *observability* and it showed that the shape of the chart is skewed towards the left hand side which does not fit a *bell shaped* curve. Therefore, it is assumed that the distribution of scores for all cases in this sample for *observability* is not normally distributed. Figure 5.6 represents the results of the graphical analysis for *trialability* and the plot indicated that the distribution of scores in this variable constructs is not normal. The normality test result for *peer network* is depicted in Figure 5.7 and the histogram shows that the distribution is not normal.

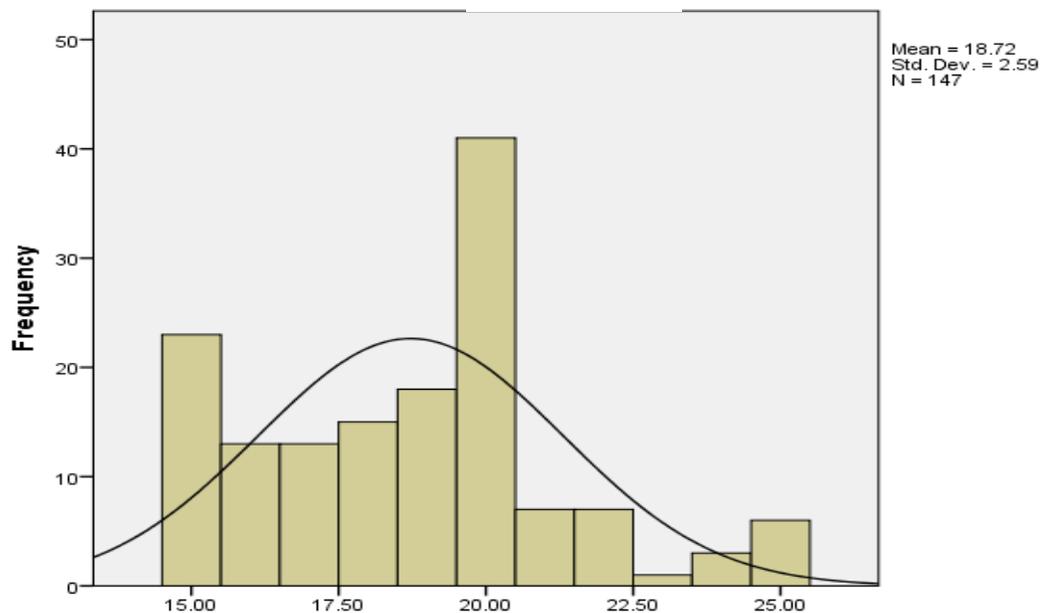


Figure 5.5: Histogram of Observability

Figure 5.8 represents the results of the graphical analysis for *change agent influence* and plot indicate that the distribution of scores in this variable constructs is not normal. The histogram plot for *innovativeness* is depicted in Figures 5.9 and it shows that the distribution is normal. Figure 5.10 represents the results of the graphical analysis for *adoption* and the plot indicated that the distribution of scores in this variable constructs is not normal.

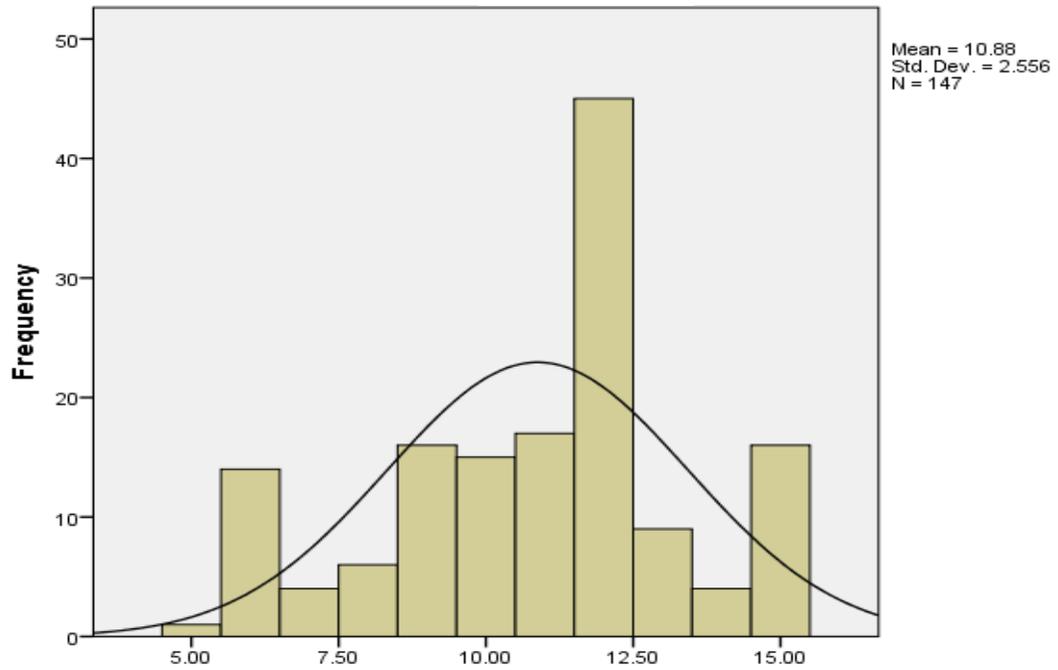


Figure 5.6: Histogram of Trialability

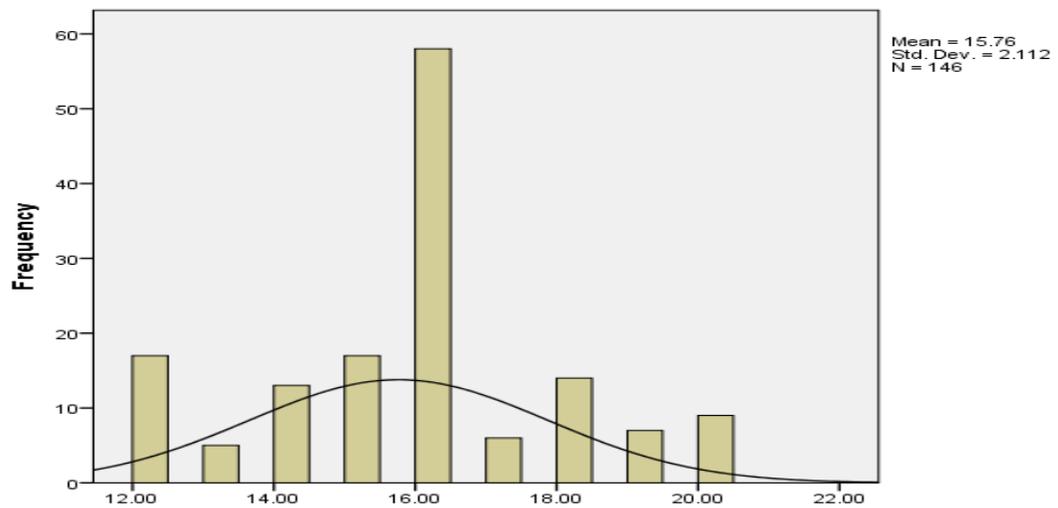


Figure 5.7: Histogram of Peer network influence

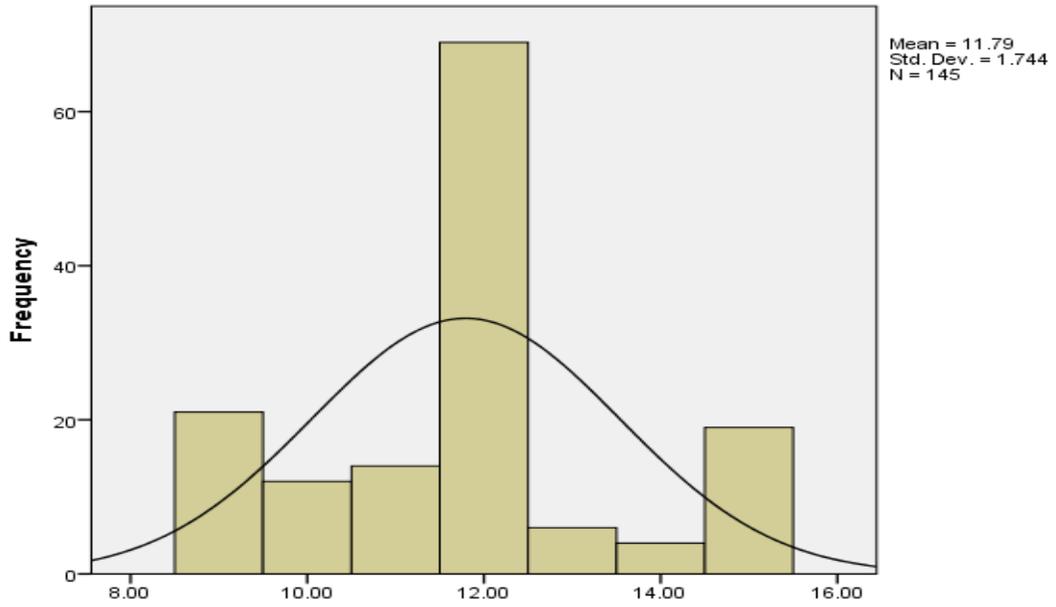


Figure 5.8: Histogram of Change agent influence

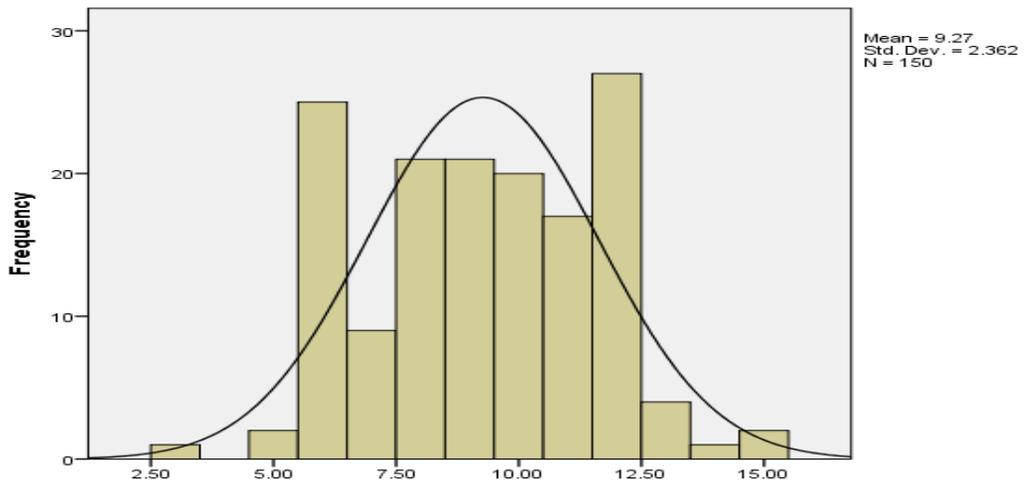


Figure 5.9: Histogram of Innovativeness

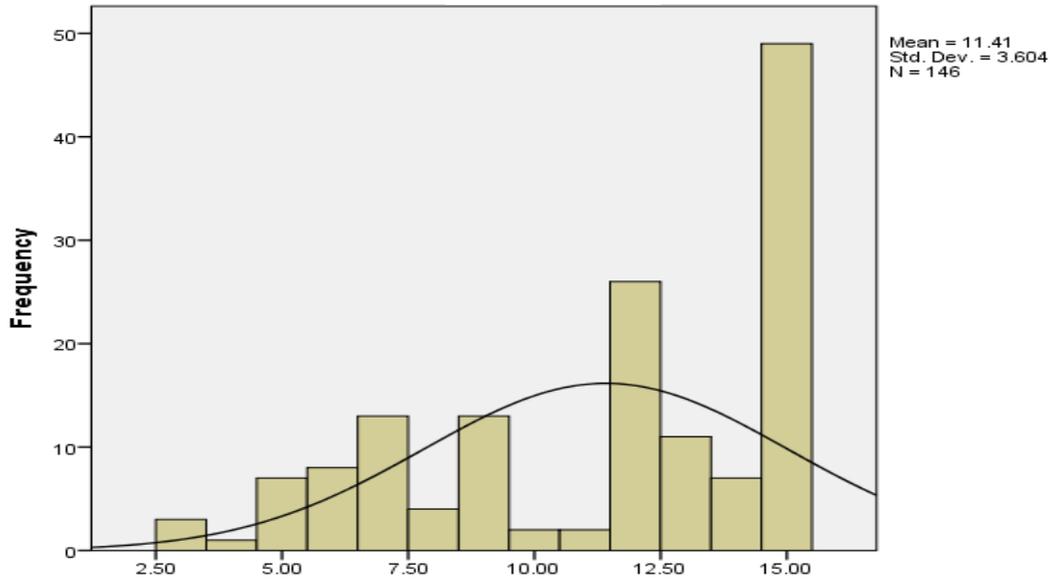


Figure 5.10: Histogram of Adoption

Hence, the graphical representations of the normality test have demonstrated that only *Complexity* and *Innovativeness* has a distribution of scores that can be regarded as approximately normally distributed, while the distribution of scores in the other case samples : *Familiarity*, *Relative advantage*, *Compatibility*, *Trialability*, *Observability*, *Peer network*, *Change agent influence* and *Adoption* are not normally distributed. Many researchers have discussed that most of the distributions of scores in quantitative research are not normally distributed especially with large samples. The test of normality guides the research to choose the right inferential statistics that is applicable in answering the various research questions in this study.

5.4 Findings

5.4.1 Demographic Information

Table 5.5 represents the output of the frequency distribution of the categorical variables: *gender, journal affiliation, publication format, field of publishing* and it shows that there are 88 males (56.4 per cent) and 65 females (41.7 per cent) in the sample, while 3 values are missing, giving a total of 156 respondents.

Table 5.5: Frequency Distribution of the Categorical Variables

	Variable characteristics	Frequency	Percent(%)
Gender (n=153)	Male	88	56.4
	Female	65	41.7
	Total	153	98.1
	Missing	3	1.9
Publication format (n=146)	Hybrid	63	40.4
	E-only	43	27.6
	Print only	40	25.6
	Total	146	93.6
	Missing	10	6.4
Publication type (n=156)	Academic	131	84.0
	Non-academic	17	10.9
	both	8	5.1
	Total	156	100.0
	Missing	0	0
Field (n=140)	Science and Technology	77	49.4
	Social Science, Arts & Humanities	63	40.4
	Total	140	89.7
	Missing	16	10.3

Results from *journal publication format* revealed that 43 (27.6%) publishers are producing their journal only in electronic format, while 63 (40.4%) publishers are practicing hybrid mode of publishing, 40 (25.6%) are still producing their journal in print format only. If it is considered that the sample analyzed in this study is a representative of the population

studied, it can be said that at the time of collecting this data, almost a third of the Malaysian journal publishers are still yet to adopt e-journal publishing.

Table 5.5 above further revealed that majority of the respondents in this sample belongs to academic journal publishing (131, 84%) while the non-academic publishers represents mere (17, 10.9%) of the sample. Journal publishers who falls under both academic and non-academic group represents (8, 5.1%) of the respondents. This indicates that the bulk of journal publishing in Malaysia is from academic institutions. The table also shows that there are 77 (49.4%) respondents from the field of science and technology while there are 63 (40.4%) from social science, arts and humanities.

5.4.2 Inferential Statistics and Results

The research method adopted for this study is quantitative, which automatically leads to adopting a quantitative data analysis method for the *e-journal publishing adoption study*. For the current investigation, the main undertaken involves using statistical tests to examining relationships between two or more variables, or differences between two groups. Inferential statistics, in this study is used to make inferences from sample data to the population. The statistic test for statistical significance of results obtained through the e-journal publishing adoption survey questionnaire, i.e. statistically significant relationships between variables or statistically significant differences between two or more groups of variables highlighted in the e-journal publishing research framework.

Inferential statistics basically deals with the problem of making broader generalizations or inferences from the study sample data to the population. This leads to conducting statistical

procedures that is used to arrive at some valid conclusions that extend beyond the sample statistics and also employ the sample scores for hypothesis testing. In the case herein, a sample of Malaysian journal publishers were taken from the population and the research was conducted using this sample, generating results that were strictly related only to the sample. The study endeavor to find out whether what is true of the sample is also true of the population. The study makes a general statement about the behavior and *adoption decision* of Malaysian journal publishers in the *adoption of e-journal publishing*. It is very essential to be able to say in this research with a certain probability how likely it is that a relationship was found in the study sample if it did not exist in the population.

Result of the statistical analysis is presented in this section, relating how each of the research questions were answered and what statistical analysis was conducted. The justification for the choice of statistics employed was explained, accompanied by tables and graphs representing the outcomes of the analysis. In the preceding section it has been observed that the distribution of scores for all the continuous variables examined, except three variables are not normally distributed. In the case where the variables are not normal, the non-parametric techniques method was applied. What is more important in this study is to understand the size of the relationship and if there are significant relationships between the demographic variables (*Field of publishing, Publication age, Publication size, Publication format, Time of adoption, Publishing experience*), the eight scale variables (*Familiarity, Innovativeness, Relative advantage, Compatibility, Complexity, Observability, Trialability, Peer network influence, Change agent influence*) and two dependent variables DV's (*Familiarity and Adoption*) as it relates to the *adoption of e-publishing* amongst Malaysian journal publishers.

Familiarity and *innovativeness* serves as both IV and DV. The result of the correlation analysis is shown in Tables 5.7 – 5.13. In the interpretation of the correlation coefficient r/ρ , a coefficient of $r/\rho \leq .29$ is considered small, $r/\rho = .30$ to $.49$ is considered medium, while $r/\rho > .50$ is considered large. The research also compares the strength of the correlation coefficients with respect to respondent's field, which is divided into two groups: *Science/Technology* journals in one group, *Social science/Arts/Humanities* in the other group. The study examines if there is a difference in the relationship between the *independent variables* and *adoption*, for Science/Technology journals compared to Social science/Arts/Humanities. In presenting the result of the statistical analysis, the study answers each of the research questions one after the other by testing the research hypothesis as follows:

5.4.3 Hypothesis Testing

H1: There is a statistically significant relationship between field of publishing and publication format.

In order to answer the first research question, Chi-square test of independence was adopted. As a norm, it was first confirmed that the study has not violated any assumption of chi-square concerning the minimum expected cell frequency which is supposed to be greater than 5 (Table 5.6). This analysis shows that 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.65. Therefore, using Chi-square test of independence, a statistically significant relationship was found between *field of publishing* and *publication format*: $X^2(2, N = 140) = 5.9, p = 0.050$ with science/technology

publishers more likely to adopt e-journal publishing earlier and in high degree than publishers from social science/arts/humanities.

Table 5.6: Chi-Square Test between Field of Publishing and Publication Format

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.986 ^a	2	.050
Likelihood Ratio	5.989	2	.050
Linear-by-Linear Association	4.458	1	.035
N of Valid Cases	140		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 16.65.

The study also analyzes the effect size statistics for the cross-tabulations as shown in (Table 5.6.1).

Table 5.6.1: Symmetric Measures between Field of Publishing and Publication Format

		Value	Approx. Sig.
Nominal by Nominal	Phi	.207	.050
	Cramer's V	.207	.050
N of Valid Cases		140	

Since this is a 2 by 3 table, the study employed Cramer's V, which takes into account the degrees of freedom. It is assumed that for a 2 by 3 cross-table, a Cramer's V value $\leq .07$ is considered small, a value = .21 is considered medium, while a value $\geq .35$ is considered large. In this case, a Chi-square test for independence indicated a moderate statistically significant association between *field of publishing* and *publication format*: $X^2 (1, n = 140) = .207, P = .050, \text{phi} = .207$.

