SCHOLARLY COMMUNICATION IN OPEN SCIENCE: A STUDY OF COGNITIVE, CONATIVE AND AFFECTIVE READINESS OF RESEARCHERS IN MALAYSIA

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SCHOLARLY COMMUNICATION IN OPEN SCIENCE: A STUDY OF COGNITIVE, CONATIVE AND AFFECTIVE READINESS OF RESEARCHERS IN MALAYSIA

ABSTRACT

The study aims to investigate the readiness of Malaysian academic researchers' open scholarly communication focusing on the three most important pillars of Open Science i.e., Open Access, Open Data and Open Peer Review. The study answered the extent of Malaysian academic researchers' cognitive, conative, and affective readiness as regards to Open Access, Open Data and Open Peer Review, as well as finding out significant differences between gender, types of researchers, and research discipline. A survey instrument of 75 questions about open scholarly communication was sent to academic researchers in five research universities in Malaysia between February and August 2018. A total of 135 responses from the questionnaire were analyzed via simple percentage. The sample size was determined as 370 (confidence level=95%, margin of error=2.5%) however, oversampling was carried out to be 400 from a population of 9,299. A total of 135 were returned for a response rate of 33.75%. The results showed the researchers' cognitive, conative, and affective readiness of Open Access, Open Data and Open Peer Review. From the study, it was revealed Malaysian researchers are generally aware of Open Access; but have low levels of awareness of Open Data and Open Peer Review. Practices of open scholarly communication are still low as reflected in the mean scores, especially on open data sharing and open peer reviewing, probably because they do not want to be associated with bad comments syndrome in science, as well as the fear of losing publication rights. Lack of incentives and misuse of data are part of disincentives for data sharing. It is widely believed that Open Peer Review will ensure transparent, provide honest feedback, increased motivation and improve science, but the issue of timing in reviewing and fear of negative comments are concerns to many respondents. The study concludes in terms of readiness that Malaysian academic scholars are somewhat ready and grouped as strollers, they are moving ahead with the trend of open scholarly communication. Future studies should investigate the importance or rewards for openness, especially in data sharing among scholars' institutions, and studies bridging the gap between policy and practices of open science should be examined.

Keywords: *Open science; open access, open data; open data sharing; open peer review; scholarly communication; scientific communication; Malaysian scholars.*

KOMUNIKASI ILMIAH DALAM SAINS TERBUKA: KAJIAN KESEDIAAN KOGNITIF, KONATIF DAN AFEKTIF DI KALANGAN PENYELIDIK DI MALAYSIA

ABSTRAK

Kajian ini bertujuan untuk mengkaji kesediaan penyelidik di Malaysia dalam komunikasi ilmiah terbuka yang memberi fokus kepada 3 elemen penting dalam sains terbuka: capaian terbuka, data terbuka dan penilaian setara terbuka. Kajian ini menjawab sejauh mana kognitif, konatif dan afektif para penyelidik akademik Malaysia mengenai akses terbuka, data terbuka dan penilaian setara terbuka, serta mengetahui perbezaan yang signifikan antara jantina, jenis penyelidik, dan disiplin di kalangan penyelidik terhadap kesediaan mereka dalam komunikasi ilmiah terbuka. Satu tinjauan terhadap 75 soalan mengenai Open Scholarly Communication telah dihantar kepada penyelidik akademik di lima universiti awam penyelidikan di Malaysia antara Februari dan Ogos 2018. Sebanyak 135 respons dari soal selidik dianalisis melalui peratusan sederhana. Saiz sampel ditentukan sebagai 370 (tahap keyakinan = 95%, margin kesalahan = 2.5%) namun, sampel berlebihan dilakukan menjadi 400 dari populasi 9.299. Minimum 33.75% kadar tindak balas parameter ukuran dipilih dari populasi sampel. Hasil kajian menunjukkan kognitif, konatif dan afektif mengenai akses terbuka, data terbuka dan penilaian setara terbuka di kalangan para penyelidik. Kajian tersebut mendapati para penyelidik mengetahui adanya akses terbuka; tetapi mempunyai tahap kesedaran rendah mengenai data terbuka dan penilaian setara terbuka. Mengenai amalan komunikasi ilmiah terbuka, tahap kesedaran masih rendah terutama pada data terbuka dan penilaian setara terbuka, ia berkemungkinan disebabkan para penyelidik tidak mahu dikaitkan dengan memberikan komen buruk dalam penilaian setara jurnal artikel, dan perkongsian data seperti yang ditunjukkan dalam skor min (tidak konsisten) serta rasa takut kehilangan hak penerbitan, kekurangan insentif dan penyalahgunaan data adalah sebahagian daripada kekangan

dalam perkongsian data. Secara amnya penilaian setara terbuka dapat memastikan ketelusan, memberikan maklum balas yang jujur, meningkatkan motivasi dan meningkatkan ilmu pengetahuan, tetapi permasalah yang timbul adalah berkaitan kerisauan tentang komen negatif yang menjadi perhatian mereka. Kajian ini merumuskan bahawa penyelidik akademik di Malaysia agak bersedia dan terdorong dalam komunikasi ilmiah terbuka, mereka bergerak maju dengan trend terkini. Kajian masa depan harus menyelidiki kepentingan atau ganjaran untuk perkongsian data di antara institusi akademik, dan kajian yang merapatkan jurang antara dasar dan amalan sains terbuka harus dikaji.

Kata kunci: Ilmu terbuka; akses terbuka, data terbuka; perkongsian data terbuka; penilaian setara terbuka; komunikasi ilmiah; komunikasi saintifik; sarjana Malaysia.

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CHAPTER 1: INTRODUCTION

This chapter provides an overview of the study. It discusses the context and problem statement and attempts to clarify the focus of this study by delineating the purpose, the research objectives, and the research questions. This study aims to investigate researchers' cognitive, conative, and affective readiness for "open scholarly communication" focusing on the three most important pillars of Open Science i.e., Open Access, Open Data and Open Peer Review. Included in the discussions in this chapter, are the conceptions of open scholarly communication viewed in the context of Open Science. The chapter also provides a brief explanation of the significance and limitation of the study, and the operational definitions of concepts used. Lastly, the chapter concludes with an outline of a structure adopted for the remaining sections of the thesis.

1.1 Overview

The Association of College and Research Libraries (ACRL, 2003) describes scholarly communication as a system through which scientific report and other scholarly works are produced, assessed for quality, published to the scholarly community, and preserved for posterity. The system includes both formal means of communication, such as publication in peer-reviewed journals, and information channels, such as electronic mailing lists (ACRL Research, 2003; 2016). The basic attribute of scholarly communication is to facilitate public inquiry and knowledge through direct or indirect funding of a research work by a government or non-government organizations (ACRL Research, 2003).

However, there have been a lot of crisis about the formal practices of scholarly communication. During the second half of the 20th century, prices for scholarly journals have risen above what libraries can cope with dues to inflation in the economy and their budgets. Libraries have to cope with journal price increases through different means such as subscription cuts and reductions in the monographic buys. But the issues of proliferation of scholarly information including high price in the number of scholarly journals, affects in the significant reduction to accessing scholarly publications. The economic challenges facing scholarly monograph publishers especially the university press is part of the crisis. Access to scholarly publishing is further threatened by various issues at the national policy ranks. Following this criticism, scholars and commercial interests have successfully supported and advocate – change in the way communication is being passed to the scientific communities which slightly addressed copyright laws and public domain that significantly reduce principles of fair use, particularly in the digital form (Solomon, 2013a). However, the issue of consolidating journal publishing industry and the prices that result from publisher mergers remain unaddressed by the National policy. This moves also reduced access to scholarship. Nevertheless, the rise of the World Wide Web (WWW) and the Internet have not only facilitated the paradigm shift from print to online communication, but have also supported the development of new tools, new formats, and even new business models for open scholarship such as in the form of open access publishing (Dawson, 2014).

1.2 Open Scholarly Communication

The conception of open scholarly communication in this study is derived from open scholarship, defined by Von Schoomberg (2019) as "sharing knowledge and data as early as possible in the research process in open collaboration with all relevant knowledge actors" (p.1) Horizon Europe, the new European Union Framework Programme for Research and Innovation, promotes the full meaning of open scholarship as "Open Science" (Burgelman, Pascu, Szkuta, Schomberg, Karalopoulos, Repanas and Schouppe, 2019), which corresponds to the movement to make scientific research, data and dissemination accessible to all levels of an inquiry society (FOSTER, 2015). The term Open Science has gained approval and turn out to be more recognized as a model for steering research in the twenty first century. Its recognition throughout the stages of the research development and scholarly communication gets stronger day by day in international scientific bodies particularly among the European Commission (EC), International Science Council (ISC), and the United Nations Educational, Scientific and Cultural Organization (UNESCO), World Bank, and the Organization for Economic Co-operation and Development (OECD), and also by prominent research establishments and institutions, among those include CIBER Research, National Science Foundation (US), Wellcome Trust, Deutsche Forschungsgemeinschaft, Research Center of UK, Howard Hughes Medical Institute, on the organizational angle and basically all world-leading universities, Max Planck Gesellschaft, on the scholarly angle (The Economist 2012; Niezgódka et al., 2011). Malaysia, through the Academy of Sciences Malaysia, has recently launched the Malaysia Open Science Platform (MOSP) as "a trusted platform that enables accessibility and sharing of research data aligned with the national priorities and international best practices" (see https://www.akademisains.gov.my/mosp/about/).