The frequency table (Table 5.6.2) shows that 49.4% of science/technology publishers are practicing hybrid mode, 32.5% are into E-only mode, while 18.2% still have it in print only format. For social science/arts/humanities publishers, in contrast, 38.1% are practicing hybrid mode, 25.4% are into E-only, while 36.5% are still having it in print only format. In

the overall sample the percentage of the publishers who are practicing hybrid mode are 44.3%, E-only is 29.3%, while print only is 26.4% of the sample.

Table 5.6.2: Cross Tabulation between Field of Publishing and Publication Format

			JurFormat			Total
			Hybrid	E-only	Print only	
JurAreaSpec	Science and Technology	Count	38	25	14	77
		% within JurAreaSpec	49.4%	32.5%	18.2%	100.0%
		% within JurFormat	61.3%	61.0%	37.8%	55.0%
		% of Total	27.1%	17.9%	10.0%	55.0%
	Social Science, Arts & Humanities	Count	24	16	23	63
		% within JurAreaSpec	38.1%	25.4%	36.5%	100.0%
		% within JurFormat	38.7%	39.0%	62.2%	45.0%
		% of Total	17.1%	11.4%	16.4%	45.0%
Total	Count	62	41	37	140	
	% within JurAreaSpec	44.3%	29.3%	26.4%	100.0%	
	% within JurFormat	100.0%	100.0%	100.0%	100.0%	
	% of Total	44.3%	29.3%	26.4%	100.0%	

Therefore, the result above has confirmed that a statistically significant relationship does exist between *field of publishing* and *publication format*. Publishers in Science/Technology field have a potential to adopt e-publishing technology earlier than their counterparts in Social science/Arts/Humanities. It might also suggest that Science/Technology publishers would be more likely to adopt other similar online publishing technologies or scholarly communication platforms earlier than their counterparts in Social science/Arts/Humanities. Hence, the null hypothesis is rejected and there is valid evidence to uphold the research hypothesis which states that: There is a statistically significant relationship between *field of publishing* and *publication format*.

H2: There is a statistically significant relationship between publishing experience and familiarity with e-journal publishing.

The relationship between *publishing experience* and *familiarity with e-journal publishing* was investigated using the non-parametric test, Spearman rho (Table 5.7). Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity

and homoscedasticity. There was no statistically significant relationship between the two variables: $\rho = 0.24$, $p > .0005$, with no association between years of experience in journal publishing and *familiarity* with e-journal publishing. This indicates that the number of years a publisher has been involved in journal publishing has no relationship with the degree at which he is likely to be familiar with various aspects of electronic form of publishing. In this case, the study rejects the research hypothesis that assumes that a relationship exists.

The finding shows that the years of experience, however high or low has nothing to do with the *familiarity* with e-publishing. This comes as a surprise since experience comes with age and publishers who have been in the publishing business for a longer period are likely to be somehow conservative and less exposed to the new online information platform that is supporting e-publishing. New publishers are likely to be young fellows with strong appetite to explore new innovative technologies. The study expects to find a relationship between *experience* and *familiarity*. It was expected that the more experience a publisher is in journal publishing, the less likely s/he will be familiar with various aspects of e-journal publishing as experienced publishers are likely to be resistant to changes and show less interest with online information delivery systems in journal publishing and prefer to stick to the traditional method of publishing. Although many research studies have attributed 'level of awareness' with technologies to years of experience and longevity in service, however this might not be true for e-journal publishing because the technologies that constitute e-publishing platforms are still evolving and require adopters to be flexible in acquiring new skills, use new methods and work on new platforms. The result obtained here differs from many studies due to the uniqueness of e-journal publishing as it continues to evolve in the new online information platform.

H3: There is a statistically significant relationship between publishing experience and adoption of e-journal publishing.

The relationship between *publishing experience* and *adoption* of e-journal publishing was investigated using the non-parametric test, Spearman rho (Table 5.7). Preliminary analyses were performed to ensure no violation of the assumptions of normality and linearity. There is no a statistically significant relationship between the two variables: rho =-0.14, p > .0005, with no association between *years of experience* in journal publishing and *adoption* of e-journal publishing.

Table 5.7: Correlation Analysis (non-parametric test, Spearman's rho)

Correlates	Familiarity	Innovativeness	Adoption	Publication age	Publication size	Time of adoption	Years of experience
Familiarity	1	.401**	.397**	-0.272	0.236	.479**	0.237
Innovativeness	.401**	1	0.186	0.136	0.244	0.196	0.163
Adoption	.397**	0.186	1	-0.182	0.189	.449**	-0.137
Publication age	-0.272	0.136	-0.182	1	0.223	0.216	.341**
Publication size	0.236	0.244	0.189	0.223	1	0.119	0.127
Time of adoption	.479**	0.196	.448**	0.216	0.119	1	.403**
Years of experience	0.237	0.163	-0.137	.341**	0.127	.403**	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

This indicates that the number of years a publisher has been involved in journal publishing has no association with the behavior and decision making towards the *adoption* of electronic form of publishing. In this case the research hypothesis is rejected. This result is quite surprising considering the fact that many research studies have attributed *adoption* of new technologies to *years of experience* and *longevity in service*. This result shows that the situation might be different with e-journal publishing due to the uniqueness of the *innovation*.

H4: There is a statistically significant relationship between publication age and familiarity with e-journal publishing.

After performing preliminary analysis to ensure there is no violation of the assumptions of normality and linearity, using the non-parametric test, Spearman rho to investigate the relationship between *publication age* and *familiarity* with e-journal publishing (Table 5.7), it was found that there is no statistically significant relationship between *publication age* and *familiarity* with e-journal publishing: $\rho = -0.27$, $p > .0005$. This indicates that the lifespan of a publication is not associated with publishers' *familiarity* with e-journal publishing. In this case the null hypothesis is accepted which states that: There is no statistically significant relationship between *publication age* and *familiarity* with e-journal publishing while the research hypothesis is rejected.

Hence, it goes by stating that what is true of the study sample is also true of the Malaysian journal publishing system at large. The research hypothesis was formulated considering theories that have stated that organization experience, culture and lifespan have a huge influence on the *adoption* of new *innovation* because as oppose to new organizations, the old ones are expected to have the capability, experience and resources to take risk in adopting new technologies and also to be able to foresee the future impact of their decision-making on the organization. Assumptions were made to be broken and this reveals that there is no specific pattern in the *familiarity* with e-journal publishing with respect to whether a publication is an old serial or a new serial in the frame.

Moreover, since e-journal publishing technologies are still at the evolving stage and the technologies associated with their use demand for a change of approach and strategy from an organization perspective, therefore organization that are more reliant and satisfied with

doing things the traditionally way will find it difficult to quickly incorporate electronic journal publishing methods into their publishing work and same pattern may be discovered with new organizations or publishers.

H5: There is a statistically significant relationship between publication size and familiarity with e-journal publishing.

After performing preliminary analysis to ensure there is no violation of the assumptions of normality and linearity, using the non-parametric test, Spearman rho to assess the relationship between *publication size* and *familiarity* with e-journal publishing (Table 5.7), it was found that there is no statistically significant relationship between *publication size* and *familiarity* with e-journal publishing: $\rho=0.24$, $p >.0005$. This indicates that the frequency of publication is not associated with *familiarity* with e-journal publishing. Therefore, the null hypothesis is accepted which states that: There is no statistically significant relationship between *publication size* and *familiarity* with e-journal publishing while the research hypothesis that states otherwise is rejected.

The research hypothesis was formulated with the viewpoint that organization size is largely associated with the *familiarity* with new technologies. The need for large size organization or publishers with large publication to maintain their publication quantity and quality will spur them to seek for new information, ideas, and methods and explore new opportunities to remain competitive in the social system.

H6: There is a statistically significant relationship between publication age and adoption of e-journal publishing.

After performing preliminary analysis to ensure there is no violation of the assumptions of normality and linearity, using the non-parametric test, Spearman rho, to study the

relationship between *publication age* and *adoption* of e-journal publishing (Table 5.7) it was found that there is no statistically significant relationship between *publication age* and *adoption* of e-journal publishing: $\rho = -0.18$, $p > .0005$. It means that the lifespan of a publication is not associated with *adoption* of e-journal publishing. In this case the null hypothesis is accepted which states that: There is no statistically significant relationship between *publication age* and *adoption* of e-journal publishing while the research hypothesis is rejected. In this regard also, a statement is made about the population studied, and what is confirmed to be true in this finding is also a true picture of what can be obtainable if the whole population is surveyed.

H7: There is a statistically significant relationship between publication size and adoption of e-journal publishing.

After performing preliminary analysis to ensure there is no violation of the assumptions of normality and linearity, using the non-parametric test, Spearman ρ , to study the relationship between *publication size* and *adoption* of e-journal publishing (Table 5.7), it was found that there is no statistically significant relationship between *publication size* and *adoption* of e-journal publishing: $\rho = 0.2$, $p > .0005$. It means that the frequency of publication is not associated with *adoption* of e-journal publishing. Therefore, the null hypothesis is accepted which states that: There is no statistically significant relationship between *publication size* and *adoption* of e-journal publishing and the study rejects the alternative hypothesis which states otherwise.

It was assumed that *publication size* has a tendency to influence the *adoption* of new technologies. This is because, compared to publishers who publish occasionally or less periodically, publishers who publish many issues per year are more likely to feel the need

to adopt new technologies to support their supply and to maintain both their publication quantity and quality. Adopting new technologies earlier would likely help them to maintain their competitive edge in the social system and also ease their workload. However, the new findings here suggest that *publication size* has no relationship with the *adoption* of e-journal publishing amongst journal publishers. There are other important variables that are more salient to *innovation adoption* than these aforementioned organization variables.

H8: There is a statistically significant relationship between familiarity with e-journal publishing and adoption of e-journal publishing

After performing preliminary analysis to ensure there is no violation of the assumptions of normality and linearity, using the non-parametric test, Spearman rho (Table 5.8), it was found that there is a moderate statistically significant relationship between *familiarity* and *adoption* of e-journal publishing: $\rho = .40^{**}$, $p < .0001$ with *familiarity* with e-journal publishing having a moderate relationship with the *adoption* of e-journal publishing.

Therefore the study hereby rejects the null hypothesis and upholds the alternative hypothesis since the relationship is moderate and reaches statistical significance. *Familiarity* with a product or service breeds interest and discussion about the product or service. This largely lead individuals to have positive perception about the new *innovation* if it promises to be of great benefit, and is supposed to ultimately end with the *adoption* of the product. As journal publishers become more familiar and get themselves used to the e-journal platforms and e-journal features, all the negative perceptions about e-journal publishing would disappear which should give way to *adoption*. However, the findings

here suggest that *familiarity* with e-journal publishing does have a moderate influence on *adoption*.

H9: There is a statistically significant relationship between innovativeness and familiarity with e-journal publishing

The relationship between *innovativeness* and *familiarity* with e-journal publishing was investigated using the non-parametric test, Spearman rho (Table 5.8). There was a moderate statistically significant relationship between the two variables, $\rho = .40^{**}$, $p < .0001$, with *innovativeness* having a slight influence on *familiarity* with e-journal publishing. Therefore, the study hereby rejects the null hypothesis that assumed there is no relationship between *innovativeness* and *familiarity* with e-journal publishing. The study therefore, upholds the alternative hypothesis that said a relationship does exist.

The line of thinking was that people who are perceived to be innovative; the generators and transformers of new ideas are more likely also to be the first to fully adopt it. *Innovativeness* is explained to be a natural characteristics or instincts and generally some people are readily innovative than others in their social system.

H10: There is a statistically significant relationship between perception about the five attributes of innovation and adoption of e-journal publishing.

In the preliminary analyses that were performed prior to running the statistical analysis, it was observed that Spearman rho test would be the ideal correlation coefficient examined, considering the assumptions of normality and linearity for each of the five attributes of innovation. Result shows that there is strong statistically significant relationship between *relative advantage* and *adoption* $\rho = .54^{**}$, $p < .0001$; *compatibility* and *adoption* $\rho = .53^{**}$, $p < .0001$. This indicates an approximately 19.53% of shared variance with

relative advantage and 17.55% of shared variance with *compatibility*, meaning that *relative advantage* helps to explain approximately 20% and *compatibility* helps to explain nearly 18% of their variance with *adoption*. This is moderately good considering the fact that the sample used for the study is respectably large (n=156).

Table 5.8 Correlation Analysis (non-parametric test, Spearman's rho)

Correlates	Familiarity	Relative advantage	Compatibility	Complexity	Observability	Trialability	Peer network	Change agent influence	Adoption	Innovativeness
Familiarity	1	.558**	.533**	-.243	.622**	.550**	.375**	.1320	.397**	.401**
Relative advantage	.559**	1	.547**	-.0008	.525**	.541**	.429**	.384**	.542**	.290*
Compatibility	.533**	.547**	1	-.0077	.519**	.477**	.497**	.432**	.529**	.294*
Complexity	-.243	-.108	-.170	1	-.243	-.007	.0012	-.116*	-.349**	-
Observability	.622**	.525**	.519**	-.0143	1	.584**	.567**	.416**	.432**	.371*
Trialability	.550**	.541**	.477**	-.0007	.584**	1	.420**	.446**	.418**	.334**
Peer network influence	.375**	.429**	.497**	.0012	.567**	.420**	1	.602**	.267**	.381**
Change agent influence	.420**	.384**	.432**	-.0164*	.416**	.446**	.602**	1	.169*	.312**
Adoption	.397**	.542**	.529**	-.349**	.432**	.418**	.267**	.169*	1	.186
Innovativeness	.301**	.290*	.294*	-	.371**	.334**	.381**	.312*	.186	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

- non-parametric test not applicable

Table 5.8.1 Correlation Analysis (Parametric test, Pearson r)

Correlates	Innovativeness	Complexity
Innovativeness	1	0.075
Complexity	0.075	1

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Furthermore, a moderate statistically significant relationship was observed between *Observability* and *Adoption* $\rho=.43^{**}$, $p < .0001$; *Trialability* and *Adoption* $\rho=.42^{**}$, $p < .0001$; and a moderate negative statistically significant relationship between *Complexity* and *Adoption* $\rho=-.35^{**}$, $p < .0001$. This shows that the two attributes of *Relative advantage* and *Compatibility* have the strongest statistically significant relationship with

adoption of e-journal publishing and the attribute of *Complexity* has a moderate statistically significant negative relationship with *adoption*.

The attributes of *Observability* and *Trialability* are moderately significantly related to the *adoption* of e-journal publishing. It has been noted by Pallant (2007) that the significance of the correlation coefficient rho can be strongly influenced by the size of the sample. According to the author, in a small sample (e.g. n=30), it is likely to have moderate correlations that cannot be considered to reach statistical significance at the traditional $p < .05$ level. However, in large samples (N=100+), very small correlations may reach statistical significance. Therefore, the study finds support for the research hypothesis that posit that a statistically significant relationship exist between the *five attributes* and *adoption*. Although *complexity* demonstrate a low correlation with *adoption*, but the variable reaches statistical significance. There is a moderate negative relationship between *complexity* and *adoption*, although a strong statistically significant negative relationship was expected.

The more complex an individual perceive a new idea the less likely s/he is going to adopt it. *Relative advantage* and *compatibility* demonstrate the strongest possible association with e-journal *adoption* and rightly so. Most studies on *innovation* diffusion have identified *relative advantage* and *compatibility* as the main variables associated with the *adoption* of any kind of *innovation*. The relevance of *relative advantage* and *compatibility* is highly ascertained. *Observability* and *Trialability* also have some strength in determining and influencing decisions to adopt or reject e-journal publishing. The level at which a subject has been able to see and observe the platforms and the process involved in e-journal publishing is also essential. Hence, from this finding, it is therefore submitted

that the *five attributes of innovation* are very important towards the *adoption* of e-journal publishing amongst Malaysian journal publishers.

H11: There is a statistically significant relationship between peer network influence and adoption of e-journal publishing.

The non-parametric Spearman's rho was used to analyze the relationship between *peer network influence* and *adoption* of e-journal publishing. The study observed a statistically significant but weak relationship between *peer network influence* and *adoption* $\rho = .27^{**}$, $p < .0001$. This shows that *peer network influence* is not highly related to the *adoption* of e-publishing amongst Malaysian journal publishers. As regards, the null hypothesis is rejected, but the alternative hypothesis is not strongly supported due to the low value of the correlation coefficient.

The research hypothesis was formulated on the basis that *peer network* has been observed to be very influential in the spread of new ideas. *Peer network* is at the interpersonal communication level in a social system and when a new *innovation* is launched into the community of potential users, the degree of network amongst the social system and the strength of their bonding will have great impact on the diffusion/adoption of the new innovation.

The point of convergence with respect to e-journal publishing is from the realities that the population in this study are journal publishers in Malaysia, who are largely academics by profession. As such, *peer network* is known to be the backbone of knowledge propagation in this discipline and it was expected that these *peer networks*, no matter wide or narrow should be able to share information and spread news about e-journal publishing *innovation* amongst the members. This information sharing and propagation could have large

influence on the *adoption* of e-journal publishing. The findings from the study suggest quite the opposite. *Peer network* was found to have a low relationship with the decision to adopt or reject e-journal publishing. The possible explanation for this may be due to the nature of the *innovation* been studied.

H12: There is a statistically significant relationship between change agent influence and adoption of e-journal publishing.

After satisfying the assumptions of normality and linearity in the preliminary analysis prior to running the statistical analysis, the non-parametric test, Spearman's rho was used to analyze the relationship between *change agent influence* and *adoption* of e-journal publishing. The study observed a statistically significant but very weak relationship between *Change agent influence* and *adoption* $\rho = .16^*$, $p < .0005$. This shows that *change agent influence* is not strongly related to the *adoption of e-publishing* amongst Malaysian journal publishers. With this result, the research hypothesis is rejected.

The research hypothesis suggests that there is an external force that is likely to have a positive impact on behavioral change and decision making within the e-journal publishing system. These external forces are supposed to be *change agents*, government or private agencies that have a stake in the development and progress of scientific research, but they cannot be identified as contributors to the diffusion process in e-journal publishing *innovation*. Thus, *change agent influence* is not highly related to *adoption* of e-journal publishing amongst Malaysian journal publishers.

H13: There is a statistically significant difference in the relationship between familiarity and adoption with respects to field of publishing.

The non-parametric test, Spearman's rho was used to analyze the relationship between *familiarity* and *adoption* with respect to *field of publishing*. *Field of publishing* was categorized into two groups: *science/technology* in one group, *social science/arts/humanities* in the other group. The outcome of the analysis has it that the relationship between *familiarity* and *adoption* differs between publishers in science/technology and social science/arts/humanities. There is a moderate statistically significant correlation between *familiarity* and *adoption* for both science/technology publishers rho = .34*, Sig. = .033, and Social science/Arts/Humanities publishers rho = .47**, Sig. = .004 (Table 5.9). However the value of correlation coefficient is higher for Social science/Arts/Humanities publishers. This shows that *familiarity* with e-journal publishing is a very important criteria for Social science/Arts/Humanities publishers before making decision to adopt e-publishing. For Science/Technology publishers, *familiarity* with the *innovation* has less impact in their decision making when adopting e-journal publishing. In this case, the null hypothesis is rejected in favor of the research hypothesis: There is a statistically significant difference in the relationship between *familiarity* and *adoption* with respect to *field of publishing*.

The research hypothesis is supported and it is was formulated bearing in mind that research in science/technology especially fields like computer science and information science are more largely associated with the new online platform that is hosting electronic journal publishing and this will largely result in researchers from this field to be more familiar with various aspects of e-journal publishing than their counterparts in social science/arts/humanities. The outcome of this study shows that *familiarity* with e-journal publishing is a very important criteria for social science/arts/humanities when making decision to adopt e-journal publishing.

Table 5.9: Correlation Coefficient for Two Groups (Field of Publishing)

Adoption	Science/Technology	Social science./Arts/ Humanities
Familiarity	.343*	.465**
Relative Advantage	.470**	.672**
Compatibility	.598**	.441**
Complexity	-.413**	-0.32
Observability	.430**	.429**
Trialability	.343*	.493**
Peer network influence	.441**	0.309
Change agent influence	0.256	.364*

*. Correlation is significant at the 0.05 level (2-tailed)

** . Correlation is significant at the 0.01 level (2-tailed).

H14: There is a statistically significant difference in the relationship between the five attributes of innovation and adoption with respects to field of publishing.

After satisfying the assumptions of normality and linearity in the preliminary analysis, the non-parametric test, Spearman's rho was used to analyze the difference in the relationship between the *five attributes of innovation and adoption* with respect to *field of publishing*. The five attributes are in this order: *relative advantage, compatibility, complexity, observability* and *trialability*. The relationship between *Relative advantage* and *adoption* differs between publishers in Science/technology and Social science/Arts/Humanities. There is a modest significant correlation between *Relative advantage* and *adoption* for Science/technology publishers $\rho=.47^{**}$, Sig. = .001 compared to a very strong significant correlation with Social science/Arts/ Humanities $\rho=.67^{**}$, Sig. = .000 (Table 5.9) meaning that in the study sample, *relative advantage* is very statistically significantly related with *adoption* among Social science/Arts/Humanities publishers far more than it is for Science/technology publishers. Adopters among publishers in Social science/Arts/ Humanities perceive a very high degree of *relative advantage* of e-publishing leading to *adoption*.

The relationship between *Compatibility* and *adoption* slightly differs between the two groups. There is a strong significant correlation between *Compatibility* and *adoption* for Science/Technology publishers, $\rho = .60^{**}$, Sig. = .000 while there is a moderate significant correlation between *Compatibility* and *adoption* for Social science/arts/humanities publishers, $\rho = .44^{**}$, Sig. = .006, which implies that publishers in the Science/technology group perceived a great deal of consistency of e-journal publishing with their publishing work and rightly so which is highly related to their *adoption* decision.

The relationship between *Complexity* and *adoption* differs between publishers in Science/technology and Social science/Arts/Humanities. There is a statistically significant moderate negative correlation between *complexity* and *adoption* for science/technology publishers $\rho = -.41^{**}$, Sig. = .006 while there is a lower negative non-significant correlation between *complexity* and *adoption* for social science/arts/humanities, $\rho = -.32$, Sig. = .083 (Table 5.9) suggesting that the perceived *complexity* aspects of e-journal publishing *adoption* present a high degree of negative effect on *adoption* for science/technology publishers more than for social science/arts/humanities publishers.

There is no significant difference in the relationship between *Observability* and *adoption* with respect to the *field of publishing*. There is a moderate significant relationship between *Observability* and *adoption* for both Science/Technology $\rho = .43^{**}$, Sig. = .003 and Social science/Arts/Humanities $\rho = .43^{**}$, Sig. = .009 with both group of publishers

most likely to adopt e-publishing at the same degree when they have been able to observe how it works.

The relationship between *trialability* and *adoption* greatly differs between publishers in Science/technology and Social science/Arts/Humanities. There is a moderate significant correlation between *trialability* and *adoption* for Science/technology publishers $\rho=.34^*$, Sig. = .033 compared to a higher significant correlation with Social science/Arts/Humanities $\rho=.50^{**}$, Sig. = .001 (Table 5.9) meaning that in the study sample, *trialability* has a moderate weight in the *adoption* decision of Science/technology publishers unlike the considerably higher significant relationship it has on the Social science/Arts/Humanities publishers.

In the forgoing analysis therefore, the study reject the null hypothesis that assumed there is no difference and find support for the research hypothesis that assumed a difference exist as follows: There is a statistically significant difference in the relationship between the *five attributes of innovation* and *adoption* with respects to *field of publishing*.

H15: There is a statistically significant difference in the relationship between peer network influence and adoption with respects to field of publishing.

The non-parametric test, Spearman's rho was used to analyze the relationship between *peer network influence* and *adoption* with respect to *field of publishing*. The relationship between *Peer network influence* and *adoption* differs between publishers in Science/technology and Social science/Arts/Humanities. There is a moderate significant correlation between *Peer network influence* and *adoption* for Science/technology

publishers $\rho=.44^{**}$, Sig. = .002, while there is a non-significant correlation between *Peer network* and *adoption* for Social science/Arts/Humanities $\rho = .31$, Sig. = .100 with Science/technology publishers more likely to perceive greater degree of influence from their peers relating to the *adoption* of e-journal publishing through various social academic network than Social science/Arts/Humanities publishers. In this case, the study hereby rejects the null hypothesis and upholds the alternative hypothesis which posits that: There is a statistically significant difference between *peer network influence* and *adoption* with respects to *field of publishing*. This might suggest that science/technology publishers' *peer network* are much more effective, efficient and alive than social science/arts/humanities.

H16: There is a statistically significant difference in the relationship between change agent influence and adoption with respects to field of publishing.

The non-parametric test, Spearman's ρ was used to analyze the relationship between *change agent influence* and *adoption* with respect to *field of publishing*. The relationship between *change agent influence* and *adoption* differs between publishers in Science/technology and Social science/Arts/Humanities. The relationship between *Change agent influence* and *adoption* is not statistically significant for Science/technology publishers, $\rho=.26$, Sig. = .176 while a statistically significant moderate relationship was observed with Social science/Arts/Humanities $\rho=.40^*$, Sig. = .038 showing that there is little promotional effort observed or perceived by Science/technology regarding e-publishing. Science/technology do not perceive any influence from *change agents* pertaining to their publishing work or precisely as regards to e-journal publishing while adopters amongst Social science/Arts/Humanities publishers perceive certain degree of influence from change agents.

5.4.4 Diffusion Rate of E-Journal Publishing

In order to evaluate the diffusion rate of e-journal publishing amongst Malaysian journal publishers, study participants were asked about the time they adopted e-journal publishing in terms of years (Table 5.10). The response to this question was used to analyze the *diffusion rate of e-journal publishing* and the classification of adopters. If it is agreed that the sample is a representative of the population, then it can be said that the *Innovators* constitutes up to 1.9% of the population. The *Early adopters* comprise of 14.1% of the population, the *Early majority* comprises of 7.1% of the population, the *Late majority* constitutes 43.6% of the population while 33.3 % of the populations are *Laggards*.

Table 5.10: Adopter Categories

Adopter categories	Expected percentage	Observed percentage	Years of adoption
Innovators	2.50%	1.90%	15 – 18 years
Early adopters	13.50%	14.10%	6 – 7 years
Early majority	34%	7.10%	4 – 5 years
Late majority	34%	43.60%	1 – 3 years
Laggards	16%	33.30%	Non-adopters

Valid values = 156; Missing = 0; Mean = 2.33; Std. Deviation = 3.00

The result of the adopter categories reflects that the distribution in this study does not correspond to Rogers categorization of adopters. The most important thing to look out for

in the table is the percentage of participants that are classified as *Innovators* and *Early adopters*.

Bearing in mind the year the data was collected which was in 2012, the *Innovators* are those Malaysian publishers that have adopted e-journal publishing between the year 1994 and 1996 when e-journal publishing was still at its very early stage. There is a big gap between the time the *Innovators* adopted and the time the *Early adopters* adopted. The *Early adopters* are publishers who adopted between the year 2005 and 2006 when the Internet and the World Wide Web (WWW) was experiencing its second phase of explosion. The *Early majority* are those publishers that adopted e-journal publishing between the year 2007 and 2009 when the *e-journal publishing innovation* has already spread across various social systems even amongst the developing countries. The *Late majority* are publishers who have just adopted very recently when the technology has already hit the critical mass, close to the time of the data collection between the year 2010 and 2012. The *Laggards* are the non-adopters amongst the publishers who are yet to adopt e-journal publishing. The approach to categorize non-adopters as *Laggards* was also used by Conklin (2006).

The *average (mean) year of adoption* of e-publishing amongst Malaysian journal publishers is 2.33 years with a standard deviation of 3.00. This further reflects the fact that the e-journal publishing technologies is still at its developing stage as far as Malaysian journal publishing environment is concerned and the diffusion rate of e-publishing amongst Malaysian journal publishers was very slow.

5.4.5 Level of Implementation of E-Journal Publishing Amongst Malaysian Journal Publishers

Innovation adoption is one step; the *implementation* of the *innovation* is a further step forward. It has been documented that many individuals adopt an *innovation* without harnessing the full benefit of the *innovation*. Individuals might accept an *innovation* and have come full circle in forming a positive attitude towards the *innovation* leading to *adoption*; however the *implementation* aspect may be lacking. This is one of the problems the study aim to look at as regards *e-journal publishing adoption*. The study assumed that many publishers might have adopted e-journal publishing without exploiting the full potential of the *innovation* by not implementing the *innovation* in its total capacity. The adopters amongst the study participants were asked about their level of implementation of the various aspects of e-journal publishing that their journal is involved. Table 5.11 represents the result of this investigation with eighteen statements highlighting the level of *implementation* and the percentage of journal publishers that have been able to implement the various modules of the e-journal publishing.

The first statement was conceived to try and understand the percentage of adopters who have their journal issues in at least PDF format on the journal website, factoring that lot of publishers only have a website for their journal publication on the Internet and in most cases, large number of these websites are decorated with static pages, only providing information about the editorial board members accompanied by their CVs, history of the publication, aim and objects of the publication and some other similar information without

actually having the most tangible material and substance users, consumers and scholars keenly aimed to acquire .

Table 5.11: Implementation of E-Journal Publishing Amongst Adopters

		Have not implemented	Planning stage	Partially	Close to full implementation	Full implementation
1	Holds articles in PDF only (format)	10.3%	5.5%	12.4%	22.8%	49.0%
2	Holds articles in more than one format (eg PDF, HTML, XML, RTF, Realpage, etc.)	39.3%	20.0%	18.6%	10.3%	11.7%
3	Provides access to current issues	10.5%	7.7%	12.6%	21.7%	47.6%
4	Provides access to archived issues	8.3%	11.0%	14.5%	20.0%	46.2%
5	Provides links to organization/society/publishers page	22.4%	16.8%	18.9%	15.4%	26.6%
6	Provides links to related articles in the other issues	37.2%	18.6%	15.9%	12.4%	15.9%
7	Provides journal contents search	22.2%	18.1%	15.3%	15.3%	29.2%
8	Provides access to full-text to all	15.9%	11.0%	11.0%	16.6%	45.5%
9	Provides interactivity through support tools for comments, emails	35.2%	12.4%	13.8%	15.2%	23.4%
10	Provides information about editorial members	2.2%	4.2%	14.0%	17.5%	62.2%
11	Provides information about reviewers and review process	38.9%	17.4%	17.4%	8.3%	18.1%
12	Provides alert service for authors	37.2%	20.7%	16.6%	11.7%	13.8%
13	Uses a journal Management system, e.g. Scholar one	34.7%	20.8%	11.1%	13.9%	19.4%
14	Allows authors to submit manuscripts online	23.6%	12.5%	10.4%	14.6%	38.9%
15	Allows authors to monitor their submissions online	34.7%	21.5%	10.4%	12.5%	20.8%
16	Allows authors to edit or revise their submissions online	31.9%	15.3%	8.3%	18.8%	25.7%
17	Supports online reviewing process	29.7%	21.4%	9.0%	17.2%	22.8%
18	Provides information about indexing status	28.3%	19.3%	13.8%	13.1%	25.5%

The revelation came to being when the researcher conducted a random check of Malaysian journals on the Internet and found that several of the journal websites are static, feeble and virtually lacking currency. The outcome of the investigation using a questionnaire other than a random check further support what was previously observed, only this time with objective data. Only 49.0% of the publishers have their publication issues in full text PDF

format online, while only 11.7% of them have their publication issues in both PDF formats along with many other formats such as: HTML, XML, RTF, Realpage, etc. This indicates that the degree of *implementation* of e-journal publishing amongst Malaysian journal publishers is very low.

The *adoption* is not well propagated, the process not well managed and *implementation* is lacking. The answer to these questions might not give a perfect outlook of the condition of Malaysian journal publishing online, but might present a useful and reliable result to work with. The study also seeks to find out the rate of accessibility provided by Malaysian journals on the Internet. Findings from Table 5.11 reveals that 47.6% of the publishers provide access to current issues of their journals while 46.2% provide access to archive issues of their journals. This might suggest that the accessibility to Malaysian journals on the Internet is very low and this is a very important factor in the Internet platform. Accessibility is one of the main issues in scholarly communication and Malaysian journal publishers need to open their door to users. It was further revealed that only a quarter of the publishers provide useful linking from their journal website to other relevant journals or organization delivering scholarly communication services. This likewise point to the very limited activity and information useful to users of Malaysian journals when browsing through pages on most of the Malaysian journal websites.

Besides, only 45.0% of the Malaysian journal publishers allow full access to their full text articles online and the provision of interactivity tools across the entire website is dismal. Interactivity tools allow users to enjoy and participate in a smooth information gathering process. Many users need answers to lot of questions concerning their information

gathering and as many are interested in sharing ideas and experience on various subjects in their field. Interactivity tools allow them to achieve this and by implementing this module in e-journal publishing, it can go a long way in selling the journal publication to a wide range of users.

Although a large majority of Malaysian publishers supply adequate details about the editorial board on their journal website online, but they reserve to provide detail information about their reviewer or reviewing process. It seems that many of the fascinating features of publishing electronic journals are considered as too much of a luxury for users of Malaysian journals online because very few of the publishers provide alert service for authors and very few uses a journal management system. In fact, a preliminary interview during the course of the research endeavor revealed that many of the publishers still correspond with their contributing authors and reviewers through the traditional e-mail system. It was learnt that even in cases where a journal management approach is in place and enforced, a respectable percentage of authors still prefer to communicate with the journal editors through e-mail, while few others still enjoy the comfort of transporting their manuscript via the help of a postage stamp.

The array of choices and features available for the enjoyment of users and contributing authors to Malaysian journals online are very limited and this is one the challenges hampering the smooth process of information exchange within Malaysian journal publishing systems. It is obvious as it has been confirmed through random trial of article submission procedures in Malaysian online journals. Although there are some exemptions to the *static nature* of Malaysian online journals, but static(ness) is the rule rather than the

exemption. Many of the website do not provide required components that permit authors to monitor their submissions online or functionalities that can assist authors to edit or revise their submission online without having to download their manuscript to their desktop. A large number of them do not yet support online reviewing process that can make life much easier for their reviewers and most lack the capability to provide information about their indexing status.

5.5 Summary

This chapter presents the analysis of result and findings as summarized in Table 5.12. The study observed no difference in the overt behavior or decision making between older publishers and younger publishers in the *familiarity with e-journal publishing* and *adoption of e-journal publishing*. The same result was obtained for the other organization variables such as: *publication age* and *publication size*. *Innovativeness* has a moderate correlation with *familiarity* but failed to make any significant impact on *adoption of e-journal publishing*. The attributes that are more germane to the *adoption* of e-journal publishing amongst Malaysian journal publishers are: *Relative advantage*, *Compatibility* and *Complexity*. *Familiarity* also has an influence but it is less influential compared to the first three. *Observability* and *trialability* appears to have a moderate relationship with adoption while *peer network* and *change agents influence* are found to be very weak in the *adoption*. The study also observed a field factor in the relationship between *familiarity*, the *five attributes*, and the *two supporting variables* with *adoption* of e-journal publishing. Apart from the variable of *observability* which shows a significant but no difference in relationship and *change agent influence* which shows a non-significant difference, the other variables demonstrated a significant difference with respect to *field of publishing*.

The analysis further revealed that the diffusion rate of e-journal publishing amongst Malaysian journal publishers is very low and the implementation of e-journal publishing is not adequate.

Table 5.12: Research Questions, Objectives, Hypothesis and Result

	Research Objectives	Research Questions	Research Hypothesis	Survey Questionnaire	Result of hypotheses
1	To determine the relevance of publishers characteristics in the adoption of e-publishing amongst Malaysian journal publishers.	How relevant are the publishers characteristics in the adoption of e-publishing amongst Malaysian journal publishers?	H1: There is a statistically significant relationship between field of publishing and publication format.	SECTION 7 Number 12 & SECTION 7 Number 15	Supported
			H2: There is a statistically significant relationship between publishing experience and familiarity with e-journal publishing.	SECTION 7 Number 18 & SECTION 1 Number 1	Rejected
			H3: There is a statistically significant relationship between publishing experience and adoption of e-journal publishing.	SECTION 7 Number 18 & SECTION 5 Number 10	Rejected
			H4: There is a statistically significant relationship between publication age and familiarity with e-journal publishing.	SECTION 7 Number 13 & SECTION 1 Number 1	Rejected
			H5: There is a statistically significant relationship between publication age and adoption of e-journal publishing.	SECTION 7 Number 13 & SECTION 5 Number 10	Rejected
			H6: There is a statistically significant relationship between publication size and familiarity with e-journal publishing.	SECTION 7 Number 14 & SECTION 1 Number 1	Rejected
			H7: There is a statistically significant relationship between publication size and adoption of e-journal publishing.	SECTION 7 Number 14 & SECTION 5 Number 10	Rejected
2	To identify key attributes and factors that are important or serve as an influence to the adoption of e-publishing amongst Malaysian journal publishers.	What are the key attributes and factors that are important or serve as an influence to the adoption of e-publishing amongst Malaysian journal publishers?	H8: There is a statistically significant relationship between familiarity with e-journal publishing and adoption of e-journal publishing.	SECTION 1 Number 1 & SECTION 5 Number 10	Supported
			H9: There is a statistically significant relationship between innovativeness and familiarity with e-journal publishing.	SECTION 2 Number 2 & SECTION 1 Number 1	Supported
			H10: There is a statistically significant relationship between perception about the five attributes of innovation and adoption of	SECTION 3 Number 3-7 & SECTION 5 Number 10	Supported

			e-journal publishing.		
			H11: There is a statistically significant relationship between peer network influence and adoption of e-journal publishing.	SECTION 4 Number 8 & SECTION 5 Number 10	Supported
			H12: There is a statistically significant relationship between change agent influence and adoption of e-journal publishing.	SECTION 4 Number 9 & SECTION 5 Number 10	Rejected
			H13: There is a statistically significant difference in the relationship between familiarity and adoption with respects to field of publishing.	SECTION 1 Number 1 & SECTION 5 Number 10 & SECTION 7 Number 12	Supported
			H14: There is a statistically significant difference in the relationship between the five attributes of innovation and adoption with respects to field of publishing	SECTION 3 Number 3-7 & SECTION 5 Number 10 & SECTION 7 Number 12	Supported
			H15: There is a statistically significant difference in the relationship between peer network influence and adoption with respects to field of publishing.	SECTION 4 Number 8 & SECTION 5 Number 10 & SECTION 7 Number 12	Supported
			H16: There is a statistically significant difference in the relationship between change agents influence and adoption with respects to field of publishing.	SECTION 4 Number 9 & SECTION 5 Number 10 & SECTION 7 Number 12	Supported
3	To evaluate the diffusion rate of e-publishing amongst Malaysian journal publishers.	What is the diffusion rate of e-publishing amongst Malaysian journal publishers?		SECTION 7 Number 16	
4	To examine the level of implementation of e-publishing amongst Malaysian journal publishers.	What is the level of implementation of e-publishing amongst Malaysian journal publishers?		SECTION 6	

CHAPTER 6

DISCUSSION AND CONCLUSION

6.1 Introduction

This final chapter presents the findings of the study with detailed discussion of the most significant outcome. The limitations of the study is discussed here with useful suggestions for future researchers who wishes to carry out follow-up studies on e-journal publishing in Malaysia or developing countries, and also for researchers who desires to investigate the diffusion of Internet-related technologies. The chapter highlights the most significant contribution of the study to innovation diffusion research and scholarly journal publishing in Malaysia. The study summarizes the findings of the research with recommendations for way-forward in the adequate *adoption* and proper *implementation* of e-journal publishing in Malaysia journal publishing circles. The chapter then submits by drawing valid conclusions from the overall investigation.