Several initiatives creating the consciousness on those developments, and good practices of executing the ideas of Open Science are encouraged (Maciej, 2014). The European Commission on Open Science summaries highlights a high-level vision for scholarly communication which includes "openness" strategies delivered through platforms such as Open Access, Open Data, Open Peer Review, Open Collaboration on platforms such as European Open Science cloud, and the development of alternative metrics (Open Metrics) for measuring the impact of scholarly works (Burgelman, et al. 2016). However, these plans remain unclear to the researchers working within the conservative frameworks and these plans remain to an extent a theoretical for many scholars. The issue of scholarly communication today has taken a new dimension and digital revolution is a fundamental change in the way how research is being carried out and distributed. The "openness" paradigms shift in the way research is being carried out currently has reflected those procedures through Open Science. The growth of Open Science is the cultivation of good research and data practices at every level of scientific study (Farnham et al., 2017).

The literature, as described in various chapters and sections in this thesis, has highlighted various aspects of Open Science such as Open Educational Resources, Open Notebooks, Scientific Social Network, Citizen Science, Open Source, Open Access, Open Data and Open Peer Review. However, this study only focuses on the three most important pillars of Open Science related to scholarly communication i.e. Open Access, Open Peer Review and Open Data, which has been described as the "cornerstone of the emergent open science agenda" (Ross-Hellauer, Deppe and Schmidet 2017).

1.3 Problem Statement

Many countries worldwide are mobilizing their Open Science plan (Rabesandratana, 2019) including Malaysia (Abrizah, 2019), in which the government, recognizing the importance of openness in the dissemination of research output, emphasized the need for the research community, libraries, scholarly publishers and relevant stakeholders to move along with the global trend in open scholarship. To transform the scholarly communication, open scholarly communication needs to be buy-in by all advocates (e.g., policy-makers, funders, researchers, scholarly publishers and societies and libraries) in order to make research output, including research data Findable, Accessible, Interoperable and Reusable (FAIR). This would not only democratize knowledge through Open Access, but also reinforce open scientific inquiry and integrity through Open Peer Review, as well as enable better research management and promote data-intensive research, while integrating sharing of research data through Open Data. Open scholarly communication would be critical to academics' reputation and more importantly for those trying to build one, especially when it comes to measuring reputation in term of impact and engagement (Abrizah et al., 2015; Abrizah, 2016; Abrizah, 2019).

The issues and challenges in open scholarly communication rest on the aims of this study. The first is, Open Access –which is "digital, online, free of charge, and free of most copyright and licensing restrictions." (Peter Suber, 2012:4; Budapest Open Access Initiative, 2002). Second, Open Data –which are data that can be used by anyone without technical or legal restrictions. The use of Open Data encompasses both access and reuse and it is characterized by: "i) availability and access; ii) reuse and re-distribution; and iii) universal participation" (OECD, 2015 p.55), and third, Open Peer Review –a process of

subjecting an author's scholarly work, research, or ideas to the scrutiny of others who are experts in the same field (Ware and Monkman, 2008).

Nonetheless, upon the promotion and the awareness of open scholarship or Open Science movement closed to a decade, many of researchers cannot differentiate between Open Science and Open Access (OA) especially among the early career researchers (ECRs). In a study carried out by the Harbinger's team titled "Early career researchers: (The New Wave) on open science" revealed that young researchers display little understanding of the concept, besides, some were confused about practicing Open Science (such as read, cite, disseminate, or share relevant research data, going through rigorous peer review etc.) (Budapest Open Access Initiative, 2002; Nicholas et al., 2015). In a related study, Xia (2013) debates that practices/behaviour and awareness of OA publishing as clutched by researchers from various social, disciplinary, and practical understandings are not as evident. In fact, Xia maintains that "few studies have made an effort to focus upon Open Science concepts and practices as understood by scholars, which demonstrates a critical research need that requires further attention" (Xia, 2013 p. 119). Studies like this would try to understand "how individual researchers perceive, behave and share in Open Science innovations, which are subjective by their disciplinary guidelines, thematic research awareness, roles in the Open Science activity, and social beliefs and regional experiences" (Xia, 2013 p. 113).

Then again, data sharing behaviour and practices among scholars were faulted according to Research Information Network (RIN, 2008; Witt et al., 2009). Scholars argue that most researchers have withholding data behaviours – studies carried out between 1962 and 2006 reveals that 38 out of 141 authors (27.0%) responded, from 37 authors, 9 responded (24.3%) and from 53 authors, 20 responded (37.7%) with actual data

sets upon request of research data for article published in major APA (American Psychological Association) journals (Wicherts, Borsboom, Kats and Molenaar, 2006; Wolnis, 1962; Graig & Reese, 1973;). In another related study, Tenopir et al. (2011) investigates 1,329 scientists' data needs, sharing practices and intentions. They find out that social science researchers are less likely to make their data electronically available to others when compared with STEM scholars. Surprisingly, 79.4 percent of them agreed or somewhat agreed that they had concerns about data being used in a wrong way. Other factors such as perceived career advancement and scholars' altruism behavior and gender of participants (sense of achievement for sharing great research) have positive relationship with their data-sharing frequencies (Kim, 2013; Kim & Stanton, 2016).

Researchers encounter resistance when discussing about data sharing among associated institutions due to lack of access to data analysis tool or research management resources support, lack of well-defined technical standards, ethical consideration (discipline norms/ethical considerations), discourages sharing and reuse of data (Corti et al. 2014); internal research cultural factors such as unfamiliarity with appropriate methods of secondary analysis and lack of sharing culture among others can affect data sharing among scholars (Jeng & Lyon, 2016; Kim & Stanton, 2016).

However, with all the benefits associated with opening of data, Malaysian scholars have not yet embraced open data. According to SinarProject.org, a Malaysian-based civic tech initiative about open technology and open data to systematically make important information public and more accessible for Malaysians, Open Data is restricted and a concern to speed up the availability of Open Data through institutional and regulations are in progress. Also, in the words of the Vice Chancellor of the University of Malaya in 2018, Datuk Ir. (Dr.) Abdul Rahim Haji Hashim, at the 6th Global higher

education forum on "thriving for knowledge, industry and humanity in a dynamic higher education ecosystem" says Malaysia researchers need to make their research data open for reusability which can also increase accessibility. In 2017, Open Data Barometer reports that Malaysia lacks the availability of Open Data for key categories, while on positive side showed that the data exists but needs to be available for people to use and access to data.

Therefore, advocates of openness have suggested ways of resolving the issues surrounding data disclosure. First, is to make sharing trivial in an age of internet and rapid communication, there should never be a technical or organizational barrier to sharing (Zuiderwijk & Spiers, 2019; Świgoń, 2017). Second, there should be stepped to incentivize data sharing within academic workflow. One of the reasons for lack of data disclosure is that little or no credits were given to academic workflow (Nicholas et. 2019; 2017; Corti & Van den Eynden, 2015). Third, there should be a reputable metric for data sharing for instance page view, downloads, citation, shared etc., the incentive for sharing can then come from having a quantifiable metric that can be linked with the researcher's reputation (Sugimoto, Work, Lariviere & Haustein, 2017; Bolan, 2017; Andy, 2016; Costas, Zahedi & Wouters, 2015). If sharing were practiced, errors could be detected and corrected at the initial stage of research formation, thereby reduce the effect and alleviating the fear of making them in the first place. Also, collaboration could be valued more highly because it would increase error detection or reduce error creation and promote a culture that is less scared of failing and drives towards success (Jeffery, 2013, p.20).

In the same vein, the advocacy for Open Science has led to Open Peer Review (OPR) moving to the mainstream, together with the above two mentioned scholarly

communication elements of Open Science (i.e. Open Access and Open Data), In OPR, aspects of the review process such as the identity of the reviewer, the review report or the platform itself are opened up to the research community or the public (Görögh et al. 2017), bringing greater transparency and participation to formal and informal peer review processes. Schmidt et al. (2018) who make available a useful guide outlining 10 considerations for OPR, stated that OPR provides excellent learning opportunities for authors to improve scholarly communication and research towards a more transparent, collaborative, and participative undertaking. Various aspectss of OPR are on the increase in the last decades, ranging from open identities, open reports, open participation, open interaction, open pre-review manuscripts, open final-version commenting and open post publications and open platforms (Ross-Hellauer, Deppe and Schmidt 2017; Hodonu-Wusu 2018).

Although OPR is on the rise, it is often poorly understood, and surveys of researcher attitudes show important barriers to its implementation. There are some evidence that authors and reviewers have contradictory tastes of some aspects of OPR. Debates on OPR are potentially sidetracked for example, raising issues of bias in peer reviewing (Bowman 2014; Helmer et al. 2017); lack of true transparency of the review process (Wang et al. 2016; Wierzbinski-Cross 2017), unsustainability of OPR due to few willing reviewers (Strickland 2015; Wang et al. 2016); and lack of agreement on whether editors should leave referees freely to decide for themselves, or not to make themselves known to authors (Wang et al. 2016). With these, researchers are overwhelmed with a lot of debates surrounding the prospect of OPR and its challenges. However, this debate has led to the innovation with open peer review, post publication peer review and double-blind peer review (Boughton, 2013)

In the recent years, a few studies have touched on issues germane to OPR and a few large-scale, largely publisher-led studies have gauged attitudes to OPR. These studies tend to show that although researchers believe OPR is necessary, and most studies have been undertaken by publishers, it is perhaps understandable that incentivizing and motivating reviewers has been a major feature of these surveys. Yet, no study has probed on, even explored the attitudes and behaviours of researchers in OPR and the challenges that often arise. The requisite for OPR understanding practices and attitudinal change is needed for these may impact research practices and scientific knowledge.

From the argument for or against OPR, authors and reviewers are to weigh the pros and the cons of OPR and presently the understanding, experiences, and attitudes of Malaysian scholars (whether males or females) as authors and reviewers of OPR are on put on hypothesis in this study - to know whether or not they support OPR and in what capacity. In line with the advocates of OPR and to ascertain whether Malaysian authors and reviewers are carrying out this task of open scholarly communications.

The motivation for this study lies in the reasoning that although the availability of open scholarship offers many opportunities for the researchers, no study exists that questions the behaviours and attitudes of Malaysian researchers in open scholarly communication and the challenges that often arise. The requisite for open scholarly communication attitude and behaviour is needed for these may impact research practices, government policies and scientific knowledge, leading to research transparency and accountability, social benefit, and economic growth (Anderson, 2018). To determine whether the academia is set to move forward with "openness" initiatives especially when it comes to research and the scholarly communications system, this study aims to gauge

the awareness, practices and perception of Malaysian researchers towards open scholarly communication.

Therefore, this study aims to investigate the readiness of Malaysian academic researchers in terms of cognitive, conative, and affective readiness of open scholarly communication. No study has investigated this issue before and so, to partially fill in this gap, this paper gauges the readiness in terms of awareness, experiences and attitudes of Malaysian researchers and the challenges that often arise. The general assumption of this study is that researchers from emerging countries, such as Malaysia, who participate, or practice open scholarship are limited. As Open Science develops, it would be interesting to see how it is understood and used among Malaysian researchers.

1.4 Research Objectives

The objective of the study is to investigate the readiness of Malaysian academic researchers in relation to their cognitive, conative, and affective attributes in open scholarly communication. The concept of cognitive readiness is of special relevance and significance for those people who must quickly adapt to emerging, unforeseen challenges, and is gauged through their awareness. The concept of conative readiness relates to the behavioral tendency by an individual and it consists of actions or observable responses that are the result of an attitude, which (include awareness), and is gauged through practices. The concept of affective readiness relates to positive or negative feelings related to accomplishing a behavior or practice and is gauged through emotion perception.

1.5 Research Questions

In order to address the objective of the study, the following research questions were developed:

1. To what extent are Malaysian academic researchers aware of open scholarly communication as regards to Open Access, Open Data and Open Peer Review?

2. What are the practices exhibited by Malaysian academic researchers towards Open Access, Open Data and Open Peer Review?

3. To what extent do Malaysian academic researchers perceive the capability and ability of Open Access, Open Data and Open Peer Review for open scholarly communication?

4. Is there a significant difference between gender, types of researchers, and discipline among Malaysian academic researchers and readiness of open scholarly communication?

In order to answer Research Question 4, the three main hypotheses were postulated in the following section.

1.6 Research Hypotheses

H1: There is a significant difference between gender of Malaysian academic researchers and their readiness for open scholarly communication (Open Access, Open Data and Open Peer Review)

H2: There is a significant difference between discipline of Malaysian academic researchers and their readiness for open scholarly communication (Open Access, Open Data and Open Peer Review)

H3: There is a significant difference between types of Malaysian academic researchers and their readiness for open scholarly communication (Open Access, Open Data and Open Peer Review).

1.7 Research Methodology

To gauge open scholarly communication readiness, this study employed the use of quantitative method. This research method is used to gather necessary information from a lot of respondents at a time. According to Churchill (1991) and Williams (2007) the use of quantitative method is very suitable when developing a scale research instrument of this kind. The justification for using this technique is because it is the most frequently used method to explore respondents' views and opinions and knowledge about Open Science as described in the literature review chapter of this thesis, and rigorous steps that are based on reliability and validity of such instrument could be seen in this method. Chapter Three of this thesis discusses extensively the research method used in this research.

1.8 Limitations of the study

This study was conducted based on certain delimitation that set boundaries to focus the research. The study is limited to 5 research-intensive universities in Malaysia namely Universiti Malaya (UM), Univeriti Sains Malaysia (USM), Universiti Kebangsaan Malaysia (UKM), Universiti Putra Malaysia (UPM) and Universiti Teknologi Malaysia (UTM). The study is also limited for the generalization of the findings. Another limitation is the number of respondents towards the data collection and analysis were small and relied on those agreeing to take part. It is also delimited in the scope of Open Science (i.e. Open Access, Open Data and Open Peer Review only). Albeit limitations in this research, the present study still manages to share an acceptable amount

of contribution to the literature and methodology with a new insight with better understanding towards open scholarly communication among scholars.

1.9 Significance of the study

The research aims to investigate scholars' cognitive, conative and affective readiness for "open scholarly communication" focusing on the three most important pillars of Open Science i.e., Open Access, Open Peer Review and Open. Since there is no study on scholarly communication readiness of academic researchers in open science, this study would be useful and significant to the scholars by providing an understanding about various dimensions of open science (particularly, in the areas of open access, open data and open peer review) and what is obtainable in practicing open science in the academic world today. As Malaysia is rolling out Open Science national plans through the Malaysian Open Science Platform (see https://www.akademisains.gov.my/mosp/about/), the researchers will be expected to comply down the line, but that will only come if the issues of a common understanding and challenges are addressed, because open science can only be performed credibly well if those involved have a clear idea as to its central drive and motivation to practise.

In addition, studies on readiness for open scholarly communication and categorization have not been discussed much in the field of library and information science (LIS), therefore, this study is valuable for academic librarians to become more aware of readiness in terms of understanding, attitudes and feelings and challenges faced when planning to establish or practice a new program, activity, or system concerning open scholarly communication.

1.10 Operational Definition of Terms

(a) Open Scholarly Communication: Sharing knowledge and data as early as possible in the research process in open collaboration with all relevant knowledge actors (Von Schoomberg 2019).

(b) Scholarly Communication: A process through which scholars freely exchange information with each other and publishing their findings so that they are available to the wider academic community and beyond (Nielson, 2011; Friesike, Widenmayer, Gassmann, *et al.* 2015; Anderson, 2018).

(c) Open Access: Digital, online, free of charge, and free of most copyright and licensing restrictions (Suber, 2002)

(d) Open Data: Data that can be used by anyone without technical or legal restrictions (OECD, 2015 p.55). It is the openness to availability and access, and reuse and re-distributed of data, and universal participations (James 2013).

(e) Open Peer Review: A process of subjecting an author's scholarly work, research or ideas to the scrutiny of others who are experts in the same field (Ware & Monkman, 2008) and make it more transparent, inclusive and accountable (OpenAIRE, 2016).

(f) Open Science Readiness: The degree of awareness, practices and perceived benefits which accrue to the individual academic researcher, the university, the user of research outputs and to the other stakeholders in the open science (Abrizah, 2019, p9)

(g) Awareness: The mental preparedness in the understanding and knowledge of the issues of open science (Morrison and Fletcher, 2002).

(h) Practices: The process of making, acting, or state of doing (Schmidt, 2014). In this case, process of practicing open scholarly communication by the scholars.

(i) Perception: The act of perceiving or apprehending by means of senses or of the mind; cognition; understanding of a particular stimulus. It deals with how scholars interpret different sensation about open scholarly communication (Morrison and Fletcher, 2002).

(j) Cognitive Readiness: The mental preparation for effective changes in response to altered or unpredictable situations. It is the mental preparation (including skills, knowledge, abilities, motivation, and personal dispositions) an individual needs to establish and sustain competent performance of an innovation (Morrison and Fletcher, 2002; O'Neil *et al.*, 2013).

(k) Conative Readiness: The behavior exhibited by researchers toward scholarly communication in Open Science. It has to do with the preparedness to practice scientific communication having understand and get the feeling of open scholarly communication (Manzuma-Ndaaba et al., 2016).

(l) Affective Readiness: The preparedness of subjecting or process of acquiring interpreting and organizing sensory information towards open science concept. It has to do with the feelings having understand the issues related to open science (Swick, 2013).

(m) Academic Researchers: Scholars in research institution of learning. They comprised:

1) Early Career Researchers (ECRs): Researchers who are generally between ages 30 and 39, who either have received their doctorate or are current in a research position (Abrizah, Shah and Nicholas 2019).