6.2 Overview of the Study

The dawn of the Internet age ushered in a fresh perspective in the way modern society obtain, use and disseminate information. The progress and improvement in information and knowledge transfer through the Internet is as a result of the development in scientific research. It did not take long before the scientific community realizes how the new Internet platform can be exploited to improve scholarly communication and scientific research. In other words, it has since transformed the pattern in which scientific publishers operate and

the manner in which scientific materials are produced, organized, presented, distributed, managed, acquired, used and reused. As the acceptance and popularity of the Internet and the WWW soars, with emerging economic and business opportunities, it was obvious that scientist would have to come up with new models of scientific communication that could be accommodated and in conformity to the style of the Internet ways of doing things.

This reality resulted in a huge transformation and a change of attitude for the service providers, authors, academic institution and private agencies all of whom have been affected by the new platform of scientific communication. As common in contemporary society, there are always different opinions and attitudes towards any particular reality. The infrastructural need of the Internet technologies was one of the earliest challenges faced by many aspiring society, and these needs were very expensive to achieve at the early period of the Internet surge. Likewise, the lack of adequate information, awareness, finance and technical ability were the worrying signs that the Internet opportunities might not be well received across various social strata.

In recent times, however, the infrastructure needed for the take up of the Internet become relatively available especially in schools, libraries and high institution of learning in most part of the developed and developing countries, as a result it was highly anticipated that the barrier to effective utilization of the Internet and its related outfits would be completely removed. Attention is turned to Malaysia, which is one of the *Early adopters* of Internet technologies amongst developing countries and one of the fastest growing economies in the world for the last decade. Economic development and viable commerce is central to the usage and dependence on new technologies in modern society and the economic and business opportunities presented by the Internet is enormous and expanding daily.

Malaysian society is on course with other world societies in their participation and contribution to various businesses, economic, leisure, vocational and entertainment events on the Internet; however one particular piece of the puzzle of the Internet jigsaw that Malaysia has not been able to fill is the *publication of Malaysian scientific journals*. There may be other areas unbeknown, but the area of concern in this research where Malaysia is not well represented is the aforementioned and this is what motivated the researcher to embark on a fact finding mission in a way to bring some clarity to the problem and suggest a way forward.

What has been reported and hold as fact in the course of the investigation is that the publication of scientific journals is generally the duty of academic institutions, research centers and professional societies, majority of whom are been funded by the Malaysian government under the ministry of higher education. As such, infrastructure and financing was not supposed to be a problem if financial budget and research grants are anything to go by. As event unfolds and the research digs deeper, it became apparent that infrastructure and financial capability alone is not enough to spur an individual or social system to embrace a particular *innovation*. There are other valuable factors that must be looked at. Doing so, the researcher became concerned with investigating the *adoption* of e-publishing amongst Malaysian journal publishers.

In achieving the purpose of the research, the researcher called out from an arrays of studies that have peculiarities with the topic that is been studied, the subjects that is studied and the key focus of the study. The resolve to pin the colors of this work on the board of *Innovation Diffusion Model* was a consequence of the flexibility and broadness of the theory. The application of the *Innovation Diffusion Model* around the zone of quantitative research paradigm pointing to the direction of *e-journal publishing adoption* has been a

fascinating endeavor that has made this research work thorough and encompassing. Thus, the research questions as presented in Chapter 1 have been addressed in this study.

6.3 Answers to the Research Questions

This section discusses how the research questions have been answered.

6.3.1 How Relevant Are the Organization Variables and Publishers Characteristics In the Adoption Of E-Publishing amongst Malaysian Journal Publishers?

1. Study Participants and Publishing Practice.

The participants of this study are Chief Editors, managers or publishers of Malaysian journals. A total of 156 subjects were recorded, among them were 88 males (56.4 %) and 65 females (41.7 %) while there are 3 subjects who wished not to indicate their gender. This shows that there is no much gender divide or gender bias in the distribution of editorial chiefs or managers of journals in Malaysian publishing circles. Both males and females are well represented and this further establishes that in Malaysia contemporary society, the women folk have been provided same opportunities like their male counterparts in terms of education and career development. There is no gender discrimination taken place in the academic arena and in journal publishing within Malaysia. Priority is given to excellence and qualification and not gender. It is expected that there would be more women involved in the management of journal publishing in Malaysia just as men in the foreseeable future.

The proportion of publishers who have focused mainly on electronic publishing add up to 27.6% or slightly more than a quarter of the publishers and those that are still practicing print-only mode of publication add up to 25.6% or a quarter of the Malaysian publishers, while those that are currently practicing hybrid-mode of publication add up to 40.4% of the publishers. By this result, it can be concluded that there has been an overall improvement in the *adoption of e-journal publishing* since the study of Zainab et al. (2012) which found that approximately 63% of Malaysian journal publishers are still producing their materials only in print, while approximately 31.3% are adopting the hybrid-mode of publishing. Care must be taking in trying to compare the latest result with that of Zainab et al. (2012) because the cited authors surveyed the whole population in their research while the current study only considered a sample of the population.

By and large, this indicates that a lot of efforts still need to be done to persuade and encourage publishers to focus on e-only mode of publication since it is highly more effective and timely than the other formats. Majority of the publishers are still practicing hybrid-mode of publication; publishing their issues in electronic platforms online and at the same time printing copies of the journal in ink. Most of the publishers in this group are those with static journal websites on the Internet and those that equate *indexation in online abstracting and indexing system* with publishing e-journal. Many of them still find it very difficult to manage e-publishing online and have less confidence in the durability of the online systems. Therefore, more investigation is needed to understand why Malaysian publishers are not ready to do away with print journals for e-only.

The publishers that are currently practicing e-only or those that have decided to publish e-journals should endeavor to have a perfect working journal management system, for example Scholar-One, that handles many functions such as author submission, reviewing

process, automatic mailing system etc . As earlier said, there are many publishers who only have a webpage that provide information about the history of their journal and their editorial board members and many of them actually equate this to mean *adoption of e-publishing* and this is one of the limitation of the result. There are far more publishers that can be technically position in the group of non-adopters than it is revealed. Hence, journal publishers need to improve their knowledge about the issues of e-journal publishing and the e-publishing platforms. The Malaysian journal publishing system requires opinion leaders and change agents to assist publishers and provide adequate information regarding the e-journal publishing adoption process.

Besides, a large number of journal published in Malaysia are from the academic institutions and this add up to 84% of the publishers. The non-academic publishers are made up of 10.9% of the publishers and those that belong in both groups comprises 5.1% of the population. Malaysian academic institutions are the most productive in terms of research with support from the government and ministry of higher education. The adoption, management and quality control of e-journal publishing should be given proper attention. Most academics in Malaysia have other avenues in the name of foreign high profile journals to publish their work and the reliance on foreign journals has meant that local Malaysian journals are negligible. Publishing research in top tier journals abroad is part of the movement in science, however this study believed that the lack of proper control and quality, emanating from the mediocre management of e-journals in Malaysia does not bold well for the image of research in Malaysia.

Therefore, it is recommended that Malaysian journal publishers should pay more attention and allocate resources to upgrade local Malaysian journals. They should endeavor to solicit

for international expertise and collaboration in research contribution and journal publication.

2. Field of Publishing and Publication Format

The study examines the relationship between *field of publishing* and *publication format* and a significant relationship was found that supported the research hypothesis: There is a statistically significant relationship between *field of publishing* and *publication format*. Publishers who are in the field of Science/Technology are more promising to adopt e-journal publishing earlier and in quick alacrity than publishers from Social science/Arts/Humanities. In all, almost a third of the Malaysian journal publishers are still yet to adopt e-publishing innovation and most of those who claimed *adoption* are lacking in its *implementation*. There are far less science/technology publishers who still engage in print-only journals compared to social science/arts/humanities publishers. 18.2% of science/technology publishers are still printing their journal without an electronic version to complement it, compared to 36.5% of social science/arts/humanities publishers.

This shows that science/technology publishers are more likely to do away with printed journals earlier in the near future than their counterparts in social science/arts/humanities. The latter are still very comfortable with print-only mode of publishing due to many unresolved issues that are still going on in the scholarly community, specifically pertaining to the way and approach of delivering their work. The pattern of research and presentation of research findings in social science/arts/humanities differs in great deal to science/technology and it is this style of research that makes their *adoption decision* behavior differs. Presentation of research findings takes much longer in social

science/arts/humanities field than in science/technology field. In the latter there are many different avenues to announce your breakthrough and make your research available as fast as possible, such as through seminars, pre-prints, open access, or abstracts, before finally making its eternal way to a scholarly journal of choice. This makes publications in science more flexible and fast unlike in the former.

In other words, some fields of publishing are more demanding than others. For example, there is more demand and pressure from scholars in the field of science and medicine to produce research findings in form of journal papers frequently and consistently. Additionally, research in science/technology fields occur in quick succession, as one research is been published, there are lot of other similar findings or counter findings that follow suit, making it very competitive to publish in science/technology journals. The situation is considerably different from social science/arts/humanities field since most researchers in this field prefers to publish their work in a holistic pattern rather than in snippet, as it usually practiced in science/technology fields.

Most research works in science/technology field are restricted by words and page limits; the more concise the better, as opposed to social science/arts/humanities where research publications are as detailed as they come – and this condition make book formats or printed works to be the most desirable form of knowledge dissemination in social science/arts/humanities field. As the new online platform become more friendly and flexible, there would be more researchers in social science/arts/humanities field embracing e-journal publishing and the days of printed information would soon become a thing of the past.

Although the same resources available to science/technology publishers are now available to their counterparts in social science/arts/humanities but the former always seems to be the pioneer of such facilities and as such would have the opportunity to exploit those online resources earlier and in large proportions before the latter group wake up to it and this makes the latter group, a slow adopter of scholarly communication technologies. The implication of the finding is that, service providers and technology inventors would always focus their product to serve science/technology researchers as they are always likely to try it earlier and eager to be the first to make use of it before others follow suit. Therefore, practitioners in social science/arts/humanities field should endeavor to partner with their counterparts in science/technology to aid the adoption and implementation of e-journal publishing. Publishers should make efforts to work with each other and identify areas where either side can be beneficial in technology transfer and adoption.

3. Publishing Experience and Familiarity with E-Journal Publishing

The study examines the relationship between *publishing experience* and familiarity with *e-journal publishing* and the outcome revealed that there is no statistically significant relationship between *publishing experience* and *familiarity* with e-journal publishing. The findings disapprove of the notion that *familiarity* with a *technology innovation* will be affected by years of experience; in this case, the number of years a publisher or Chief Editor has been involved in journal publishing.

Years of experience, whether high or low, is not related with *familiarity* with e-publishing. This result would be of interest to academics and scholars since experience comes with age and length of service. Most of these publishers are academics, and the older ones amongst

them are very unpopular for their conservative lifestyle and mindset as regards to teaching and pedagogy. As such it was conceived that the old guards amongst them would be less familiar to e-journal publishing features compared to young and aspiring ones. It was assumed that most of the older participants, who had spent more years as Chief editor or publisher before the advent of e-publishing would be passive in e-publishing activities. Because they are already very much used to catering for printed journals, managing its subscriptions and correspondence. In that case, they would show less interest to get themselves familiar with the new online platform unlike the young Editors who became exposed to the Internet earlier in their academic and publishing career.

The submission therefore is that there is no difference in the approach or behavior to e-journal publishing technologies with respect to years of experience. There is no difference in the behavior and attitudes of older publishers and younger publishers in the *familiarity with e-journal publishing*. If the result obtained here has been in the favor of older publishers over younger publishers or vice versa, as it affect the *familiarity* with e-publishing, it would have been advised that the favored group should be accorded the privilege to manage journal publication in Malaysia for productive changes to be effected, but the findings did not provide enough evidence that can allow the researcher to make any suggestion concerning the management or leadership style of Malaysian journals.

Therefore, it is suggested that the leadership style of journal management in Malaysia should be critically examined. The role of the Chief Editors must be functional and publishers must allocate more time for the journal publishing task. Publishers must also make efforts to employ permanent staffs for their journals and make sure that the journal management process is consistent and sustainable for long term. The succession plan of journal management should also follow proper due process since many of the Chief Editors

are old professors and Emeritus in some cases. Therefore they should prepare the ground for succession for the sake of consistency and sustainability. This area can be properly looked into in future studies.

4. Publishing Experience and Adoption of E-Journal Publishing

The study examines the relationship between *publishing experience* and *adoption* of e-journal publishing by Malaysian journal publishers and also determines if the relationship of the *publishing experience* with *familiarity* is different from *adoption*. Many individuals are very familiar with products and services that they never adopted. It was found that as with *familiarity*, there is no statistically significant relationship between *publishing experience* and *adoption* of e-journal publishing. The same argument put forward to explain the result of *publishing experience* with *familiarity*, can also be advanced in the case of *publishing experience* with *adoption*.

The length of service years of a Chief Editor or Publisher has no influence on his/her decision making concerning the *adoption of e-publishing*. The outcome of this study shows that experience carry less weight in affecting the *adoption of innovation*. Zakaria and Rowland (2006) also find no relationship between *experience*, operationalized as length of service and attitudes towards *technology adoption*.

Meanwhile, Massad, Brown and Tucker (2011) observed that years of academic experience is related to the *perception and adoption of e-journals* amongst business faculty members as younger faculty members are more likely to adopt e-journal publishing earlier than older members. Similarly, Scott et al. (2008) observed relationship between *years of experience* and the *adoption* of Canadian Heart Health Kit (HHK) amongst a sample of Physicians in Alberta, Canada.

The uniqueness of *e-journal publishing innovation* compared to other technology *innovations* is found in the distinctness, growth, and dynamism of the Internet platform supporting it. The result might be generalized to other technology *innovations* supported and channeled through the Internet. It is therefore submitted that for Internet-related technologies, *years of experience* or *length of service* will have no relationship with *adoption*.

5. Publication Age and Familiarity with E-Journal Publishing

The study examines if there is a correlation between *publication age* and *familiarity* with e-journal publishing and the findings revealed that, there is no statistically significant relationship between *publication age* and *familiarity with e-journal publishing*. The hypothesis for this research objective was formulated considering the fact that older journals are more likely to have a larger user base and influence than new journals. These characteristics should favor older journals in adopting e-journal publishing earlier and with effective management. New journals are assumed to be in a disadvantage in journal publishing, since it takes time for them to introduce themselves to the scholarly community and it takes longer time even to attract prolific authors, contributors and funding for the new publication as they keep up soliciting for contributions.

Older journals are perceived to be more dependable with the caliber of scholars sitting on the editorial board, editors and reviewers working for the journal. There is an identity to respect and formidable background to trust -- something that might be lacking at the onset for new journals. Besides, older publications are likely to have accumulated lot of citations to their journal and high citation means high impact and valued respect in scholarly

publishing. This line of thinking made the researcher assumed that a relationship might exist between *publication age* and *familiarity* with e-journal publishing. It is expected that Chief Editors or publishers of older titles would be more familiar with e-publishing activities than managers of new journal titles. This *publication age* should not be confused with *publishing experience*.

A well-established organization or journal publication are likely to have a solid culture, proper planning and objective that galvanize the organization and allow it to be flexible to change. It does not matter if the manager or Chief Editor is an older or younger scholar, the predefined roles and activities of a well-established organization or journal publication will play a part in the decision making and behavioral change when a new *innovation* is introduced into the social system. This organization culture would assist them in forming positive attitude and an immediate course of action to get familiar, observe and make a push for *new technology innovations*. This is why the researcher assumed that older journals are supposed to be well established and by and large would be more familiar with e-journal publishing technologies than the newly created journals.

The outcome of the investigation however revealed that this assumption is not true. *Publication age* has no effect on the *familiarity* with e-journal publishing. There is no difference in the behavior or decision making of Malaysian publishers whether they are Chief Editors of an old journal or a newly established one. Moreover, as the commercial and economic aspect of e-publishing technologies still remains unclear and continues to be discussed, many Malaysian publishers both managers of old and new publications, seem comfortable doing things the traditionally way and find the ever changing and unstable e-publishing platform difficult to sail. Therefore, the management process of Malaysian journal publishing needs to be reformed to meet international standard.

6. Publication Size and Familiarity with E-Journal Publishing

This study examine the relationship between *publication size* and *familiarity with e-journal publishing*. This was brought fought from the purview that publishers with large publication run or issues would feel obliged and more in need to adopt new technologies to support their production, accelerate their work and improve quality. This will lead them to engaging and obtaining necessary information and skills required for the new task. However, the findings of this study suggest otherwise. The outcome of the investigation is that no statistically significant relationship was found between *publication size* and *familiarity with e-journal publishing*. It means that there is no particular pattern of behavior regarding *familiarity* with e-journal publishing, whether one considers publishers with large publication or publishers with small publication issues.

The change in behavior or possibility to make decision on new technology is not affected by the *size of the organization*. This implies that *size* does not matter in journal publishing and *size* may be a very intangible phenomenon in this context. This result might be different if focus of the study is not limited to Malaysia. It is possible to obtain a different result if other social strata are considered, such as commercial journal publishers or e-book publishers. For these categories, *organization size* might be associated with *innovation adoption*.

In the Malaysian case, many of the journal publication are not managed by commercial publishers, as most of them are by academic institutions, non-profit professional societies and government research agencies with lack of interest in the economic niceties of e-journal publishing. Many of these Malaysian journals are published periodically and the

mean of the publication issue is approximately 3 issues per year, the mode is 2 issues per year; 42.8% of the publishers produce only 2 issues per year. This shows that *publication size* cannot be chosen as an important factor to consider in the *adoption* of e-journal publishing amongst Malaysian journal publishers.

7. Publication Age and Adoption of E-Journal Publishing

The study examines if any relationship exists between *publication age* and *adoption of e-journal publishing*; if *publication age* can have any effect on *familiarity* or *adoption* or both. It has been revealed in the previous finding that *publication age* has no influence on *familiarity*. Similarly, it was found that there is no significant relationship between *publication age* and *adoption of e-journal publishing*. The research reasoned that old publications are likely to have more influence and popularity in the scholarly community than new publications. Since older journals are supposed to be well established, and although the management and editorial board members might change over time, the management position or the Chief Editors post remains with the mission of duty and expected behavior of individuals filling those positions.

Old titles are supposed to have a larger user base than new journal titles, as such they tends to receive higher demand from subscribers and users to adopt new *innovations*; therefore they are likely to be more ready and capable to adopt new *innovations* earlier than new publications. However, the findings have revealed that this assumed pattern of behavior is unfounded and there is no specific pattern in *e-publishing adoption* with respect to whether a publication is an old journal title or a new journal title. The revelation from this study is similar to the findings of Glass and Li (2010) in the study of *adoption* of IM (instant

messaging) at the workplace. The authors observed that *age* has no impact on the *adoption* of technology at workplace. Likewise, the findings is similar to Zakaria and Rowland (2006) who found no correlation between *age* and attitude towards *adoption* of publishing online scholarly journals amongst Malaysian scientists, managers of university presses and other not-for-profit publishers in Malaysia.

This emphasizes that organization variable such as *publication age* cannot be regarded as a variable of importance in the *adoption of e-journal publishing* amongst *Malaysian journal publishers*. If the result has reflected a positive impact of *publication age* and *adoption*, it would have been suggested that *service providers* and *change agents* should try to focus attention and publicity on older publications when promoting and advertising *technology innovations*. Therefore since no meaningful correlation was found between *publication age* and *adoption*, marketing strategies may be created to focus on other important aspects of *innovation diffusion process*.

8. Publication Size and Adoption of E-Journal Publishing

The study examines if there is any relationship between *publication size* and *adoption of e-journal publishing*. This is in view of the fact that, larger sized organization has generally been observed to be more innovative, just like individuals with large incomes and high social pedigree (Murphy, 2011; Nordin, Othman and Che Mat, 2008; Rogers, 2003). It was found that there is no significant relationship between *publication size* and *adoption of e-journal publishing*. The study had attempted to examine how *publication size* affected *familiarity* and *adoption*. It has been earlier confirmed that *publication size* has no impact on *familiarity* with e-journal publishing and neither does it have any impact on *adoption*.

The same explanation put forward in the earlier case is backed up in this. Frequency of publication is not associated with *adoption of e-journal publishing* amongst Malaysian publishers, probably due to the fact that there is no much disparity in their production size and publication quantity. Almost a half of the publishers publish their journal issues twice a year and very few of them published more than twice a year. There are rare cases where some titles produce up to 10 or more issues per year and these were the exemptions rather than the rule.

In the foregoing, it is difficult to generalize these results because it is plausible that this situation is only peculiar to Malaysia or peculiar to journal publishing, nonetheless, there exist some studies that have similar result with what is found here, such as Pankratz, Hallfors and Cho (2002), Hausman and Stock (2003). Pankratz, Hallfors and Cho (2002) found that *size* was not significantly associated with *adoption* of a federal drug prevention policy (principles of effectiveness) amongst Safe Drug Free Schools (SDFS) coordinators in 12 states of the United States, while, Hausman and Stock (2003) find no correlation between *size* and *adoption / implementation* Electronic Data Interchange (E.D.I) in hospitals.

On the contrary, some studies have found relationship between size and technology *adoptions*, such as: Nordin, Othman and Che Mat (2008) who found relationship between *size* and *adoption/implementation* of technology within Malaysian herbal industry as SMEs (small and medium-sized enterprises) are less likely to adopt *innovations* before the larger sized. Syzdykbayeva (2009) observed relationship between *size* and *adoption* of Green Computing Technology amongst companies and organization within Malaysia. The author observed that small sized firms are less likely to adopt the *innovation* because they don't perceive the impact of environmental problems strongly enough. Murphy (2011) observed

a relationship between university *size* and the *adoption* of iPad in tertiary institutions in the US. Smaller universities are more motivated to communicate to the market about the PPC (Post PC devices) initiatives than the big universities. This shows that the important of demographic and organization variables on technology *adoption* would be largely dependent on the kind of *innovation* and the social system studied.

Hence, if other social systems or regions are considered, the result obtained in this study might be different. The outcome of the investigation on the *adoption* of e-journal publishing amongst Malaysian journal publishers, suggest that *publication size* has no relationship with the *adoption* of e-journal publishing. It is therefore pertinent to look deeper as there could be some other variables that are more salient to *innovation adoption* in this context, than the aforementioned *demographic and organizational variables*.

9. Innovativeness and Familiarity with E-Journal Publishing

The jury is still out concerning the issue of whether there is a general trait in human being called *innovativeness* which affects and dictates individual's general decision to embrace any new product, idea or service. It is considered a *De Factor* element; natural, existing personal attitudes, which could mediate the influence of external variables and stimuli. *Innovativeness* is one of the key ingredients in the *Innovation Diffusion Model* and the study examines the relationship between *innovativeness* and *familiarity* with e-journal publishing. Participants were asked about perception about their own degree of *innovativeness* and this was correlated with the *familiarity* with e-journal publishing. Rogers (2003) has defined *innovativeness* as the degree at which an individual or other unit

of *adoption* is relatively earlier in adopting new ideas than other members of his/her social system.

The scope of thinking was that publishers who perceived themselves to be *Innovators* and visionaries in the bigger sense would have more positive attitude towards most *technology innovations*, and would readily familiarize themselves with e-journal publishing which should lead to *adoption*. It was assumed that their natural behavior towards previously introduced *innovations* in the past would be directed towards e-journal publishing and this will result in decision to adopt e-journal publishing.

A strong correlation was expected, although the study observed a moderate correlation and significant enough to be taken into consideration in *innovation* diffusion. Besides, some other factors may mediate the relationship between *innovativeness* and *familiarity* with e-journal publishing, such as age, income etc. Therefore, assuming that all other mediating factors are controlled, it should be possible to find a reliable relationship between *innovativeness* and *familiarity* with e-journal publishing. The *innovativeness* play crucial role in the *familiarity* with e-journal publishing but stop short of influencing the *adoption* of e-publishing amongst Malaysian journal publishers.

Therefore, it is suggested that suppliers of new publishing technologies should focus marketing strategies to convert the *innovators* and *early adopters* in the social system before the other adopter categories is taken care of. Future research might want to look at the characteristics of participants who consider themselves to be *Innovators* and *Early adopters*. This reality might deepen our collective ideas concerning this elusive concept of *innovativeness*.

6.3.2 What are the key attributes and factors that are most relevant in the adoption of e-publishing amongst Malaysian journal publishers?

1. Familiarity with E-Journal Publishing and Adoption of E-Journal Publishing

The study evaluates the association between *familiarity* and *adoption of e-journal publishing*. The result of the investigation revealed that a moderate significant relationship exist between *familiarity* and *adoption*. It was conceived that the more *familiar* an individual is with *e-journal publishing*, the more likely s/he is to adopt it, but at the same time, there is a possibility that many people are familiar with some products and services they never adopted. The point of convergent is that when publishers become familiar with the publishing, submission and reviewing process of e-journal publishing, they would be motivated to adopt it for their own journal.

Familiarity will lead them to be more conversant with the pricing process of e-publishing and the rules and policies that govern the publishing activity. By becoming aware and familiar with various aspects of the management, commercial and economic issues that surround the publishing cycle, they would feel more comfortable to adopt it. However, it has been observed that even publishers who understand all the formalities of e-publishing are still yet to adopt it for their own local Malaysian journal. Many of these Malaysian publishers are authors themselves contributing articles to scholarly e-journals published abroad but are reluctant to adopt the new technology for their own local journals which they managed, and that is the main explanation for the moderate relationship that was observed between *familiarity* and *adoption*.

One important factor, though that is likely to mediate the effect of *familiarity* and *adoption* is available resources (human or material resources) but this variable was not considered in the research framework since many of these Malaysian journals are under the control of their parent institutions and the resources needed are provided by the institution. Both the public and private institutions in Malaysia are well funded by the government and private funding agencies, therefore, it was viewed that lack of funding or lack of resources cannot be an obstacle for journal publication in Malaysia.

All the blame for a non-functioning journal should be placed on the head of the Chief Editor, publisher or the management of the journal. The editorial board and management team are likely to be the key influence on the status of their journal publication. Nonetheless, the study hold on to the opinion that *familiarity* is supposed to lead to *adoption*. It is hoped that as journal publishers become more familiar with various aspects of e-journal publishing, all the negative perception about e-publishing would disappear and this will ultimately lead them to embrace the technology in its full capacity.

2. The Five Attributes of Innovation and Adoption of E-Journal Publishing

The cornerstone of the *theory of innovation diffusion* is the *five attributes of innovation*. The study examines the relationship between the *five attributes of innovation* and *adoption of e-journal publishing*. The five attributes of *innovation* are: *Relative advantage*, *compatibility*, *complexity*, *observability* and *trialability*. These five attributes are the most popular influence to the *adoption* of any kind of *innovation* and it is a legitimate duty to assess their effect on *e-journal publishing adoption* in the Malaysian context.

The outcome of the investigation showed that among the five attributes, *relative advantage* and *compatibility* demonstrated the strongest significant relationship with *adoption* of e-

journal publishing. *Relative advantage* alone explains approximately 20 per cent of the variance in *adoption* while *compatibility* was able to explain nearly 18 per cent of the variance in *adoption*. The study observed a moderate statistically significant relationship between *observability* and *adoption*, likewise a moderate significant relationship was found between *trialability* and *adoption*. A moderate negative significant relationship was found between *complexity* and *adoption*.

This indicates that amongst the five attributes, *relative advantage* and *compatibility* demonstrate the strongest influence on the *adoption of e-journal publishing* amongst Malaysian journal publishers. Rogers (2003) has defined perception of *relative advantage* as the degree at which an individual perceives an *innovation* to be superior to the idea it supersedes. This indicates that journal publisher's perception of the benefit of e-journal is most important factor for them to embrace e-publishing platform. Likewise, the perception that e-publishing fit the style of publishing and in unison with their work profile is also very important to *adoption*. Similar result was obtained by Arts, Frambach and Bijmolt, 2011; Deligiannaki and Ali (2011), Hafizah and Kamil (2009), Massad, Brown and Tucker (2011).

For any new form of *innovation*, what the potential consumer would like to know at first contact is the usefulness of it and after that, try to understand how well it is suitable for his/her needs. This first step is crucial and it has been well reported that *innovations* that project an advantage over previous practice will experience a speedy *adoption*. Likewise *innovations* that are perceived to correspond with the need and past experience of the potential user would receive wide patronage. This emphasizes the need to create a program that will demonstrate to Malaysian publishers about the essential benefit of e-publishing. Awareness program should be created that will focus attention to the non-adopters and

explain the importance, benefit and strategy in moving from print to e-publishing. This strategy can be applied to other similar *technology innovations* in the future.

Complexity has a rather moderate significant relationship on *adoption*. A strong negative relationship was expected. Majority of the diffusion research studies have found strong negative correlations between *complexity* and *adoption* (Al-Ghaith, Sanzogni and Sandhu, 2010; Glass and Li, 2010; Kim and Galliers, 2004). The more difficult publishers perceive e-publishing the less likely they are going to adopt it. The popular assumption is that e-publishing is less of a work because there is no printing, posting or shipping involved in it, but it is still very challenging to produce e-contents. The difficult aspects of the e-publishing are many and these issues are still been debated, even with the flurry of newly introduced publishing models that can be adopted and implemented by publishers to ease their task.

Easy does it in this new era of information explosion and information are becoming more tangible and flexible nowadays that people become impatient and will readily ignore and reject a complex technology for an easy one. *Innovations* are coming thick and fast and also easier and tender to use, reuse and modified. As the technology supporting e-journal publishing continues to evolve, e-journal publishing is foreseen to become easier to handle and understand. Therefore, Malaysian journal publishers need the service of *change agent* and technology promoters in the *adoption of e-journal publishing*. They need individuals and experts that can serve as *change agents* or consultants, assisting publishers to develop solutions to some of the tasks that seem difficult to accomplish. Also these *change agents* can provide trainings and support to publishers and their employees. This will go a long way to reduce difficulties in *e-journal publishing adoption and implementation*.

Observability and *trialability* also showcase some degree of influence in the decision to adopt e-journal publishing, but difficult to state with certainty how large this influence is on *e-journal publishing adoption*. It was believed in certain quarters that individuals are likely to change their behavior as a result of seeing other people doing something new (Gardner and Amoroso, 2004; Moore and Benbasat, 1991; Pankratz, Hallfors and Cho, 2002). The level at which a manager of a journal has been able to see and observe the platforms and the process involved in e-journal publishing is also essential.

This *observability* and *trialability* tendencies would trigger information exchange between the observer and the host and this could be essential to behavioral change and decision making. Publishers who have seen how other colleagues go about *adopting* and *implementing e-publishing* would most likely adopt it also. Publishers who have been able to try the submission, reviewing, online, and authoring process of *e-publishing* are the most likely to adopt the technology for their journal publications, as oppose to those who are yet to have that same hands-on experience. Experimentation and trial of a new *innovation* on a limited scale is very important attributes towards the full *adoption* of the technology, since this experience would be able to erase any questionable doubt about the usefulness and consistency of the *innovation*. Therefore, it is recommended that Malaysia journal publishers should try, engage and get involve with e-publishing on a number of different platforms as this will help them to be able to sustain the adoption process.

3. Peer Network Influence and Adoption of E-Journal Publishing

The study examines the relationship between *peer network influence* and *adoption of e-journal publishing* amongst Malaysian journal publishers. The outcome of the finding is that *peer network* has a significant, but weak relationship with *adoption* and similar result was obtained by (Akinci, Aksoy and Atilgan, 2004). *Peer network* was considered a very

important influence that can change behavior in any social system. It explains a lot about how individuals in a social system alter their behavior due to communication and interaction in their personal network. The implication is that in Malaysian journal publishing cycle, there is less communication going on regarding *e-journal publishing innovation* and there seems to be lack of interest in engaging with this discussion.

It also emphasize that personal networks within the publishing environment has very little impact on their publishing work. This portrays the Malaysian publishing network system as generally passive when it comes to technology propagation and transfer. The participants of the study are majorly academics and as such *peer network* or *academic network* is a common place in this social system and it was expected that these *peer networks*, could connect academics within a community, a zone or region and by so doing should have a substantial influence in enhancing technology diffusion.

According to Rogers (2003), the *Innovation Diffusion Model* portray society as a huge learning system where individuals are continually learning and acting on what they learn, changing behavior and making decisions through time, but independently of one another. What happen is that everyone makes his own decision and has a change in behavior and opinion, not just on the basis of his own individual experiences, but to a large extent on the basis of the learned, observed or talked about experiences of his peers and people around him. This observation put forward by Rogers (2003) was telling in the findings of Agarwal (1997) who observed that *peer network influence* is significant in individual decision to adopt *innovations*; Hausman and Stock (2003) which found that social influence on *innovation* is even more effective than either coercive or non-coercive efforts; the work of Glass and Li (2010) which revealed that social influence factors (subjective norm and

perceived critical mass combined), are more important than perceived usefulness and perceived ease of use in the *adoption of technology* in the workplace.

Therefore, Malaysian journal publishers need to strengthen their personal links. They can form a journal publisher's community where they meet occasionally and discuss about the challenges they are facing and suggesting way forward in tackling the problem. Malaysian journal publishers should engage in constant interpersonal communications with other publishers who have adopted and implemented e-journal publishing as this can drive the *adoption* process. Publishers would be keener to embrace e-journal publishing if other publishers around them have adopted previously. Malaysian journal publishers can also endeavor to link up with fellow publishers around the region and see how they can help each other to move forward in e-journal publishing. Journal publishers should endeavor to learn more about the journal publishing process by inviting consultants for talks on e-journal publishing, and creating training programs for their employees and workforce.

4. Change Agent Influence and Adoption of E-Journal Publishing

The study examines the relationship between *change agent influence* and *adoption of e-journal publishing* amongst Malaysian journal publishers and it was observed that there is a very weak relationship between *change agent influence* and *adoption*. *Change agent* play key roles in ensuring that their immediate society and social system in which they serve have timely access to information that will allow them to continue moving forward. These *change agents* are relentlessly looking for novel ideas, instigating new approach, and preparing grounds for paradigm shift in technology, commerce and economy. They tend to serve various units in their eco-system in terms of expertise and advice. These *change agents* comes in different groups, names and fashion and they are responsible for key developments that can transform the community.

In the case of e-journal publishing, *change agents* can be anyone who propagate and assist in orientating people about e-journal publishing. They possess valuable knowledge about the *innovation* and provide help and assistance when needed. These groups of individuals could play significant roles in preparing information and enlightening concerned publishers about how they can go about taking up the process of *e-journal publishing*. It was conceived that many publishers would have had contacts at some points with these kinds of agencies or agents and that might have a great impact on their decision to adopt e-journal publishing. However, the findings revealed that this is not the case. It shows that *change agent influence* is not related to *adoption of e-journal publishing* amongst Malaysian journal publishers, indicating that there are no *change agents* interested in e-publishing diffusion in the Malaysian context.

Many Malaysian publishers, as already noted, are not professional publishers since the task of publishing, by them is considered a part-time job, along with other academics task. Therefore, the publishers have no proper budget or financial benefit in publishing journals, and this might explain the less influence of *change agents* on e-journal publishing *adoption*. Most of the professional *change agent*'s work for commercial companies and their job is to contact clients and potential adopters to influence their *adoption* of a product of interest. Malaysian government and other non-profit organizations that have interest in research and development can also take a cue from professional companies and make it a point of duty to provide *change agents* to academic institutions and research agencies and help them in their *adoption decision process*.

5. Familiarity and Adoption with Regards to Field Of Publishing

The study examines the difference in the relationship between *familiarity* and *adoption* with respect to participant's *field of publishing*. The outcome of the analysis revealed that a

difference exist in the relationship between *familiarity* and *adoption* with respect to *field of publishing*. It was found that there is a moderate association between *familiarity* and *adoption* for Science/Technology publishers, but considerably higher association was observed between *familiarity* and *adoption* for Social science/Arts/Humanities publishers. The interpretation is that *familiarity* with e-publishing is a very important indicator for behavioral change and decision making for Social science/Arts/Humanities more than it is for the other group.

Familiarity contributes moderately to the adoption decision of Science/Technology publishers. The explanation of this result stem from the point view of *compatibility* and *observability* attributes of *innovation diffusion*. Research in science/technology fields, computer/information science in particular are more consistently related with social media and online platforms. Although engineers and computer scientist created the computers with Internet that make social media possible, however, it has been observed that scientist in the field of biology and chemistry were the first group of scholars to embrace online platform of information and knowledge sharing. This was in form of *Abstract publications* in scientific journals and this initiative was followed suit by other publishers in various field of science/technology. It took quite a while and lot of deliberation before scholars in social science/arts/humanities joined the movement.

There were lots of discussions concerning the pattern in which issues such as intellectual property, copyright and plagiarism would be handled in the online publishing platform. Although these highlighted issues affect all categories of publishers on the Internet, but it took a toll on social science/arts/humanities publishers and led to the slow *adoption* by publishers in that group. As these issues began to unravel, publishers in social science/arts/humanities starts to weigh both the pros and cons of publishing their works

online and the demonstration and willingness of the academics, commercial service providers, and online search engines to resolve the issues of authorship, intellectual property, copyright and so forth, have mellowed the ground for social science/arts/humanities scholars.

Afterwards, it became clear that the roadblocks that prevent the full acceptance of e-journal publishing would soon be removed. The creation of new frontiers in publishing and other positive enterprises pioneered by scientists, publishers and stakeholders further reinforce the stability of e-journal publishing. The implication is that before publishers in social science/arts/humanities could make a decision to *adopt e-journal publishing*, effort must be made to enhance their familiarity with it, whereas for science/technology publishers, there isn't much need for that since they are readily familiar with the platform. In other words, a *change agent* intervention to promote e-journal publishing *adoption* should focus more resources and time on publishers from the social science/arts/humanities field as they would need more time and assurance before their *adoption* decision could be made.

6. Innovation Attributes and Adoption with Respects to Field Of Publishing

The study examines whether there is any difference in the relationship between the five attributes of *innovation* and *adoption* with respect to the *field of publishing*. The five attributes of *innovation* are: *relative advantage*, *compatibility*, *complexity*, *observability* and *trialability*. For *relative advantage*, it was submitted that the relationship between *relative advantage* and *adoption* differs between publishers in Science/technology and Social science/Arts/Humanities. A relationship exists between *relative advantage* and *adoption* for Science/technology publishers and a relationship does exist between *relative advantage* and *adoption* for Social science/Arts/ Humanities. The difference is that the

relationship for social science/arts/humanities is much stronger compared to that of science/technology which is just moderate.

The interpretation is that before making a decision or having a behavioral change, academics in social science/arts/humanities would have perceived a great deal of benefit before adopting. Adopters amongst social /science/arts/humanities publishers are those that believe that definitely e-journal publishing has a lot of benefit and it will improve their publishing practice. This reflect the essence of perceived benefit when individuals make decision to adopt an *innovation*, and in this case, it is rather highly essential and is a factor to take into consideration for social science/arts/humanities publishers for changes in behavior, far more important to them as a factor than for publishers in science/technology.