2) Mid- Career Researchers: Researchers who holds a PhD and graduated within the past 5-10 years (excluding career interruptions in relation to caring responsibilities) (see www.socsocmed.org.uk/mid-career)

3) Established Researchers: Researchers who have developed a level of independence or those that are leading in their research areas (European Researchers Framework, see www.vitae.ac.uk/rdf)

1.11 Thesis Organization

The thesis is organized in eight chapters. Chapter 1 introduces the study. It discusses the importance of the subject area, open scholarly communication, problem statements, research objectives and research questions, aspect of research methodology used, limitation and significance of the study. Chapter 2 provides a general review of the study areas (five research institutions), and critical analysis of existing literature to support the study, including key literature of the field. Chapter 3 discusses the methodology used in the present study including research design, conceptualization of the construct, research instrument, population and sample, sample techniques used, pilot study, changes made after the pilot, data collection, administering the survey, handling non-response bias from the paper survey distributed, validity and reliability of the instrument, data analysis, and summary. Chapter 4 presents the demographic information of the respondents and answered the Research Question 1 and addresses the cognitive readiness status of scholars towards open scholarly communication. Chapter 5 explores the scholars' practices of Open Access, Open Data and Open Peer Review, answering Research Question 2 and addresses the conative readiness status of scholars. Chapter 6 presents answer to the Research Question 3 while presenting the analysis and findings of the study through summarizes its reports based on the findings obtained from the third research question and affective readiness status of scholars towards open scholarly

communication. Chapter 7 discusses Research Question 4 and presents the testing of the hypothesis of scholars towards open scholarly communication while summarizes its reports based on the findings obtained from the research hypothesis. Chapter 8 presents the discussion, and recommendation of the major findings, significance and implications of the study while concluding the thesis.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter discusses the review of literature that can be used as a basis for the development of a method for measuring scholarly communication readiness in open science, specifically focusing on awareness, perception, and practices. The chapter further explore related literature on open scholarly communication and sub-divided into –Open Access, Open Data and Open Peer Review in this study as well as related theories that support open scholarly communication.

The chapter begins with brief introduction to open scholarly communication in Open Science as it is view worldwide and in the context of Malaysia, the pillars of open scholarly communication (Open Access, Open Data and Open Peer Review), readiness and practices of open scholarly communication by Malaysia scholars, editors, publishers and literature related to the background, as well as identifying gaps in open scholarly communication that justify and guide the study, and theoretical and conceptual framework to the study and finally the summary of the chapter.

2.2 Open Scholarly Communication

This section discusses the concept of open scholarly communication in relation to the World views about open scholarly communication, and the Malaysians understanding about the concept of open scholarly communication.

2.2.1 The World View of Open Scholarly Communication

Scholarly communication started with the sharing of research data findings in its first publication on 5th January 1665 but gradually became popular in the 1970s (UNESCO, 2015; Anderson, 2018). According to Von Schoomberg (2019), the word open scholarly communication originated from open scholarship, as "sharing knowledge and data as early as possible in the research process in open collaboration with all relevant knowledge actors" (p.1). further, Horizon Europe, the new European Union Framework Programme for Research and Innovation, promote Open Science in the full meaning of open scholarship Burgelman, Pascu, Szkuta, Schomberg, Karalopoulos, Repanas and Schouppe (2019). A term highlighting the movement to make scientific research, data and dissemination accessible to all levels of an inquiry society (FOSTER, 2015). In understanding the conception of open scholarly communication, David (2014, p571) argued that the rise of open scholarly was as a result of the ethos and the characteristics of the idea and practices that was break out from the previous dominant ethos of secrecy in the pursuit of Nature's secrets. David notes that this is a unique and important organizational aspect of the scientific revolution, from which developed a new set of norms, incentives and organizational structures that reinforced scientific researchers' commitments to rapid disclosure of a new knowledge. In the same way, the study of Neylon discussed what constitutes openness in science. It was revealed that the fear of co-option of various efforts from open access to open data is driving a reassessment and redefinition of what is intended by 'open' (2017, p7). This study reviewed different model from cultural to economics and presented the unease between exclusionary group formation and identity and aspirations towards inclusion and openness in science. The study concludes that instead of positioning openness as new, and in opposition to

traditional closed system, it may be more productive to adopt a narrative in which efforts are to increase inclusion of a very old core value of the science albeit one that is a constant work in progress (Neylon, 2017).

But again, David in his study argued that "the intention of open scholarly communication was to make rapid disclosure and wider dissemination of scholars new discoveries and inventions through the internet, yet the issue of why and how this came about has not received the notice it deserves especially in the view of the complementarities and tensions that are reorganized to be present today in relations between the regimes of 'open' and 'proprietary' science" (David, 2004; 574). Further, Cope and Kalantzis point to an epistemic disruption in the scientific knowledge communication system with repercussions on academic journals. They argued that the unsustainable costs and inefficiencies of traditional commercial scientific publishing, which lead to the expensive costs of subscription journals and inaccessibility of science by the scholars (Cope and Kalantzis, 2009).

Therefore, advocates of openness have suggested ways of resolving the issues surrounding data disclosure. First, is to make sharing trivial -in an age of internet and rapid communication, there should never be a technical or organizational barrier to sharing. Second, there should be stepped to incentivize data sharing within academic workflow. One of the reasons for lack of data disclosure is that little or no credits were given to academic workflow. Third, there should be a reputable metric for data sharing for instance page view, downloads, citation, shared etc., the incentive for sharing can then come from having a quantifiable metric that can be linked with the researcher's reputation. If sharing were practiced, errors could be detected and corrected at the initial

stage of research formation, thereby reduce the effect and alleviating the fear of making them in the first place. (Jeffery, 2013, p.20).

From the above, it shows that there is resistance about open scholarly communication and with the rise of the Internet and the world-wide world (www) that is more collaborative and data intensive in nature which has brought scholarly communication to the fore in academia. However, with the increased reliance on technology by researchers with regards to creation, use, publication, dissemination, and review and sharing of research through open scholarly communication has propelled many research funding bodies to mandate academic researchers to make their research open for all to use, reuse and redistributed without a limitation barrier (Hey, Tansley, & Tolle, 2009; FOSTER, 2015).

According to Peters and Roberts (2012), Open scholarly communication is seen as a way of promoting certain kind of freedom, justice, forms of participation, transparency, sociality, collaboration. They see it as a movement toward greater openness that represents a change of philosophy, ethos, and government as well as a set of interrelated and complex changes that transform markets, solidarity and democratizations. This new system makes research outputs openly and freely accessible and it believe, makes it easier to gauge, reproduce and build upon knowledge produced by others and, so, to enable scientific and technological developments and the encouragements of awareness for social and economic benefits (Gaule and Maystre, 2011; McKiernan et al., 2016; European Commission, 2016).

Management of Open Access (OA) model of scholarly publishing needs understanding of what enables, encourages and inhibits practices OA publishing among

the scholars and to appreciate individual differences within disciplines. The closed disclosure of perception and practices related to scholarly communication among the scholars (Gao and Haworth, 2016) and open disclosure review or practices such as publication (Kapeller and Steinerberger, 2016) and Open Data must be understood (Perkmann and Schildt, 2015).

In the same vein, the advocacy for open scholarly communication has led to Open Peer Review (OPR) moving to the mainstream, together with the above two mentioned scholarly communication elements of Open Science (i.e. Open Access and Open Data), In OPR, aspects of the review process such as the identity of the reviewer, the review report or the platform itself are opened up to the research community or the public (Görögh et al. 2017), bringing greater transparency and participation to formal and informal peer review processes. The issues of open scholarly communication among Malaysia scholars shall be investigated in this study.

2.2.2 Open Scholarly Communication in Malaysia context

Malaysian scholarly communications have gone through a period of rapid development and improvement in recent times. This was as a result of emphasis on research and publication by local universities and research institutions (Shukor, 2018). The emphasis on scholarly publications has led to the creation, use and publishing in many journals. Online and electronic publishing has also facilitated the growth of Malaysian researchers towards open scholarly communication. The government of Malaysia has joined this trend by recognizing the potential of open science by placing emphasis on improving information and communications technology with the public universities with specific focus on Open Data and e-Government.

The recent initiative by Abrizah's team for moving open scholarly communication forward by the Malaysia scholars through I-CONNECT and Malaysia Open Science Platform (MOSP) is a chart in the right direction where Malaysia's research data would be seen as a valuable national asset through trusted platform that enables accessibility and sharing of research data aligned to national priorities and international best practices. MOSP Seeks to determine whether the academic researchers are set to move forward with open initiatives especially when it comes to research and the scholarly communications system, and the best ways to do so (Abrizah, 2019). This initiative proposed to link to other Open Science Platform globally and the digitally connected platform will be a conduit for industry to tap into the knowledge in the research space and enabling open innovation (I-CONNECT and MOSP, 2019). More information about this initiative can be seen at https://www.akademisains.gov.my/mosp

Equally, the 2011 Tenth Malaysia Plan specifically identified e-Government and Open Data as fundamentals in the move towards more effective, transparent and accountable public service delivery. Their target is to harness the power of data to be carried forward in the "Eleventh Malaysia Plan" (2016-2020) which clearly expresses the country's intention to use data-driven governance to improve people lives and service delivery, increase responsiveness, and strengthen accountability through greater transparency. Nevertheless, while Malaysia scholars have made some progressive move towards a more open environment, many are still not practicing openness in their institutions (World Bank Group, 2017). Furthermore, the Malaysian Citation Centre (MCC) that was established in 2011 by the Ministry of Education (MOE) responsible for collating, monitoring, coordinating and improving the standard of scholarly journal

publications in Malaysia. From, the MyCite webpage[1], MCC maintains a citation system, named MyCite or Malaysia Citation Index. This provides access to bibliographic as well as full-text contents of scholarly journal published in Malaysia in the various fields. Likewise, MyCite provides citation and bibliometric reports on Malaysian researchers, journals and institutions based only on the contents within MyCite. It is estimated that there are over 500 Malaysian journals, the contents of which needs to be made visible globally so that Malaysian researchers can identify expertise, areas of possible collaboration, stimulate use and citations. Journal articles being published by Malaysian academics as indexed in the Web of Science (WoS) and Scopus now number in the thousands per annum (Sa'ari, 2018). Malaysian journals indexed by WoS and Scopus are considered to have contributed to the increasing visibility of Malaysian scholars and their impacts. Besides, designation of five of Malaysian universities as research universities to focus on research, innovations, and publications in the field of science, medicine and technology have helped to improve researchers in scholarly communications. In addition, the Malaysian blueprints for higher education (2015-2025) clearly states the government's aspiration to create a higher education system that ranks among the world's leading higher institutions globally. Enhancing Malaysian scholarly communication has been channeled through journals and conference proceedings, symposium, workshops, and collaborations (Zuraidah, 2018). According to recent study carried out by Zuraidah, on Malaysian researchers' performance on scholarly output, it was revealed that Malaysia's 5 research universities are on the top of the list. These research universities contribute 64% of the total Malaysia's scholarly output but when compare globally is

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[1] www.mycite.my

low. More so, Noorhidawati, found out nine characteristics about Malaysian scholarly communication. i) that Malaysians scholarly communication were more of articles with reviews having more impact; ii) lowly self-cited; iii) mainly published in first quartile; iv) many from science disciplines; v) outcome of national funded research; vi) authors are collaborated vii) many Malaysian are first authors and as reprint authors; viii) mainly affiliated to Malaysian institutions and finally ix) have more international collaborations. However, this study has shown aspect of scholarly behavior, further investigation is needed to ascertain whether their involvement translate to scholarly communication.

Also, from editor's perspective of scholarly publication among the Malaysians, it was gathered that many authors are actually involving in submitting paper for publications, but this does not necessarily mean quality, as many submissions do not reflect scholarly work that has novelty or impact (Fariza, 2018). Similarly, as a journal editorial manager, Sa'ari believes that in the last 5 years, the number of submissions in Malaysia have increased drastically, but in many instances, quality is lacking in the manuscripts sent to them thereby received rejections (Sa'ari, 2018). Likewise, in terms of sharing data or submitting data, there is not many revelations in Malaysia as many of the scholars still withhold their data due to fear of misuse or receives negative feedbacks.

There are increase number of scholarly societies and institutions developing open scholarly communication journals as part of contribution towards open scholarly communication. Academic librarians manage the development of OA institutional repositories that houses theses, dissertations, institutional documents, and data, as well as other files that may likely be accessible by the public (Cullen and Chawner, 2011). Interestingly, Latif, Timo and Tochtermann (2014, p8) note in relation to open scholarly communication movement as follows:

"Making resources available through open scholarly communication portend their readiness and practices towards open science, this equally helps the researchers as well as other academicians get scholarly information. The availability of preprint and post-print, dissertation, theses, dissertation research reports and other scholarly resources shows their practices towards expanding open scholarly communication as well as sharing scientific and knowledge sharing."

To collaborate their readiness and practices of open scholarly communication, Hunter (2012) stated that academic libraries have embraced digital publishing to provide digital resources for both faculty and students or other users.

Academic librarians and their libraries are resources as well as publishers all at once, considering their practices in publishing and disseminating knowledge. They are very useful resources for research supports and scholarly communication (McKee, Stamison and Bahnmaier, 2014, p.190). Academic librarians are promoters of open scholarly communication initiatives, they serve as librarians, researchers, reviewers, editors and provide access to research output and other documents from their individual institutional repositories. In fact, librarians contribute immensely to the scholarly and scientific communication by providing and marketing the resources instead of keeping them away from the users, this they do by opening doors of scholarly communication). However, this movement does not exist universally, in developing countries for example, the movement has been slow.

More so, lack of infrastructure for online access is another challenge faced by them and this has slowed pace open scholarly communication the third world nations. Further, in the report of Maron, Kennison, Bracke, Hall, Gilman, Malenfant, Roh, and Shorish, (2019) to

ACRL, "encourages all academic library practitioners, no matter their role or the size of their institution, to work to enact change in the scholarly communications system, whether by implementing the report's practical actions or investigating new research questions. Their report *"Open and Equitable Scholarly Communications"* is organized to address —people, content, and systems—and each of these areas delineates several specific effective practices being used in scholarly communication today. The first section of their report on people addresses embracing diversity and inclusion, improving the working lives of people engaged in scholarly communications, and increasing awareness concerning creators' rights. The second section, content, acknowledges the opportunity for greater inclusion and openness by rethinking what scholarship "counts" and creating more representative and open collections. The third section on systems identifies several avenues to explore: supporting sustainable technological infrastructure, creating systems that permit more access to more people, building mission-aligned organizational and financial systems, and advancing innovation in academic libraries.

Also, the perception of librarians needs to change concerning how science is being carry out today and they need to move with time else they would be left behind by technology. Libraries should not be a close access to institutional repositories, rather should be Open Access repositories. Every hand must be on deck to drive in this vision across the breadth and length of our institutions as librarians and researchers need a lot to do in order to achieve this (OECD, 2013). Also, data awareness of the librarian can go a long way in extending traditional information literacy and bibliographic instruction programmes. In some ways existing forms of library instruction lend themselves easily to the addition of concepts of data management and re-use. For example, in teaching about doing a literature search in a given discipline, librarians may give instruction in using standalone or online

reference management tools, such as EndNote, Reference Manager, Zotero or Mendeley (Robin & John, 2016, p.35).

2.3 The Pillars of Open Scholarly Communication

The pillars of open scholarly communication rest upon the nine movements of Open Science i.e. –Open Access, Open Data, Open Peer Review, Citizen Science, Open Source, Open Reproducible Research, Open Science Education, Open Science Policies, and Open Science Tools (FOSTER, 2015). However, this study only focuses on Open Access, Open Data, and Open Peer Review because they are related to open scholarly communication of researchers in the research institutions of study. Over the past decade the scholarly communications agenda has progressed gradually. Currently there are strong tendency among all research stakeholders to engage with the practice of open scholarly communication and the European Commission (EC) funding framework, Horizon2020, requires that all research results funded by the European Union (EU) should be provided open access and, with respect to research data that accompany these results. (Pontika et al. 2015; Williams, Bagwell & Zozus 2017; Zijlstra, et al. 2017). In Malaysia, a few universities have recently step-up the open access to their research output, and a concern to speed up the availability of open data through institutional and regulations are in progress (World Bank Group 2017; Abrizah, 2019). The adoption open scholarly communication requires a shift in the researchers' behaviour regarding the conduction of research and communication sharing that will demand the adoption of new practices. However, research conducted with respect to open access implementation showed that there are still several components that need to be addressed to support the compliance of funders' open access policies and improve the

availability of information that could bridge knowledge gaps (ERC, 2012). The subsections below discuss three major pillars in this study.

2.3.1   Open Access

Open scholarly communication has been incorporated into online publishing models. For instance, Open Access (OA) in its freshest exercise are free, digital information that are without right or usage restriction (Suber, 2013). Put differently, OA follows removing both price barriers- payments, licensing fees, pay-per-view fees and authorization hindrances (mostly, copyright and licensing limitations) (Budapest Open Access Initiative 2002; The Bethesda Statement on Open Access Publishing, 2003; Suber, 2013) so that data and information are freely accessible online and can be used for any legal drive, without monetary, lawful, or mechanical barricades other than those dedicated from attaining access to the internet itself (Budapest Open Access Initiative, 2002; The Bethesda Statement on Open Access Publishing, 2003; Berlin Declaration on Open Access to Knowledge, 2003). For about four decades now, journal prices have increased at astronomical rate and many academic institutions have find it difficult to cope with especially among the librarians and libraries. This situation is what librarians called "serial crisis" (Greco, Wharton, Estelami & Jones, 2006). Some scholars argue on the reasons for such an increased in journal prices due to the costs involved in publishing both print and online publications (Kling & Callahan, 2003; Fidczuk, Beebe, & Wallas, 2007). Others like Bergstrom & Bergstrom, (2006) argued that the monopoly of copyright laws allows publishers to over-charge authors. While there are some other certain causes which the result is a system that is not sustainable. Authors especially, librarians find it difficult to cope with the rise of publishing and journals price for their institutions with a meagre budgets and so the proponents of Open Access (OA) as

a publishing model, argued that it can help alleviate the burden of publishing by researchers and academic libraries' can be relieved from serials and acquisitions budgets (Creaser; Fry; Greenwood; Oppenheim; Probets; Spezi; & White, 2010), and scholars can have free access to what others are doing so as not to slow down research.