In the forgoing analysis, putting together all the outcomes of the previous research questions, it can be concluded that science/technology publishers readily adopt new *innovations*. For *compatibility*, there exist a difference between the two groups; the relationship is stronger for science/technology publishers than their colleagues in social science/arts/humanities. The former perceive a great deal of consistency and fitness of the technology with their discipline and the way they like to do their work more than social science/arts/humanities does. Again this is another fascinating result and it is not a surprise that science/technology publishers perceived e-journal publishing to be in line with how they love to work and use information. As stated in the previous section, there has been lot of debates as to whether e-journal publishing suits the style of social science/arts/humanities, although most of those uncertainties are been removed with

development of new models, advancement in e-publishing management and delivery system. The challenges remains, but they are gradually evaporating.

Similarly, the study observed a difference in the relationship between *Complexity* and *adoption* with respect to *field of publishing*. A statistically significant moderate negative correlation was observed for Science/technology while a non-significant correlation was observed for social science/Arts//Humanities. This finding suggest that the perceived *complexity* aspects of e-journal publishing *adoption* present a high degree of negative effect on *adoption* for science/technology publishers more than for social science/arts/humanities publishers.

For *observability*, no difference was observed between the two groups, as regards to the relationship with *adoption* of e-journal publishing. The correlation coefficient recorded for both groups are very close. A moderate statistically significant relationship was revealed in both cases with both groups most likely to adopt e-journal publishing at the same degree when they can see other publishers in their personal network trying and making use of the new *innovation*.

The significance of *trialability* as a good indicator greatly differs between the two groups. A weak relationship was observed for science/technology publishers while a moderate significant relationship was observed with social science/arts/humanities. It shows that *trialability* is less likely to influence *adoption* for science/technology publishers compared to the influence it has on social science/arts/humanities publishers. The latter group would need to have tried an *innovation* on a limited basis before making decision on *adoption*.

Social science/arts/humanities publishers require a great deal of assurance on the reliability and compliance of the new platform to their ways of doing things before making decision to adopt. The change in behavior would be highly affected by gaining opportunity to see, try and understand the pros and cons, benefits and drawbacks of e-journal publishing before finally making decision on whether to adopt or not. This in effect will also affect the *timing of adoption*.

The outcome of the analysis shows that there is a considerable degree of difference in the relationship between the five attributes of *innovation* and *adoption* with respects to *field of publishing*. The only case where the difference is minimal is for *observability* whereas the relationship with *relative advantage*, *compatibility*, *complexity* and *trialability* demonstrate a significance difference between the groups. The implication of the result comparing the two groups is that *change agents* and technology advertisers should focus more energy on social science/arts/humanities as they would need more time and conviction before moving forward with *e-journal publishing adoption* and other similar *technology innovations*.

7. Peer Network Influence and Adoption with Respects to Field of Publishing

The study examines the difference in the relationship between *peer network influence* and *adoption* with respect to *field of publishing*. It was found that the relationship between *Peer network* and *adoption* greatly differs between publishers in Science/technology and Social science/Arts/Humanities. There is a moderate statistically significant correlation between *Peer network* and *adoption* for Science/technology publishers compared to a non-significant correlation observed between *Peer network* and *adoption* for Social science/Arts/Humanities. This reflects that personal academic network is functional in

Science/technology fields in Malaysia and it is less functional amongst the social science/arts/ humanities. *Peer network influence* is high amongst science/technology publishers and has impact on their publishing behavior, which is as a result of regular conference, seminars and workshop that is very common amongst science/technology scholars.

These formal gathering also characterize research development in the science/technology field. This implies that a strong social and academic link amongst publishers can positively affect *innovation* diffusion. It is therefore suggested that academics in social science/arts/humanities should endeavor to increase and strengthen their academic network as this can have positive impact on e-journal publishing *adoption* and *implementation*. They should also endeavor to collaborate and join forces with their counterpart in science/technology field, so as to benefit and maximize the efficiency of e-journal publishing and other similar publishing technologies. They can both learn from each other and be a partner in the new information world order.

8. Change Agent Influence and Adoption with Regards to Field of Publishing

The result in previous section of this study has revealed that *change agent* is almost ineffective in aiding *innovation* diffusion as far as e-journal publishing is concerned in Malaysia. The study pushes the discussion further by trying to examine the difference in the relationship between *change agent influence* and *adoption* with respect to *field of publishing*. It was observed that there is a non-significant relationship between *change agent influence* and *adoption* for science/technology; however the study observed a moderate significant relationship for social science/Arts/Humanities. Publishers in science/technology have received no support from change agents regarding their publishing activities and they perceive change agents to be less influential in their decision

making. However, social science/Arts/Humanities publishers perceive certain degree of influence from change agents in their journal publishing activities. This implies that there is very little or no attention given to e-journal publishing from Malaysian professionals, librarians, private or public agencies.

The most impediments to the proper *adoption* and *implementation* of e-journal publishing are the lack of awareness knowledge and technical skills, which are direct result of lack of *change agent* promotional effort. Many Malaysian journal publishers are yet to adopt e-publishing because they lack the required knowledge and skills on how to kick-start it. While some of the publishers have adopted e-publishing without really understanding the consequences of *adoption*. Besides, there are some who have adopted and did not understand how to move forward, and are not clear on how to integrate new technologies with the ongoing process. These problems might have been considerably reduced if the publishers have been exposed to trainings and discussion sessions on e-journal publishing. This undertaken can be supported by both private and public agencies.

Therefore part of the recommendation of this study is focused on the need for the Malaysian government or the ministry of higher education to realize the importance of the employment of *change agents* in their ministry. This office can be created as part of the department that sees to technology creation and *innovation* diffusion in Malaysia. Their job would be to identify a potential *innovation* and make effort to spread information about it across the social system with which it is intended.

9. The Five Attributes of Innovation and Supporting Variables

This research has been able to highlight the importance of the variables presented in the framework as they affect and influence the *adoption of e-journal publishing* amongst Malaysian journal publishers. It is also essential to understand the most significant predictor(s) of e-journal publishing amongst the nine variables. It was observed that *relative advantage*, *compatibility*, and *complexity* make the most significant contributions. Amongst the three most contributing variables, *complexity* was observed to be the best predictor of *adoption* of e-publishing amongst Malaysian journal publishers. *Complexity* makes the most powerful unique contribution, compared to other variables in the model, in explaining *adoption*. *Complexity* happens to be the most important predictor when the variance explained by all other variables in the model is controlled for.

In the correlation analysis presented before, the study observed a very significant but moderate negative relationship between *complexity* and *adoption*. It reflects the fact that perceived *complexity* has a negative effect on *adoption*. It will take a long time and huge efforts for individuals to embrace *innovations* that are perceived to be difficult to use and implement. Many Malaysian publishers perceive e-journal publishing to be difficult to understand, adopt and implement. This emphasizes the lack of appropriate *adoption* and *implementation* that is very apparent in most Malaysian journal publishing system. This is why new publishing models should focus on designing features that would be easier for publishers to understand and use. Web designers, service providers, and information scientist should pay special attention to making sure that the journal management systems and the journal publishing platforms are easy and inexpensive to purchase, understand and use.

The variable that was observed to be the least predictor of *adoption* is *innovativeness*. This revelation concerning the weight of *innovativeness* is revealing, since many of the participants actually perceive themselves as innovative individuals, but this perception is not reflected in the *adoption* of e-journal publishing. There were no relationship between their perceived innovative tendencies and their actual behavior. It was actually expected that *innovativeness* will be highly correlated with *adoption*, since many studies have shown that highly innovative people readily adopt new technologies. The characteristics of *Innovators* and *Early adopters* also match the characters of the population studied; highly educated people, high social economic status, financially stable etc. although many of these characteristics might not be revealing to the study, but the fact that they are academicians make it plausible to consider them as *Innovators* and *Early adopters*. In other words, academic qualification or social economic status does not guarantee *innovativeness*; rather does it guarantee the *adoption* of technology.

6.3.3 What is the diffusion rate of e-publishing amongst Malaysian journal publishers?

One of the most important aspects of the study on e-journal publishing adoption is the outcome of the diffusion rate of the innovation measured through the time of publishers unit of adoption and categorized into five groups, representing the percentage of *Innovators*, *Early adopters*, *Early majority*, *Late majority* and *Laggards* in a given social system. The finding from this latest study shows that, the diffusion of e-journal publishing amongst Malaysian journal publishers does not follow the normal diffusion curve and the percentage of adopters in the groupings does not conform to that of Rogers (2003).

It was found that only 1.9% of the publishers can be placed into the group of *Innovators*; 14.1% were grouped into the categories of *Early adopters*; 7.1% of the publishers were grouped into the categories of the *Early majority*; 43.6% were grouped into the category of the *Late majority*; while 33.3 % of the populations are categorized as *Laggards*. Various factors were responsible for the lopsidedness of this result. The first journal to adopt e-publishing in Malaysia is Malaysian Journal of Computer Science (MJCS), and the main influence to the very *early adoption* of e-publishing by MJCS is because the journal is affiliated to the top-research university in Malaysia (University of Malaya) and under the guidance of the faculty of computer science and information technology. This can be explained by the influence of *previous practice, norm of the social system or communication behavior* at the '*knowledge*' stage of the *Innovation Diffusion Model*

Since the journal is a computer science journal and the e-publishing innovations are pioneered and designed by experts in this field, it is not surprising that MJCS is among the first journals to adopt e-publishing innovations. Another interesting finding is that the *Malaysian Journal of Library and Information Science (MJLIS)* is also amongst the *Early adopters* of e-publishing. Although MJLIS publish research papers in library science and social science studies, however the journal is also published under the faculty of computer science and information technology which also publish and managed MJCS. This can be explained by *peer network influence* at the '*knowledge*' stage of the *Innovation Diffusion Model*, as MJCS publishers are likely to have influenced MJLIS publishers to adopt e-publishing since they are colleagues in the same faculty and under the same management. The same explanation put forward for MJLIS can be extended to *Annals of Dentistry* which is also one of the very *Early adopters* of e-publishing and it is produced by Faculty of Dentistry of the University of Malaya.

Meanwhile, it is also very understandable that *peer influence* alone cannot stimulate *adoption*, because there are still many journals produced in University of Malaya (UM) that did not adopt e-publishing at the time *MJCS*, *MJLIS*, and *Annals of Dentistry* was adopting it, and this can be explained by other attributes of *innovation* such as *compatibility* and *complexity* as other faculty journal publishers might have perceived the idea of putting journals on the open Internet not consistent with their previous practice and find it difficult to use and understand. There have been few cases where publishers in natural science and medicine have spearheaded the e-publishing adoption for their journal out of *curiosity* and *perceived need*, in order to increase readership and accessibility before the innovation has reached the critical mass of adopters.

The *mean time of adoption* is 2.33 years and the mode is within 0.5 years at the time the data was collected (year 2012) which indicate that majority of the adopters are those who adopted around the year 2010 and later. The high rate of *adoption* around the year 2010 and later years can be explained by the attributes of *familiarity*, *trialability* and *observability* at the '*persuasion*' stage of the *Innovation Diffusion Model* (Figure 5.1). This is because by the year 2010, the e-journal publishing innovation has been able to spread across various academic institutions and research centers especially in developed countries and since Malaysian academics are very prolific in publishing research in top-ranked e-journals largely produced in Western-European countries. As such, as they go along in their normal research publications, they have been required and demanded to adopt the online journal management system whenever they are submitting their manuscripts to these top e-journals.

This has resulted in the opportunity for Malaysian academics and publishers to get familiar (*familiarity*), try e-publishing on specific term on various platforms (*trialability*) and

observe how it functions (*observability*). The implication of the findings is that for any new technology innovation to experience high rate of diffusion in Malaysia journal publishing circus, there must be strong *peer network influence* and *change agent* promotional efforts. The functionality of academic network should be able to improve technology transfer and lead to effective adoption of a new technology. Therefore, it is suggested that journal publishing network should promote policies and ideas that will aid adequate adoption and implementation of new publishing platforms.

In the foregoing, it is expected that more publishers would take a cue from the critical mass of adopters and there will be more publishers adopting e-publishing in the near future. Future research on e-journal publishing adoption in Malaysia might want to further investigate the *implementation* and *confirmation* of the *innovation*. This current study has been able to observe that in many of the cases where *adoption* has been claimed, *implementation* and *sustainability* has been seriously wanting.

6.3.4 What is the level of implementation of e-publishing amongst Malaysian journal publishers?

It has been observed in some diffusion studies that many people adopt an *innovation* without putting the *innovation* into good use. A sizable proportion of studies confirmed that *implementation* is lacking in many *adoption* stories. The study examines the *level of implementation* of e-journal publishing amongst Malaysian journal publishers. The assumption was that many Malaysian publishers might have adopted *e-publishing* without fully implementing the *innovation* in its full capacity and this assumption was supported by the findings reported here.

After making decision to adopt e-journal publishing, and the completion of the initial *adoption* stage, *implementation* of the *innovation* would mean that the *innovation* continues to be used, improved, upgraded and maintained. *Implementation* of e-journal publishing should result in a mutual adaptation in which both the *innovation* and the journal publishing is transformed in positive ways. That positive change has not been reflected in Malaysian journal publishing systems.

Details of these were reported in Chapter five section of this analysis. There are varieties of features and components typical of a standard journal system, that are largely non-existence in most Malaysian e-journal websites. It reveals that in many of the cases where *adoption* has been performed, the *adoption* has not been consistent, maintained and managed. Many of the supposed-to-be e-journal websites are mere static pages that offers very little to users. Most of the journal website lacks the quality, features and contents expected of a journal management system. These might be the major reasons why local and foreign researchers alike are becoming more reluctant to contribute their works in Malaysian journals. Appearance is very essential in the digital age and many Malaysian journal website fall short of show-casing a quality appearance expected of scientific journals on the Internet and perhaps, this is why many researchers would likely bypass Malaysian journals and aim to publish their works in the champions-league journals. The dream of every researcher is to position his/her works among the best in his/her chosen field, and in the scholarly community, the publisher of an article is a reflection of the quality of the article, the status of the author and his/her affiliation.

The reason for the current situation of Malaysian journals can be traced to the centralization of the organization. Most Malaysian journals are hosted by their parent institution through the institution's own central journal system and this reveals why many of the journals are underperforming. Many of the publishers are not independent of the parent institution and their behavior and action is dependent on what is agreed upon by the university management for all their university journal publication as a whole. There are few cases where the *adoption* and *implementation* has been well performed, and these mostly happen to be publishers who are independent of the parent organ. There are few standard journals from universities and professional societies, which are well funded and well managed, but these are rather exemptions in the larger sense of things.

It is therefore suggested that Malaysian journal publishers should be independent of their parent organization and stand on their own. Publishers should make efforts to generate funding for their journal, and make strategic decisions that could help improve the face of their journals. Besides, as Malaysian researchers have made a large mark in *international research collaboration*, they can extend that also to journal publishing; by inviting experts in the field to sit on their editorial board, engage with expert reviewers and solicit for commercial publishers to publish their journals. This will go a long way to improving the profile of Malaysian journals rather than allowing their parent institution publishing unit to continue to be the publisher - as been practiced by many Malaysian journals.

Malaysian journal publishers need to improve the structure of their website and provide features that enable users to download materials on the go, by the use of their personal computers or other devices. Potential users and contributing authors should be able to

enjoy their experience when going through pages of journal websites. Publishers should make effort to increase accessibility to their journal issues, and make provisions for interactive services that help users to enjoy their information gathering and contribute to the culture of social integration and learning.

In the online social marketing media of minds, many users seek answers to lot of questions concerning their information gathering, research work and social life. The modern social human are interested in sharing ideas and experience on various subjects in their field, and they want it done on the click. Interactivity tools allow users to savor these experiences, and by implementing this module in electronic journal platforms, it can go a long way in selling the journal publication to a wide range of users. This can have huge impact on how users gather information, experience reading and engage in research collaboration. Malaysian publishers should endeavor to develop or purchase a standard journal management system that eases the task of all concerned in the publishing process.

6.4 Limitation and Suggestions for Future Research

This study is a step forward in facilitating the development, growth and stability of scholarly communication in Malaysia. It is another progress in ensuring and achieving an information society in Malaysia. By investigating the practice of journal publishing in Malaysia, the study was able to achieve the main aims and objectives of the study which is to understand, examine and discuss the factors that contribute to the *adoption of e-publishing* amongst Malaysian journal publishers. Although, in the developed world, e-journal publishing is already losing its identity as an *innovation* because the *adoption* has

almost gone beyond the critical mass, but still remain novel to journal publishers in Malaysia as at the time of conducting this research.

The study is limited to the participants surveyed who are Chief Editors or managers of journals published in Malaysia and the result can only be generalized to the Malaysian population. Caution must be observed in trying to generalize the findings to other developing countries, because the observations and discussions presented here is very peculiar to Malaysia. Although, e-journal publishing is distinct from other publishing enterprise such as *e-books*, *e-media*, *social media*, *web 2.0* etc but the boundaries that separates various online platforms are shifting and the gaps are getting closer. E-journal publishing is part of the bigger publishing landscape that is changing daily; therefore future studies can dive into other publishing sectors, such as: *e-book publishing*, *newspaper publishing*, *social media* etc and see whether there is a common pattern observed.

The most promising platform for the future is likely to be the growing and enticing social media platforms of information socialization and collaboration. The new opportunities brought about by web 2.0 technologies are been referred to as Open Science, Science 2.0 or e-science and has generated a whole barrage of interest from scholarly communicators (Ponte and Simon, 2011). The research community deserved to know how open science, and open collaboration of research can enhance scientific research and how it can be modelled to improve other aspect of scientific publishing, such as the peer review process, open access, the impact and influence of a single paper or author amongst a collaborative network or research community.

The research community would like to know what is going on in other publishing industry or publishing platforms and tell us what can be learned from the findings. In the digital age that we all find ourselves today, more content is available than ever, in excess and the explosion of contents has been fuelled by an increase in the user base, a new generation of consumers that are well informed, engaging and demanding than ever. It would be educating to know how different groups in the society are reacting to the new information platform, and what changes these transformation has brought to human daily, social and spiritual life. The discussion pertaining to the new models of accessing scientific information and the new models of participation is expansive and elative. There is need to keep the dialog open and the candidate hope that the revelation that came about from this study will spawn numerous debates on this subject and positive changes would manifest in the Malaysian journal publishing of the future.

6.5 Contribution of the Study

This thesis is an added contribution to an array of studies in quite a number of research fields, such as: *scholarly communication studies*, *new media platform studies*, *innovation diffusion studies*, *technology adoption studies*, and *library/information science studies*. It is believed that many journal editors in the listed research areas would find the outcome of this study publishable and useful to their audience. The researcher was successful in forming the research paradigm around a holistic frame of the *Innovation Diffusion Model*. There is a unique method in the whole schema of this new research, not only because of the topic chosen to be discussed or the main subjects of discussion, but also due to the pattern in which the research was carried out.

Prior to this investigation, there are no studies found that have done any research or something similar to what the candidate has done here. Many researchers only focus on few parts of the *Innovation Diffusion Model* without recognizing the importance of the model as a compact whole that must be worked and processed together as it has been done here. Besides, *Innovation Diffusion Model* has never been applied to address issues concerning the *adoption of e-journal publishing* before this. Likewise, most Malaysian studies on journals or serial publications have never focus on the publishers or chief editors or managers of journals as it has been specifically treated in this study.