2.3.1.1   Open Access Routes

There are two forms of OA routes, namely: Gold OA and Green OA. According to Lewis, (2012), there are different types of Gold OA models.

a)   Direct Gold OA – this permits journals to publish articles that are freely accessible to readers at the time of publications.

b)   Delay Gold OA journals – these are journals that provide access to articles after an embargo period are considered.

c)   Hybrid Gold OA journals –this allows authors to choose to pay for a submission or publication fee. When, authors pay this fee, their articles will be immediately accessible to the readers even in journal issues that have articles that are not OA because others did not pay a fee.

2.3.1.2   Green Access Routes

On the other hand, "sits alongside the subscription journal system and does not attempt to replace it" (Lewis, 2012, p.494). This model self-archiving the publication. Authors who take advantage of Green OA have several options for self –archiving. Scholars may deposit a copy of their article's pre-print or post-print version either on their personal website or in an institutional or subject repository. Pre-prints are versions of the article that have yet to be peer –reviewed (more explanation in Section 2.8) while Post-prints are versions of article that have been peer –reviewed.

Chan (2004) distinguishes between Gold and Green Open Access as Open Access Publishing (OAP) and Open Access Archiving (OAA), respectively. Both OAP and OAA models are the original definitions in the Budapest Open Access Initiative in 2002, and Berlin conference of 2003 (Suber, 2012). Other attributes of OA include contents that are freely accessible, is online, and has minimal restrictions for re-use. The re-use factor relates to copyright of open data or publication, which often held by author(s) of an OA study and may be assigned a Creative Common license.

In summary, OA research largely focuses on three major areas: the benefits to the scholars, in form of increased access to OA publications and influence in terms of citation counts or number of attributions such as downloads, copy, save, share, cite etc., which is an indication for readership. Also, benefits to the libraries and the public. This assumed that the benefits to the libraries and the public users outweigh the cost, where the costs might be marginalized by the academic libraries through distribution of content storage and some unnamed implications (Burns, 2013). Research that focuses on measuring OA's influence by comparing downloads and citations between OA and subscription –only articles or journals includes its audience other researchers with interest, for various reasons, in such behavior or measures when deciding what to read, cite or publish in OA or subscription-based journals. Generally, this section OA sub-divided into three other sub-sections in deciding what to read, cite and publish in OA.

i) Reading

According to (Abrizah et al., 2015; Abrizah, 2016), the author's impact on readers is not much felt in terms of traditional citation counts and that reading behavior among scholars showed little revelation or sign of new form of scholarly behavior of them taking full effect. They point out that scholars were much involved in good old-fashioned scholarly detective works when it comes to what to read, cite or publish. They argued that scholars craft a "footprint" via profiles in social networks, homepages or publication lists to make themselves and their work more visible which is against the citation impacts or counts. Also, in the first of three years study of Harbinger's team, scholars were having little understanding of the concepts of open science and some swapped open access for open science practices (Nicholas et al., 2015). Furthermore, Xia (2013) equally found out that researchers lack practical understanding of what open science is.

ii) Publishing

The issue of publish or perish has changed the ways researchers in academics viewed scholarly communication. A researcher can do anything to make sure he/she published in reputational journals. It is of no secret that researcher's professional success is highly dependent on the number of publications he/she has -either for jobs, improve salaries, tenure, promotions and funding (Mahoney, 1985, p.35, Martin, 1992). Aside individual, assessment and ranking of departments and universities are equally done using the number of publication criteria (Nosek et al., 2010). Examining the nature of publication and professional success, the aim to publish by scholars often is very clear (Sovacool, 2008). Furthermore, there are issues of pay to published among scholars these days and professionally, it is in the interest of a researcher to publish whether or not the

findings are accurate (Hackett, 2005; Sovacool, 2008). While most scholars would not intentionally commit fraud (Fanelli, 2009; Steen, 2011), strong professional motives supply inspired understanding to arrive at the desire outcome (Kunda, 1990), specifically when practices that will increase the chance of this outcome are known, approved -even encouraged -and, under some conditions reasonable. The machinated goals for success instantiate inspired awareness to justify practices as accurate, when, in fact, these practices only increase likelihood of publication (Fanelli, 2010a).

When a researcher chooses the type of journal in which to publish, he or she typically effect a compromise between aspiration and expectation. Usually, a researcher seeks to publish in a high impact factor journal as possible. Though, other considerations for publishing include the journal promptness in publishing a paper (Hassan Jamil Syed et al., 2017; Geithner & Pollastro, 2016; Solomon & Björk, 2011; Bechhofer, 2010). Wider coverage (Solomon & Björk, 2011; SAGE Open 2013; Watson, 2007; Swan and Brown 2004). However, some scholars feel that some factors such as article processing fee (APC) can deprive them from publishing in Open Access journal (Geithner & Pollastro, 2016).

iii) Citing

The scientific impact of a scholar could be measured in terms of number of publication he/she has as well as the number of citations received (Garfield, 1970). High quality of researcher's work will generate more citations. Today, journal impact factor (JIF) is seen as measuring tool which serves as indicator of quality. Saha, Saint, and Christakis (2003) found out that there is a strong correlation between JIF and physician's rating of journal quality, being higher among physicians than other practitioners.

But JIF has been questioned to evaluate the quality of research through shortcomings. These include the calculation of citations within a 2-year window which may not be enough for papers in some disciplines like social sciences, bias towards journals and exclusion of citations from books and conference proceedings and English language journals. Furthermore, errors in journal-to-journal citations such as discrepancies between citing and cited data, changed or deleted journal title, and differences in abbreviations in journal titles, all these causes missed citations and reduce the validity and reliability of JIF score (Rice, Borgman, Bednarski, and Hart, 1989). In addition, authors may not actually cite all articles that are "influential" in a field (MacRoberts & MacRoberts, 2010).

One way of recognizing the most influential researcher is through highly cited papers. Highly cited paper is a paper that belong to the top 1% of paper in a research field published in a specified year (Noorhidawati, 2018). However, it is an uninspiring statement that some 90% of papers that have been published in academic journals are never cited. Indeed, as many as 50% of papers are never read by anyone other than their authors, referees and journal editors. (Simkin and Roychowdhury, 2003; Meho, 2007, p. 32).

The mere available of information or publication cannot transform the society, therefore, users or individual must be able to access, shared and used them (Gurstein, 2011). According to Meho, (2007) if citation counts are not realistic due to non-reading of papers by readers or other users amount to a waste of resources between the creation, assembly, dissemination, synthesis and exploitation of knowledge." Houghton, Rasmussen and Sheehan (2010) judged that over a 30-year period following the implementation of an open access mandate, the potential economic benefits could be

worth between four and 24 times the cost of the basic research, depending on the archiving model used.

Researchers in low-income countries are among those who can find it especially difficult to gain access to information. This is recognized by the existence of programmes set up to facilitate such access. For example, the World Health Organization's HINARI programme offers funding to improve online access in low-income countries (WHO, 2011). While it may be impossible precisely to identify an absolute connection between lack of access to information and good-quality research, 'access to timely, relevant, high-quality scientific information represents a substantial gain for researchers, students, teachers and policymakers in low-income countries' (Aronson, 2010, p. 968).

One of the confusions surrounding the use of metrics in scholarly communication is a variety of reasons why people cite other authors (Tattersall, 2016). The worse offence an academic can commit against his/her colleague is not to misquote or wrongly cite him/her but to ignore their work completely. The motivation for citing someone else's work comes from the awareness and perception or practices which could stem from type of researchers that is dealing with the decision, academic positions he/she occupies, years in academia etc., can be motivated through psychological or sociological even political influence on author's decision to cite a study but the relative influence to do so may vary from discipline to discipline (Simkin and Roychowdhury, 2003). Additional intricacy derives from the findings that many authors categorically do not read the paper they cite from (Simkin and Roychowdhury, 2003). Simkin and Roychowdhury estimate that only 20% of authors have read the work they cite. It is unclear whether this statistic will improve with greater Open Access to citable sources or whether, conversely, it will get

worse as it becomes easier to identify relevant work through internet search engines and social bookmarking.

More so, in today scholarship, researchers cite if it has been peer reviewed, have or received higher impact factor and if its source has high quality reference (Abrizah, et al., 2015; Nicholas et al., 2015; David and Eti, 2016). On contrary, researchers find it difficult to cite an article if the article is of low quality (Abrizah, et al., 2015; Nicholas et al., 2015; David and Eti, 2016).