The numbers of studies on *innovation* diffusion continues to increase but many stop short of studying *implementation* of the *innovation*. When people make decision to adopt an *innovation*, *implementation* does not always follow suit. *Implementation* of an *innovation* emphasizes the importance of harnessing all the capabilities of the *innovation* which can be achieved by putting the technology into good use and in good hands. Additionally, most diffusion studies identified *level of awareness* as a significant indicator for the *adoption* of any new product, but it was conceived that for this current study, it is better to study *familiarity* instead. This is because very few people would be less-aware of the *Internet-related innovations*, in this digital age we are living, due to the popularity of the Internet. However, an individual may be aware of a technology, but not really familiar with it. Hence, it was reasoned that for this case study, *familiarity* with the technology should be investigated, and this is the first known diffusion research that has included *familiarity* in the research framework. It is therefore recommended that future researchers should also consider to study the variable of *familiarity* when studying Internet-related innovations. This study has profound implications for the interpretation, attitudes and diffusion of *Internet-related technology* amongst academics in developing countries.

This study added to the few diffusion researches that have extended their focus to *innovation implementation* and since e-journal publishing is still at its early stage in Malaysia, it was considered not to extend the model variables beyond *implementation*. Confirmation is the last piece in the model and it was not studied in this research, because confirmation can only be studied when the *adoption* and *implementation* has taken place, whereas this is not the case yet in Malaysia. The findings of the study exposed how journal publishing in Malaysia has not really changed over the past decade, particularly in the utilization of Malaysian journal publishing for academic and economic advantage. Insights into the changes in the diffusion of innovation in the new digital age can be gained in this study.

One might have expected that *e-journal publishing innovation* as obviously beneficial and cost-effective as advertised, would receive a rapid and effortless diffusion, but this is not the case. Although it is clear and well emphasized from the findings presented here that there is a *field factor* in *e-journal publishing innovation* diffusion, and the result might be a sort of backing in some quarters where it is believed that philosophy and the humanities are clearly outside the realm of natural science, both in terms of practice and attitude towards *innovations*.

Meanwhile, Malaysian academics have been very prolific in research publication in reputable foreign journals and this should not be confused with journal publishing in Malaysia. Malaysian journal publishers tends to perceive the e-publishing work and the nature of the Internet platform as excessive that cannot be adequately processed and utilized, and that is why they rely on high profile journals abroad that boast of the kind of expertise and work force they are lacking, to publish their best research works. Many of these high profile e-journals are now been taken over by professional commercial

publishers who are giants in the publishing industry. Many Malaysian journal publishers lack the capability to stabilize *adoption* and the capacity to maintain the *implementation* process.

There is a need to separate the production of research as an element of the growth and development in Malaysia and the identification of publishing high-profile journals in Malaysia, as an area of special economic and business opportunity. The study was able to highlight discrepancies in the Malaysian journal publishing industry and was able to identify it as an important sector of the knowledge economy; a change currently underway that if well managed and utilized, it can generate lot of revenue for the country and position Malaysia journals amongst the best in the world. Although, there may be no more printing and shipping involved in publishing, but the task presented by publishing electronic journal is no mere simple and there are still lots of uncertainties. However, to tackle this and achieve their goals, journal publishers must engage with the new technology and even be prepared to fail in doing so, because some of these goals may not be achieved by all publishers but the opportunities are there for the taken.

The study was able to understand and discuss that *e-journal publishing adoption* is a painstaking process and the actualization of the goal of e-journal publishing is very challenging as the finish line continues to move further and further away. The study also deepens our understanding of what it means to be an academic researcher in a developing country in the digital age.

6.6 Discussion and Practical Implications

The dawn of the new millennium witnessed the second phase of the growth of the Internet and World Wide Web and this created and extended the research frontiers in science. One area of research that is vigorously tested in the new media is *innovation diffusion research*, with focus on *Internet-related innovations*. The new entrants have changed the way we see and view information, and has continue to be a favorite topic of discuss amongst research scholars, students and reader's community. People are interested in knowing how the changes in information medium would affect changes in human behavior as a result of the diffusion of new ideas on the Internet.

The Internet is changing the way people live and playing a radical role in improving the lives of many people. There were 361 million Internet users by the end of the year 2010 and increased to 2.4 billion users by the end of the year 2012 (Internet World Stats, 2012). The majority of these new Internet users are coming from the developing countries and the Internet has given them a voice they never had before. Astonishing amount of new users from the developing countries are getting involved in online debate and has resulted in a greater degree of inter-cultural exchange of information and ideas. For the new and future Internet users coming from developing countries, it should not be only about getting information and knowledge; it should be about contributing to it.

The challenges and opportunities brought about by these changes have, and will remain a part of the conversation that the scholarly community would continue to engage amongst themselves. Although, it is difficult to assume that the fundamental diffusion forces are any different than what they have always been, but this research has confirmed that the

diffusion forces from of Rogers (1962) to Rogers (2003) has quite changed since the birth of the Internet. In the new Internet age, things happen rather differently, because there is so much to do, so much to learn, so little time. Nonetheless, the basic economic fundamentals still applies to the Internet business models and this should be taken into consideration in the *adoption of e-journal publishing* in Malaysia.

It is the digital age and we are living it. This is an extraordinary time in the maximization of *Internet-related innovation* for commercial and economic benefit, therefore, it is time for Malaysian journal publishers to admit that the services they are offering to users is becoming obsolete and take advantage of the new horizon in scholarly publishing. Digital technologies amplify what people are good at and publishers would eventually achieve the benefit of e-journal publishing if they increase their dedication. Although funding agencies are acknowledged in most Malaysian affiliated research papers published in foreign journals, the importance of making local Malaysian journals relevant amongst the top tier journals is still very much cherished. Work should begin in earnest in building for the future and journal publishers need to maximize the efficiency of the e-journal publishing *innovation* and this can be achieved through rigorous *implementation* strategy. The Malaysian ministry of higher education also needs to sit down with publishers and discuss how they can achieve the economic benefit of e-publishing which could yield great dividends.

The magnitude of the changes brought about by the new machines of e-publishing technologies must not be overlooked or underrated and this reality calls for the revival of journal publishing in Malaysia. It is understandable that publishing Malaysian research in

high impact journals is the main priority of the Malaysian government at the moment and they can move this agenda forward by prioritizing journal publishing in Malaysia. Malaysian journal publishers must showcase that they are not just a card-carrying academics, but also enterprising and dynamic fellows. They need to reassure the public, government and funding agencies that their response to technological shift is positive and in line with the mission of science. Publishers need to demonstrate their passion for journal publishing by recruiting for culture, stabilizing for tradition, acquiring and training competencies to manage and re-engineer Malaysian journal publications.

6.7 Conclusion and Recommendation

This research was able to identify an area of concern in the scholarly communication sector of Malaysia by investigating the *adoption of e-journal publishing amongst Malaysian journal publishers*. The overall findings show that the distribution of Chief Editors or journal managers amongst Malaysian journal publishers is well distributed with respect to gender. The gender divide is getting closer and closer in Malaysian academic environment and it would not be an issue anymore in the near future. Many Malaysian journal publishers are still yet to embrace the shift in technology, and still produce their materials in the old traditional way, although things are changing and more publishers are embracing the new format of publishing. Meanwhile, in cases where the *adoption* has been claimed, *implementation* has been lacking. The study observed a field factor in the *adoption* scenario, with publishers in science/technology field adopting e-publishing earlier than their counterparts in social science/arts/humanities.

The study observed no difference in the overt behavior or decision making between older publishers and younger publishers in the *familiarity with e-journal publishing* and *adoption of e-journal publishing*. The same result was obtained for the other organization variables such as: *publication age* and *publication size*, and the study therefore submitted that for technologies channeled through the Internet, organization variables such as years of experience, organization age and organization size will have no effect on the *familiarity with and adoption of the innovation*. This implies that the effect of demographic and organization variables on *technology adoption* would be largely dependent on the kind of *innovation* and the social system been examined.

Innovativeness has a moderate correlation with *familiarity* but failed to make any significant impact on *adoption of e-journal publishing*. The most important factors that influence *familiarity* with e-journal publishing is not extended to the *adoption* of e-journal publishing. Publishers' perception of their *innovativeness* is not transformed into the *adoption* of e-journal publishing. Many journal publishers who perceived themselves as *Innovators* and *Early adopters* of technology in general, have not showed the same desire towards *e-journal publishing adoption*.

The attributes that are more germane to the *adoption* of e-journal publishing amongst Malaysian journal publishers are: *Relative advantage*, *Compatibility* and *Complexity*. *Complexity* however happens to be the best predictor of e-journal publishing *adoption* amongst Malaysian journal publishers and this result corresponds with other studies on *innovation* diffusion. *Familiarity* also has an influence but it is less influential compared to the first three. *Observability* and *trialability* are found to have moderate influence in the *adoption* of e-publishing amongst Malaysian journal publishers, while *peer network* and *change agent* have weaker influence. This implies that for a successful and proper

implementation of e-journal publishing in Malaysia, the benefit and *compatibility* of the *innovation* must be well advertised and broadcasted. Likewise, the *innovation* must be communicated to be easy to use, understand, and maintained.

The study similarly observed a field factor in the relationship between *familiarity*, the *five attributes*, and the *two supporting variables* with *adoption* of e-journal publishing. Apart from the variable of *observability* which shows a significant but no difference relationship, the other variables demonstrated a significant difference with respect to the *field of publishing*.

The current condition of Malaysian journals undervalues the hard work that both the academics and the funding agencies supposed to have put to it. Journal publishers are entrusted with the fabric upon which the scientific community is woven and therefore, they must put on the colors of new beginning to serve the society better. For new Malaysian journals making their debut in the 21st century Malaysia, it should be expected that their titles would be born digital or at best electronic along with the printed-version. There is need to embrace with both arms, the ephemeral nature of the publishing industry, as everything is bound to change, and yet again it will. The change must be seen as an opportunity and not a threat. The changes present thrilling possibilities and challenges for publishers and they need to take measures that will allow them to overcome the resistance that Internet-related *innovations* might provoke. Therefore, Malaysian journals need to quit serving as peripheral journals and take measures that will propel them to the gold-standard level of journal publishing.

The study will recommend Malaysian government to create an office that would serve as change agency that aid technology and *innovation* diffusion in Malaysia. The duty of the

change agency should be to identify new *technology innovations*, and lay out the possibilities that are open to the social system the technologies are intended for. For example, part of the work of an e-publishing *change agent* could be to organize workshops/seminars and lead discussions on how e-journal publishing affect publishing, the cost-benefit of it and how e-journal publishing opportunities can be properly harnessed. These *change agents* should serve to teach and inform local academic publishers on how to engage with new e-journal publishing technologies. Professional librarians can be recruited to serve as *change agents*, this recruitments process should be focused on professionals who have had experience coordinating or teaching information literacy and other similar library courses.

All barriers and resistance to change must be broken down and the candidate will recommend Malaysian journal publishers to remove the barrier between today's key-decision makers in publishing and its workforce, because the Internet consumers and workforce of this age are younger and daring fellows who need to be involved in the conversation. The younger workforce also needs to be considered when creating online contents. Malaysian journals require new and vibrant publishers to take charge, and they must receive support and encouragement from those that have come before them. Malaysian journal publishing also demands for new workforce in journal management and publishers can exploit the knowledge and expertise of library science graduates as journal system managers.

Malaysian journal publishers should be well equipped, push the boundary, make efforts to experiment, learn about the commercial side of the business, and think of new ways to monetize their contents beyond what is achievable in the short time. Klein and Knight

(2005) explained that an efficient *innovation adoption /implementation* would demand for considerable investments of time and money in technology start-up, training, user support, monitoring, meetings, and evaluation. Malaysian journal publishers should introduce and provide services that allows for a proper journal management and enables instantaneous download of journal articles on any device anywhere in the world.

Malaysian journal publishers can make efforts to adopt and implement the APC (Article Processing Charges) model or Gold-open access publishing model for their journals, where contributors to Malaysian journals are asked to pay certain fee for the processing of their research paper. It is recommended that journal publishers endeavor to make the charges very affordable so that it wouldn't discourage authors from submitting their manuscripts. If they can achieve this, local journals can still retain a flavor of the past as it will help to alleviate the financial constraint of journal publishing and assist them to maintain their publication productivity for a long term. As explained by Pinfield (2013), this means that authors (or in reality their funders and institutions) will increasingly pay for the management of the peer review processes, editing and publishing of a paper upfront in order for the article to be made open access (OA), rather than libraries paying for post-publication subscriptions.

E-journal publishing would require a major change in publisher's behavior and a good deal of learning and time. The blueprint that has been adopted by the opinion makers to further collaboration in research and development in Malaysia could also be applied in journal publishing. Considering the demand side of the equation, Malaysian government can develop a policy that attracts experts and scholars to partner with Malaysian publishers in journal publishing. Malaysian publishers can focus on developing countries and Asia

acific region as prospective partners in this movement. Journal publishers should be more confident to test and experiment with new publishing and business models even with a probability of failure. Just like Malaysian researchers have made their names internationally through quality research work, Malaysian journals also need to be drawn around the best journals in the world.

The feast has been an eye watering quality so far, with the high international collaboration in Malaysian research but the main course is yet to be served with the condition of Malaysian-own journals. This might be the grand-slam in the quest for a developed country and this should be the next target of the ministry of higher education. All these are issues Malaysian publishers need to try and work through.

E-journal publishing is here to stay and thrive, it continues to evolve and it is embraced as a work in progress, but nonetheless it is eternal.

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APPENDIX A: Sample of the pilot questionnaire

22 May 2012
Dear Sir/Madam

Participants in “Adoption of E-Journal Publishing” Pilot Questionnaire

As someone currently involved in the editorial activity of a Journal published in Malaysia, I would greatly appreciate a few minutes of your time to respond to the enclosed questionnaire.

This is a pilot study on the extent of e-journal publishing adoption amongst Malaysian Scholarly publishers. The results of this study will be used to determine the factors that are necessary for e-journal adoption/diffusion and will also provide information about the rate and level of adoption of e-journal publishing in Malaysia.

This research is undertaken for a Ph.D thesis under the Digital Library Research Group, University of Malaya. Your participation is very much appreciated and will allow the group to understand problems and suggest solutions to speed the uptake of scholarly journal electronic publishing in Malaysia.

All information provided by you will be treated as strictly confidential.
Thank you for your participation

Yours sincerely,

Sanni, Shamsudeen
Ph.D candidate
Dept of Library & Information Science
University of Malaya

Supervisor: Professor Dr Zainab Awang Ngah, Digital Library Research Group, Dept of Library & Information Science, University of Malaya.

ADOPTION OF E- JOURNAL PUBLISHING SURVEY

Please read and answer each question by clicking/ticking the box that best describes your opinion. Please answer every question that is applicable to your practice.

SECTION 1: AWARENESS OF E-JOURNALS

1. Please indicate the extent in which you agree or disagree with the following statements about *the degree of your awareness of e-journals*.

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. I discuss issues about e-journals with colleagues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I read about issues concerning e-journal publishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I am aware of the format type of e-journal publishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. I am aware of the management process of e-journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. I am aware of the rules and policies concerning e-journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. I am aware of e-journal reviewing process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. I am aware of the access and pricing policy of e-journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 2: RECEPTIVENESS TO INNOVATIONS IN GENERAL

2. Please indicate the extent in which you agree or disagree with the following statements about *the degree at which you are earlier in adopting new innovations*:

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. I am venturesome and eager to be the first to try new innovations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I am always looking for innovations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I adopt innovations and influence others to do so	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. My opinion about innovations is respected by peers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. I am willing to follow the lead of others in adopting innovations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. I will adopt innovations but do not attempt to influence others to do so	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. I need to be convinced of the advantage of innovation by peers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. I will only adopt innovation out of necessity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. I am suspicious of innovations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. I generally don't adopt new innovations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 3: PERCEPTION ABOUT THE ATTRIBUTES OF E-JOURNAL PUBLISHING: RELATIVE ADVANTAGE

3. Please indicate the extent in which you agree or disagree with the following statements about *the degree at which you perceive e-journal publishing to be better than print journal publishing*.

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. E-journals are easier to produce than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. E-journals increase the quality of journal than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. E-journals make journals more visible than the print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. E-journals attracts more authors to submit than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. E-journals give authors more recognition than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. E-journals attracts wider readership than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. E-journals are faster to publish than the print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- h. E-journals are easier to disseminate than print journals
- i. E-journals makes articles more accessible than print journals
- j. E-journals enhances our productivity than print journals

COMPATIBILITY

4. Please indicate the extent in which you agree or disagree with the following statements about *the degree at which you perceive e-journal publishing to be consistent with existing values and needs of your organization/publishing enterprise.*

- | | Strongly
Disagree | Disagree | Unsure | Agree | Strongly
Agree |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 1 | 2 | 3 | 4 | 5 |
| Publishing journals in electronic format : | | | | | |
| a. Comply with current situation in our organization | <input type="checkbox"/> |
| b. Comply with all aspects of our publishing work | <input type="checkbox"/> |
| c. Suits the way we like to publish our works | <input type="checkbox"/> |
| d. Comply with our publishing values and norms | <input type="checkbox"/> |
| e. Comply with the needs of our members/users | <input type="checkbox"/> |
| f. Is consistent with the practice of journal publishing | <input type="checkbox"/> |

COMPLEXITY

5. Please indicate the extent in which you agree or disagree with the following statements about *the degree at which you perceive e-journal publishing to be difficult to understand, adopt and implement.*

- | | Strongly
Disagree | Disagree | Unsure | Agree | Strongly
Agree |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 1 | 2 | 3 | 4 | 5 |
| a. Adoption of e-journal publishing is very challenging | <input type="checkbox"/> |
| b. Implementation of e-journal publishing is difficult | <input type="checkbox"/> |
| c. E-journal publishing is too demanding | <input type="checkbox"/> |
| d. E-journal publishing requires new technical skills/technologies which are difficult to understand | <input type="checkbox"/> |
| e. E-journal publishing requires many difficult tasks | <input type="checkbox"/> |

OBSERVABILITY

6. Please indicate the extent in which you agree or disagree with the following statements about *the degree at which you perceive the result of e-journal publishing to be visible to others.*

- | | Strongly
Disagree | Disagree | Unsure | Agree | Strongly
Agree |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 1 | 2 | 3 | 4 | 5 |
| a. I have no difficulty communicating to others about how to implement e-journal publishing | <input type="checkbox"/> |
| b. I have seen how other publishers handle e-journal publishing | <input type="checkbox"/> |
| c. I can communicate to others the consequence of publishing e-journals | <input type="checkbox"/> |
| d. The outcome of publishing e-journal is clear to me | <input type="checkbox"/> |
| e. I have observed many e-journal website and see how they work | <input type="checkbox"/> |

TRIALABILITY

7. Please indicate the extent in which you agree or disagree with the following statements about *the degree at which you have been able to experiment with e-journal publishing.*

- | | Strongly
Disagree | Disagree | Unsure | Agree | Strongly
Agree |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| | 1 | 2 | 3 | 4 | 5 |
| a. I have a great deal of opportunity to try various e- journal applications | <input type="checkbox"/> |

- b. I have experimented with e-journal publishing on a number of publishing platforms such as open access systems
- c. I have opportunities to submit papers in e-journals through the online electronic submission system

**SECTION 4: FACTORS INFLUENCING DECISION TO ADOPT:
INFLUENCE OF PEER NETWORK**

8. Please indicate the extent in which you agree or disagree with the following statements about *perceived influence of your peer network on your organization or publishing practice*.

- | | Strongly
Disagree
1 | Disagree
2 | Unsure
3 | Agree
4 | Strongly
Agree
5 |
|---|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a. Information we share with other publishers helped us to incorporate new innovative ideas in our organization | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. The support we receive from publishers we know helped us to incorporate new innovative ideas in our publishing practices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Conferences, workshops and seminars organized by peer network have great influence on our publishing practices. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Overall our peer network have large influence on our publishing practice | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

INFLUENCE OF CHANGE AGENTS

9. Please indicate the extent in which you agree or disagree with the following statements about the *perceived influence of change agents (government or private) on your organization or publishing practice*.