2.3.1.3 Open Access Use and Reuse

According to FOSTER, (2015), the main aim of OA is to allow use and reuse of the peer reviewed scientific research. Nick Shokey in her presentation at the Munich conference said OA use and reuse helps to accelerate research by returning research communication to its roots. (Shokey, 2014). However, in the study of Kuula and Borg (2010) on OA to and reuse of data, many datasets can no longer be used because they were not documented and processed for archiving and reuse from the start. This fact is shown in their survey findings, 54% of the respondents were concern about the usability of data (i.e. insufficient documentation) as an important reason why data were not reused in their field. Also, 54% of the respondents estimated how very important a limitation is to enhance open access to document and process data for reuse.

Furthermore, information technology has also created a barrier for reuse as digital data tends to become out of date very quickly. 38% of the respondents considered outdated formats or damaged data as a vital reason for which data were not used. They argued that even when attitudes towards reuse are positive, the rapid development of formats and equipment may affect every good intention.

However, the possibility of archiving and reuse of research data must be a priority for researchers. Therefore, when formats change, conversion is necessary, although, awareness and understanding as well as appropriate technology is needed. Moreover, to cope with the barrier of use and reuse, there must be a concerted effort from the researchers to invest time and energies in advising others to make their research or data available for use and reuse.

2.3.2 Open Data

Open Data refers to online, free of cost, accessible data that can be used, reused, and distributed provided that the data source is attributed and shared alike (FOSTER (Facilitating Open Science Training for European Research) 2017a). Open Data is a component of Open Science, which is described by FOSTER (2017b) as "the various movements that aiming to remove the barriers for sharing any kind of output, resources, methods or tools, at any stage of the research process". At the core of the library and information science field, the focus of Open Science is placed on two of these movements: Open Research Data and Open Access to scientific publications. Much has been studied on the general movement that result in open access, however very few studies have looked at the extent to which open data is understood, practiced and perceived.

Much of the literature on Open Data touch on the issues of Open Data sharing. Data sharing increase the credibility of research findings, providing evidence to support analytic frameworks and decisions and a source for a researcher to consult when building on existing studies (National Research Council 1985). Tenopir et al. (2011) emphasized the importance to study the data sharing practices of researchers as it is a valuable part of the scientific method allowing for verification of results and extending research from prior

results. Researchers can have diverse motivations to share their data, and to re-use research data already available, and most of the time, sharing research data sets is mostly driven by personal decision (Savage and Vickers 2009). Studies show that there is great variation among research fields in their data-sharing norms (Curty et al. 2017; Fecher, Friesike and Hebing 2015; Zuiderwijk and Spiers 2019), to such an extent that different fields can be said to have different data cultures (National Research Council 2009). For example, data availability is high in disciplines that have well-developed traditions of Open Access and less so in disciplines where data sharing is uncommon.

Tenopir et al. (2011) who investigated 1,329 scientists' data needs, sharing practices and intentions, found out that that social science researchers are less likely to make their data electronically available to others when compared with their science counterparts. Combining information from a bibliometric analysis, a survey and case studies (carried out in Netherlands), CWTS and Elsevier examined how 1,162 researchers from various disciplines worldwide share data, the attitudes of researchers toward sharing data, and why researchers might be reticent to share data (Wouters and Haak 2017). The key findings were that attitudes are generally positive, but open data is not yet a reality for most researchers.

Data sharing principles is dependent on the field and practices in that field: for example, researchers in intensive data-sharing fields are advanced in data curation, storage, and sharing, whereas researchers in restricted data-sharing fields are more traditional in terms of knowledge production and dissemination. They are aware of data repositories, but they keep data to themselves and share it through publication or collaboration, making it less accessible or open. There has been good evidence for a culture of devalued sharing concerns data publishing.

Sayogo and Pardo (2013) outlined specific reasons from four perspectives: technology, organizational, legal and policy, and data complexity due to local context and specificity. Although open data sharing policies as well as the technology to facilitate data sharing are quite increasing (Crosas 2012; Crosas et al. 2015), scholars do not share their data even when ethically required to do so (Wicherts, Bakker and Molenaar 2011), especially through publications. Data withholding that occurs in academic affects essential scientific activities such as the ability to confirm published results (Campbell et al. 2002). Existing literature has discussed at length the challenges of data publication in Open Data initiatives. Some journals have mandated that authors should submit their data together with their results for verification. The availability of data and its reusability has been a challenge as many scholars are not willing to share data due to negativity that may result from sharing research data. A refusal to share data has been established to be related to the number of errors in the resulting manuscript (Wicherts, Bakker and Molenaar 2011); that is to say, the data that need to be reviewed the rigorous out of exactness concerns are the data not being made public. Some aspect of this is probably linked to "fear of errors being discovered" (Spies 2013, p.19).

Sharing of published results from available data would go a long way toward openness in science and it will increase the reproducibility of results because some results can be dependent on how the research materials were designed. Thus, re-using the same data increases the chances of reproducing the prior results (Fecher, Freisike and Hebing 2015). It is also widely believed that the nature of research data can highly influence the intention or motivation to share. The volume and complexity of data (especially those involving a variety of sources) might discourage scholars from sharing data (Jahnke, Asher and Keralis 2012).

Conversely, some data might contain sensitive or copyrighted information, which has disclosure risks and cannot be share without proper handling (Wei 2017). Furthermore, the uniqueness of the data can also raise issues of confidentiality or ambiguity of data ownership (Parry and Mauthner 2004). As such, methods like source or volume of the data, techniques to organize, archive and reuse data must be well taken care of (Wei 2017). There is a consensus in the literature that researchers face resistance when discussing data sharing in the context of their institutions for the following reasons: lack of access to data analysis tool; lack of research data management support; absence of well-defined technical standards; and ethical consideration that discourages sharing and reuse of data (Corti and Van den Eynden 2015). Internal research cultural factors such as unfamiliarity with appropriate methods of secondary analysis and lack of sharing culture among others can affect data sharing among scholars (Kim and Stanton 2016).

Fecher, Friesike and Hebing (2015) who examined if there is a common, easy-to-locate platform on which researchers can publish data, found out that even if there is such a platform, it might not always be easy to adopt and use; therefore, an easy-to-use data sharing platform such as a well-designed feature like a simple upload mechanism, or automatic data verification is important. King et al. (2011) warned that the benefits of collecting and sharing data may be undermined by infrastructural weaknesses in managing the vast types and quantities of data. Researchers often lack the resources or the skills to make sure that the data they use, gather and produce are available for reuse – they need to have the right set of incentives to ensure effective data sharing (OECD 2013).

Scholars are unsure to publish the data or to what extent it should be sanitized to protect parts' privacy. Other factors are such as insufficient time for usage of unfamiliar data (Tenopir et al. 2011), lack of reward models (Wei 2017) or reward system that

recognize scholars, research funding and given credits to those who contribute to knowledge creation (Kim and Adler 2015), and extrinsic motivations for data sharing are lacking (Kim and Stanton 2016). Other factors such as perceived career advancement and scholars' altruism behavior (sense of achievement for sharing great research) have positive relationship with their data-sharing frequencies (Kim 2017; Kim and Stanton 2016).

Also, in another study, Kim and Adler (2015) hypothesize that the pressure from funding agencies and journal publishers influence researchers' data sharing and there are no statistically evidence supporting their hypothesis. Researchers (Zuiderwijk and Spiers 2019) have suggested ways of resolving the issues surrounding data disclosure. First is to make sharing trivial - in the age of Internet and digital scholarship, there should never be a technical or organizational barrier to sharing. Second, there should be measured to incentivize data sharing within the academic workflow. One of the reasons for lack of data disclosure is that little or no credits were given to data sharing. Third, there should be recognized metrics for data sharing such as page views, downloads, citation, and mentions; the incentive for sharing can then come from having a quantifiable metric that can be linked with the researcher's reputation. If sharing were practiced, errors could be detected and corrected at the initial stage of research formation, thereby reducing the effect and alleviating the fear of making them in the first place.

Besides, collaboration could be valued more highly because it would increase error detection or reduce error creation and promote a culture that is less scared of failing and drives towards success (Spies 2013, p.20). The review reflects that, in order to address the challenges and constraints surrounding open data, we need to understand researchers' readiness in terms of knowledge, level of appropriation and perceived values of Open Data.

Hence, the current study seeks to design a survey that includes Open Data readiness to add value for determining researchers' awareness, practices, and attitudes of Open Data. Obviously more studies are needed to gauge whether Open Data behaviours and perception are universal or perhaps country specific, thus filling the existing research gap in understanding their acceptance, or the challenges that researchers may face.

2.3.3   Open Peer Review

Scientific practices such as Open Peer Reviews (OPR) have many benefits including upholding the integrity of science, excluding invalid or low-quality research, ensuring control in scientific communication, filtering and determining the originality of the manuscript and improving the quality of research articles (Barroga, 2014; Danka & Malpede, 2015; Geithner & Pollastro, 2016; Guilford, 2001). Despite being a major pillar of Open Science, OPR has neither a standardized definition nor an agreed schema of its features and implementations in science (Ford, 2015).