- | | Strongly
Disagree
1 | Disagree
2 | Unsure
3 | Agree
4 | Strongly
Agree
5 |
|--|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a. We have had contacts with agencies regarding e-journal publishing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. We have never received information from any agency concerning e-journal publishing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. We have had contacts many times with change agents regarding our publishing practices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d. The supports we receive from change agents help us to incorporate innovative technologies in our publishing practices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Recommendations made by change agencies helped us in making decisions about our publishing practices | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

SECTION 5: IMPLEMENTATION OF E - JOURNAL PUBLISHING

(Please answer the questions in this section if your organization has adopted e-journal publishing)

10. If you are already adopting electronic publishing please indicate the level of implementation that characterized your journal.

- | Features of the electronic journal I am involved in publishing are as follows. | Have not
implemented
1 | Planning
Stage
2 | Partially
implemented
3 | Close to full
implementation
4 | Full
implementation
5 |
|---|------------------------------|--------------------------|-------------------------------|--------------------------------------|-----------------------------|
| a. Hold articles in PDF only (format) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Hold articles in more than one format (eg PDF, HTML, XML, Realpage, etc.) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Publish articles on the Web as soon as it is ready (speed) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Features of the electronic journal I am involved in publishing are as follows.	Have not implemented	Planning Stage	Partially implemented	Close to full implementation	Full implementation
	1	2	3	4	5
d. Publish issues before the print (speed)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Provide access to current and archived issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Provide links to organizationa/society/publishers page	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Provide links to related articles in the other issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Provide journal contents search	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Provide single article purchase for non-subscribers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Provide access to full-text to all (open access)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Provide personalized reader service	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Provide interactivity through support tools for comments, emails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. Provide information about editorial members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n. Provide information about reviewers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o. Provide alert service for authors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
p. Use a journal Management system like Scholar one (example).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
q. Allow authors to submit manuscripts online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
r. Allow authors to monitor their submissions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
s. Support online reviewing process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
t. Provide information about indexation status	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 6: BRIEF INFORMATION ABOUT YOURSELF AND YOUR PUBLICATION

11. The type of affiliation our journal publication falls under is (Please select one)

- Academic
- Government/Public sector
- Society
- Industrial/business sector
- Non-commercial research institution
- Other (please specify)

12. When was the first ever issue of your journal published?(years)

13. How many issues do you normally publish yearly?

14. The format of our journal publication is (Please select one)

- Print + electronic (hybrid)
- Only electronic
- Only print

15. If you have adopted e-journal publishing, for how long have you adopted it (years)

16. Which of the following best describes your current areas of expertise?

- Agriculture and Food Sciences
- Biology and Life Sciences
- Chemistry
- Earth and Environmental Sciences
- Health Sciences

- Mathematics and Statistics
- Physics and Astronomy
- Arts and Humanities
- Social sciences
- Computer and Information sciences
- Technology and Engineering
- Other (please specify)

17. For how many years have you been involved with your journal publication? (years)

18. Please indicate your gender

- Male
- Female

19. Please indicate your age (years old)

Please we would welcome any additional comments you may wish to make.....

.....
.....
.....
.....

THANK YOU SO MUCH FOR YOUR TIME

APPENDIX B: Sample of final questionnaire

COVER LETTER

15th of October, 2012

Dear Sir/Madam

Participants in “Adoption of E-Publishing” Questionnaire

As someone currently involved in the editorial activity of a journal published in Malaysia, I would greatly appreciate few minutes of your time to respond to the enclosed questionnaire. This is a study on the extent of e-publishing adoption among Malaysian journal publishers. The results of this study will be used to determine the factors that are necessary for e-publishing adoption/diffusion and will also provide information about the adoption rate of e-publishing in Malaysia.

This study is undertaken as part of research work under the Digital Library Research Group, University of Malaya. Your participation is very much appreciated and will allow the group to understand problems and suggest solutions to speed the uptake of scholarly journal electronic publishing in Malaysia.

All information provided by you will be treated as strictly confidential.

NOTE: After we have received the completed questionnaire, we will send you a gift voucher in appreciation.

RETURN INSTRUCTION: Please use the self-stamped envelope that accompanied the questionnaire to return the completed questionnaire.

Should you have any questions or suggestions, please do not hesitate to contact me. I look forward to receiving your response.

Thank you for your participation

Yours sincerely,



Sanni, Shamsudeen

Principal Researcher

Digital Library Research Group, Dept of Library & Information Science

University of Malaya

Phone no: +6014-9320411

Fax no: +603-79676373

SUPERVISOR: Professor Dr Zainab Awang Ngah, Digital Library Research Group, Dept of Library & Information Science, University of Malaya.

ADOPTION OF E- PUBLISHING SURVEY

Using the scale below, please tick the box that best describes the extent in which you agree or disagree with each statement.

SECTION 1: FAMILIARITY WITH E-JOURNALS

1. Please indicate the extent in which you agree or disagree with the following statements about the *degree of your familiarity with e-journals*.

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. I am familiar with the format type of e-journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I am familiar with the management process of e-journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I am familiar with the rules and policies concerning e-journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. I am familiar with e-journal reviewing process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. I am familiar with the access policy of e-journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. I am familiar with the pricing policy of e-journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 2: PERCEPTIONS ABOUT RECEPTIVENESS TO INNOVATIONS (INNOVATIVENESS)

2. Please indicate the extent in which you agree or disagree with the following statements about *your receptiveness to innovations*.

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. In general, I am the first among my peers to adopt a new product and service when it is launched	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. If I hear that a new product and service is available I would be the first to adopt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I generally adopt a lot of new products and services and influence my peers to do so	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. My opinion about new products and services is respected by peers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**SECTION 3: PERCEPTIONS ABOUT THE ATTRIBUTES OF E-JOURNAL PUBLISHING:
RELATIVE ADVANTAGE**

3. Please indicate the extent in which you agree or disagree with the following statements about *your perceptions of e-journal publishing compared to print journal publishing*.

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. E-journals are easier to produce than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. E-journals increase the quality of journals than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. E-journals make journals more visible than the print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. E-journals attract more authors to submit than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. E-journals give authors more recognition than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. E-journals attracts wider readership than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. E-journals are faster to publish than the print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. E-journals are easier to disseminate than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. E-journals enhance productivity than print journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

COMPATIBILITY

4. Please indicate the extent in which you agree or disagree with the following statements about *your perceptions of e-journal publishing with respect to your organization/publishing enterprise.*

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
Publishing journals in electronic format :					
a. Complies with all aspects of our publishing work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Suits the way we like to publish our works	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Complies with our publishing values and norms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Is consistent with our practice of journal publishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

COMPLEXITY

5. Please indicate the extent in which you agree or disagree with the following statements about *your perceptions of e-journal publishing in terms of understanding, adoption and implementation.*

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. Adoption of e-journal publishing is very challenging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Implementation of e-journal publishing is difficult	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. E-journal publishing is too demanding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. E-journal publishing requires technical skills/technologies which are difficult to understand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. E-journal publishing requires many difficult tasks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

OBSERVABILITY

6. Please indicate the extent in which you agree or disagree with the following statements about the *degree at which you perceive the result of e-journal publishing to be visible to you.*

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. I have no difficulty communicating to others about how to implement e-journal publishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I have seen how other publishers handle e-journal publishing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I can communicate to others about the consequences of publishing e-journals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. The outcome of publishing e-journals is clear to me	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. I have observed e-journal websites and see how they work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

TRIALABILITY

7. Please indicate the extent in which you agree or disagree with the following statements about *the degree at which you have been able to experiment with e-journal publishing.*

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. I have a great deal of opportunity to try various e-journal applications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I have experimented with e-journals on a number of publishing platforms such as open journal systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I have great deal of opportunity to submit or review papers in e-journals through the online submission system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 4: INFLUENCE OF PEER NETWORK

8. Please indicate the extent in which you agree or disagree with the following statements about *perceived influence of your peer network on your organization or publishing practice.*

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. Information we share with other publishers helps us to incorporate new innovative ideas in our organization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. The support we receive from other publishers helps us to incorporate new innovative ideas in our publishing practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Conferences, workshops or seminars organized by peer network have great influence on our publishing practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Overall, our peer network has a large influence on our publishing practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INFLUENCE OF CHANGE AGENTS

9. Please indicate the extent in which you agree or disagree with the following statements about *perceived influence of change agents (people or organizations) on your organization or publishing practice.*

	Strongly Disagree 1	Disagree 2	Unsure 3	Agree 4	Strongly Agree 5
a. Contacts we had with specific individuals/organizations has an influence on our publishing practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. The support we receive from specific individuals/organizations help us to incorporate innovative technologies in our publishing practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Recommendations made by specific individuals/organizations helped us in making decisions about our publishing practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 5: ADOPTION OF E-JOURNAL PUBLISHING

10. Please respond to the following statements about *whether you have decided to adopt e-journal publishing or not*.

	Not at all 1	To a small extent 2	To a moderate extent 3	To a great extent 4	To a very great extent 5
a. We have decided to produce our journal in electronic format	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. We have decided to disseminate our journal through the internet/web/online portals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. We have decided to archive the full-text of our journal via the internet/web/online portals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 6: IMPLEMENTATION OF E - JOURNAL PUBLISHING

11. If you are already adopting electronic publishing, please indicate the level of implementation that characterizes your journal.

Features of the electronic journal I am involved with are as follows:	Have not implemented 1	Planning Stage 2	Partially implemented 3	Close to full implementation 4	Full implementation 5
	a. Holds articles in PDF only (format)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Holds articles in more than one format (eg PDF, HTML, XML, Realpage, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Publishes articles on the web as soon as it is ready (online first)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. Publishes issues on the web as soon as it is ready (online first)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Publishes issues before the print (speed)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Provides access to current issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Provides access to archived issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Provides links to organization/society/publishers page	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. Provides links to related articles in the other issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. Provides journal contents search	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k. Provides single article purchase for non-subscribers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
l. Provides access to full-text to all	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
m. Provides interactivity through support tools for comments, emails	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
n. Provides information about editorial members	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o. Provides information about reviewers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
p. Provides alert service for authors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
q. Uses a journal Management system, e.g. Scholar one	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
r. Allows authors to submit manuscripts online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
s. Allows authors to monitor their submissions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
t. Allows authors to edit or revise their submissions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
u. Supports online reviewing process	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
v. Provides information about indexing status	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 7: BRIEF INFORMATION ABOUT YOURSELF AND YOUR PUBLICATION

20. What kind of journal publishing are you involved in?
 Academic journal publishing
 Non-academic journal publishing
21. What is your journal's area(s) of specialization?

22. In what year was the first issue of your journal published?.....
23. How many issues do you normally publish in a year?

24. The format of your journal publication is (Please select one)
 Print + electronic (hybrid)
 Only electronic
 Only print
25. If you have adopted e-journal publishing, in what year did you adopt?.....
26. What is your role/position in your journal editorial activity?.....
27. How many years have you been involved in journal publishing personally?.....
28. Please indicate your gender
 Male
 Female
29. Please indicate your age (in years)

Please give your comments on this research effort and about e-journal publishing in general

NOTE: After we have received the completed questionnaire, we will send you a gift voucher in appreciation.

RETURN INSTRUCTION: Please use the self-stamped envelope that accompanied the questionnaire to return the completed questionnaire.

THANK YOU SO MUCH FOR YOUR TIME

APPENDIX C: Factor loadings for the constructs examined (pilot testing)

Table 4. 2 Factor loadings for the constructs examined (Pilot testing)

<i>Awareness</i>	
Scale items	Factor loading
1. I discuss issues about e-journals with colleagues	0.62
2. I read about issues concerning e-journals	0.67
3. I am aware of the format type of e-journals	0.82
4. I am aware of the management process of e-journals	0.88
5. I am aware of rules and policies concerning e-journals	0.86
6. I am aware of e-journal reviewing process	0.8
7. I am aware of the access and pricing policy of e-journals	0.73
Variance explained = 59.65% Cronbach's Alpha = .882 N of items = 7	
<i>Innovativeness</i>	
Scale items	Factor loading
1. In general, I am the first among my peers to adopt a new product and service when it is launched	0.747
2. If I hear that a new product and service is available I would be the first to adopt	0.68
3. I generally adopt a lot of new products and services and influence my peers to do so	0.712
4. My opinion about new products and services is respected by peers	0.804
Variance explained = 61.67% Cronbach's Alpha = .807 N of Items = 3	
<i>Relative advantage</i>	
Scale items	Factor loading
1. E-journals are easier to produce than print journals	0.56
2. E-journals increase the quality of journals than print journals	0.59
3. E-journals make journals more visible than the print journals	0.74
4. E-journals attracts more authors to submit than print journals	0.64
5. E-journals give authors more recognition than print journals	0.68
6. E-journals attracts wider readership than print journals	0.82
7. E-journals are faster to publish than the print journals	0.74
8. E-journals are easier to disseminate than print journals	0.71
9. E-journals makes articles more accessible than print journals	*
10. E-journals enhances our productivity than print journals	0.64
* Indicate item that did not load and is omitted from the final questionnaire	
Variance explained = 42.5% Cronbach's Alpha = .845 N of items = 9	
<i>Compatibility</i>	
Scale items	Factor loading

1. Complies with current situation in our organization	0.91
2. Complies with all aspects of our publishing work	0.91
3. Suits the way we like to publish our works	0.87
4. Complies with our publishing values and norms	0.92
5. Complies with the needs of our members/users	*
6. Is consistent with the practice of journal publishing	0.9
* Indicate item that did not load and is omitted from the final questionnaire	
Variance explained = 68.55% Cronbach's Alpha = .943 N of items =5	
<i>Complexity</i>	
Scale items	Factor loading
1. <i>Adoption</i> of e-journal publishing is very challenging	0.79
2. <i>Implementation</i> of e-journal publishing is difficult	0.8
3. E-journal publishing is too demanding	0.82
4. E-journal publishing requires new technical skills which are difficult to understand	0.8
5. E-journal publishing requires many difficult tasks	0.8
Variance explained = 64.43% Cronbach's Alpha = .862 N of items =5	
<i>Observability</i>	
Scale items	Factor loading
1. I have no difficulty communicating to others about how to implement e-journal publishing	0.51
2. I have seen how other publishers handle e-journal publishing	0.73
3. I can communicate to others the consequence of publishing e-journals	0.76
4. The outcome of publishing e-journal is clear to me	0.84
5. I have observed many e-journal website and see how they work	0.84
Variance explained = 55.828% Cronbach's Alpha = .787 N of items =5	
<i>Trialability</i>	
Scale items	Factor loading
1. I have a great deal of opportunity to try various e- journal applications	0.81
2. I have experimented with e-journal publishing on a number of publishing platforms such as open journal systems	0.87
3. I have opportunities to submit/ review papers in e-journals through the online electronic submission system	0.84
Variance explained = 70.42% Cronbach's Alpha = .788 N of items =3	
<i>Peer network</i>	
Scale Items	Factor loading
1.Information we share with other publishers helped us to incorporate new innovative ideas in our organization	0.89
2.The support we receive from publishers we know helped us to incorporate new innovative ideas in our publishing practices	0.89

3.Conferences, workshops and seminars organized by <i>peer network</i> have great influence on our publishing practices	0.74
4. Overall our <i>peer network</i> have large influence on our publishing Practice	0.74
Variance explained = 66.75% Cronbach's Alpha = .833 N of items =4	
<i>Change agent influence</i>	
Scale Items	Factor loading
1. We have had contacts with agencies regarding e-journal publishing	0.75
2. We have never received information from any agency concerning e-journal publishing	*
3.We have had contacts many times with <i>change agents</i> regarding our publishing practices	0.78
4.The supports we receive from <i>change agents</i> help us to incorporate innovative technologies in our publishing practices	0.89
5.Recommendations made by change agencies helped us in making decisions about our publishing practices	0.84
* Indicate item that did not load and is omitted from the final questionnaire	
Variance explained = 53.25% Cronbach's Alpha = .826 N of items =4	

APPENDIX D: Factor loadings on the eight constructs examined (Final questionnaire)

Familiarity	Code	Loading
I am familiar with the rules and policies concerning e-journals	FamRuPol	.916
I am familiar with the management process of e-journals	FamMgtPrc	.898
I am familiar with the access policy of e-journals	FamAccPolc	.892
I am familiar with e-journal reviewing process	FamRevProc	.864
I am familiar with the format type of e-journals	FamFrmt	.863
I am familiar with the pricing policy of e-journals	FamPrcPol	.808
Innovativeness		
In general, I am the first among my peers to adopt a new product and service when it is launched	FirstAdopt	.772
If I hear that a new product and service is available I would be the first to adopt	FirstIfHear	.645
I generally adopt a lot of new products and services and influence my peers to do so	AdoptInflu	.779
Relative advantage		
E-journals enhance productivity than print journals	EnhancProd	.754
E-journals make journals more visible than the print journals	MakVisib	.748
E-journals attracts wider readership than print journals	WiderRead	.742
E-journals are easier to disseminate than print journals	EasyDiss	.737
E-journals are faster to publish than the print journals	FastrPubl	.732
E-journals attract more authors to submit than print journals	AttrctAuth	.707
E-journals give authors more recognition than print journals	AuthRecog	.600
E-journals increase the quality of journals than print journals	IncrQual	.580
E-journals are easier to produce than print journals	EasyProd	.548
Compatibility		
Complies with our publishing values and norms	CompValNorms	.946
Complies with all aspects of our publishing work	CompAllAspct	.905
Is consistent with our practice of journal publishing	ConstJurnPub	.858
*Suits the way we like to publish our works	SuitsOurWays	.768
Complexity		
Implementation of e-journal publishing is difficult	ImplDiff	.851
E-journal publishing is too demanding	TooDemand	.798
Adoption of e-journal publishing is very challenging	VeryChalleng	.662
E-journal publishing requires technical skills/technologies which are difficult to understand	SkillsDiff	.650
*E-journal publishing requires many difficult tasks	ManyDiffTask	
Observability		
I can communicate to others about the consequences of publishing e-journals	CanCommOthrs	0.823
I have seen how other publishers handle e-journal publishing	SeenOthrPub	.802
I have observed e-journal websites and see how they work	ObsrvWebsite	.785
The outcome of publishing e-journals is clear to me	OutcomClear	.744
I have no difficulty communicating to others about how to implement e-journal publishing	NoDifficulty	.703
Trialability		

I have experimented with e-journals on a number of publishing platforms such as open journal systems	ExpOnPlatforms	.891
I have a great deal of opportunity to try various e-journal applications	OppToTry	.885
I have great deal of opportunity to submit or review papers in e-journals through the online submission system	SubmtReview	.863
Peer network influence		
Information we share with other publishers helps us to incorporate new innovative ideas in our organization	InfoWeShare	.844
Conferences, workshops or seminars organized by peer network have great influence on our publishing practices	ConfWorkshp	.836
The support we receive from other publishers helps us to incorporate new innovative ideas in our publishing practices	SuprtReceive	.807
Overall, our peer network has a large influence on our publishing practice	PeerLargInfue	.774
Change agent influence		
The support we receive from specific individuals/organizations help us to incorporate innovative technologies in our publishing practices	SupportOrg	.933
Recommendations made by specific individuals/organizations helped us in making decisions about our publishing practices	RecommOrg	.916
Contacts we had with specific individuals/organizations has an influence on our publishing practices	ContctOrg	.854
Adoption		
We have decided to produce our journal in electronic format	DecToArchiv	.951
We have decided to disseminate our journal through the internet/web/online portals	DecToDissemi	.949
We have decided to archive the full-text of our journal via the internet/web/online portals	DecToProduc	.939

*Items that were dropped are and are not used in subsequent analysis.