However, for the purpose of this sub-section, the researcher defined OPR as a term enabling reviewers and authors identities open, publishing review reports and allows greater participation and interactions in the peer review process. OPR has been used interchangeably with peer review where the identities of both authors and reviewers are published along with the publication articles. Some see it as a method where "invited experts" are able to comment, others view it as a variety of association of this novel approach (Alam & Patel, 2015; Herron, 2012; Woodall et al., 2015); Ross-Hellauer, 2017).

In all these, recognizes the variation in the usage of Open Peer Review, Ross-Hellauer systematically reviewed 122 articles about OPR and came up with a technical definition about OPR that is currently lacking to mean "an umbrella term for a number of

overlapping ways that peer review models can be adapted in line with the ethos of Open Science, including making reviewer and author identities open, publishing review reports and enabling greater participation in the peer review process". However, there are numerous fears about Open Peer Reviews. Researchers have contradictory tastes of some aspects of OPR which include independent factors (such as open identities, open interactions, open reports, open participation, open pre-view manuscript, open platforms and final version commenting), which have no required association with each other, and various advantages and setbacks. Appraisal of the effectiveness of these clashing constructs and comparison between them is problematic. Debates are potentially side-tracked (for example, raising issues of bias in peer reviewing, unsustainability of open peer reviewing due to few willing reviewers, lack of agreement on whether editors should leave referees free to decide for themselves whether or not to make themselves known to authors, growing resistance from reviewers on implementations to further innovations, lack of true transparency of the review process in OPR etc.) as well as when claims are made for the efficiency of OPR in general, despite comments based on one element or unique model for OPR (Bowman, 2014; Helmer et al., 2017; Strickland, 2015; Wang et al., 2016; Wierzbinski-Cross, 2017; Kalantzis, 2009; Fitzpatrick 2010; Mulligan, 2008).

Apart from the challenges faced by OPR, OPR is seen as a sound reliable science for academe. Recent study on OpenAIRE survey (2017) revealed that majority of the respondents favor OPR becoming mainstream scholarly practices of Open Science. A novel and surprising high level of experience with OPR, with three out of four (76.2%) respondents reporting having taken part in an OPR process as author, reviewer or editor. There were also high levels of backing for most of the attributes of OPR, such as commenting on the final version of published articles or data. Furthermore, the idea of

supplementing pre-publication peer review with some form of post-publication evaluation would improve scientific communication (Ali & Watson, 2016; Ferreira et al., 2016; Geithner & Pollastro, 2016; Guilford, 2001; Knoepfler, 2015).

Summarizing this fact is a strong and very encouraging omen for OPR in the academe however, caution must be taken to avoid a "one-size fits all" solution and to tailor such systems to different disciplinary contexts (Almquist et al., 2017; Ballantyne, Edmond, & Found, 2017; Yarris et al., 2017). Though, peer review has been in existence since mid-twentieth century (Kreiman, 2016; Twaij, Oussedik, & Hoffmeyer, 2014; Yaffe, 2009) but due to its defect, some scholars like (Suber, 2002; 2016; Green & Chief, 2017; Wicherts, 2016) advocate for openness in science. OPR is not just a new science but a sound and reliable scientific exercise. The aim of the study is to discuss the novel and sharp practices of OPR in today's scholarship.

General beliefs that the traditional model is subjected to disapproval and has been accused of inconsistency and unrealistic peer reviewing (Herron, 2012; Park, Peacey, & Munafò, 2014; Teixeira da Silva & Dobránszki, 2015; Vinther & Rosenberg, 2013). Studies of Kravitz et al., (2010); and Herron, (2012) reveal very weak levels of agreement at levels only slightly better than chance. Similarly, rejection and acceptance of papers are inconsistent, for instance, Peters and Ceci's classic study found that 8 out 12 papers were rejected for methodology flaws when resubmitted to the same journals in which they had already been published (Peter and Ceci, 1982).

However, some scholars still believed that peer review is one of the sacred pillars of the scientific edifice (Driggers, 2015; Gennaro, 2015; Jefferson, Wager, & Davidoff, 2002), irrespective of the flaws (Blockeel, Drakopoulos, Polyzos, Tournaye, & García-Velasco,

2017) , majority believed it is a king (Nicholas et al., 2015; Kurdi, 2015; Le Bailly, 2016; Shriki & Bhargava, 2015; Smith & Milnes, 2016; Wagner & Bates, 2016; Wierzbinski-Cross, 2017) in academe, and Goodstein, (2000) is one of the advocates of Open Peer Review. Openness in peer review is paramount to development of science and the question of Open Peer Review being a sound reliable science or just 'novel' science can be further broken down to threefold.

One, does Open Peer Review help verify the validity of scientific studies? Two, does Open Peer Review help filter scientific studies from every "Tom Dick and Harry" journals? And three, to what extent does Open Peer Review express novelty and openness? And lastly, Is OPR changing the role and purpose of peer review itself? To answer these questions, we should not forget that science is based on repeated experiment and Open Peer Review is a means of evaluating the quality of the experiments or research.

As per the validity and quality of scientific works, peer review has been seen by many scholars as the last hope in academics against fraudulent publications and experiments (Ali & Watson, 2016; Pöschl, 2012; Wicherts, 2016). They serve as check and balances for measuring scholarly validity and filtering of quality in academe (Gennaro, 2015; Jefferson et al., 2002; Kurdi, 2015). Conversely, in terms of openness and innovation in peer review needs more intrinsic quality of individual intelligence of the peer reviewers and the excellence of the review they produced. In the mentorship programme offered at eLife, the encouragement of reviewers to engage with one another by using collaborative approached to review that Open Peer Review enables, according to Emily Ford, a reviewer in Ross-Hellauer, OpenAire (2017) "this approach makes peer review a more robust, including more than just vetting, fact checking, and some substantial feedback".

More so, in his article, Jean-Claude Guédon suggests that knowledge should be regarded as a conversation where people should freely be able to contribute to it. The traditional peer review is too rigid, concentrating on the technical and organization means of publishing. Open Peer Review is a way of the future and it has come to terms where knowledge can be created, modified on a global scale, improve upon, use and reuse or recycled. Guédon concludes that contributions to knowledge as a whole should not be left for "experts" alone, others can contribute to the knowledge, share and redistributed hence, the move for openness in peer review and post publication peer reviewing is paramount where both reviewers and authors get feedback on their publications or data which can help to solve some inherent problems in traditional peer reviewing but a step ahead in scholarship (Smith & Milnes, 2016; Teixeira da Silva & Dobránszki, 2015; Twaij et al., 2014).

2.3.3.1 Open Peer Review Initiative

(i)   Patient Peer Review: This is a new model initiated in Open Peer Review. It is a model whereby all research articles related to health and social care and as well focus on patient and wider involvement and engagement of research at all stages. In this approach, all articles within the reach of research Involvement and Engagement are over seen by patient and academic Editor Pair and are reviewed by at least two academics and two patients.

(ii)   Registered Report: The rationale behind this initiative is the study proposal and methodology. The study and the proposed methodology are pre-registered with the journal and submitted for peer review before data are collected for the study. One of the merits of this initiative is that once the methodology and the questions in the manuscripts are cleared by the reviewers, thence, the registered report is accepted in principle irrespective of the outcomes of the study. This type of peer review also reduces bias in

publication. Some journals in BMC are practicing this novel initiative e.g., BMC Biology Editorial.

(iii) Results-Free Review: This is another initiation in peer reviewing, where the editors and reviewers are blind to the results of a completed study and focuses on editorial decisions, rationale, and methodology alone. This type of peer review is very similar to Registered Report, but the key difference is the final outcomes which are already known but withheld from the peer reviewers from the beginning to avoid bias in the peer review process. However, if the manuscripts (excluding results and discussion) is accepted for publication, peer review of this entire manuscript later take place to ensure conformity to the methodology, results and conclusion.

(iv) Re-review Opt Out: This new innovative model in peer review allows authors to avoid multiple rounds of re-review by allowing authors decide whether their manuscript to be seen by reviewers again after revision or for Editors to make the final editorial decision. The rationale behind this peer review is to eliminate delay and enhanced faster publication (Janowicz & Hitzler, 2012).

(v) Automated peer review: Artificial intelligence is being incorporated into peer review today. A text mining and machine learning algorithms are to assess basic statistical reporting in manuscript submitted by authors. This text mining and machine learning algorithms are to report relevant peer review guidelines on issues of methodology used and the likes. Editorial policies and sets of strategies designed to speed up the process and reduce editors' task can be improve upon using automated peer review tactics. Also, the issues of fighting plagiarism, bad statistics, bad reporting, data fabrication and copied text or paraphrasing that real reviewers would find difficult to unearth can be detect by this machine learning algorithm (DeVoss, 2017). Presently, three

BMC journals are involved in part one of the pilot, Trials, Critical Care and Arthritis Research and Therapy and discussion on part two is underway. Similarly, a study was carried by PLoS ONE using Cartesian Genetic Programming, a nature-inspired evolutionary algorithm that can melodramatically redouble editorial stratagems. In their study, the artificially developed approach reduced the duration of the peer review process by 30%, without combining the group of reviewers (as compared to a typical human – developed method). The results of the study demonstrate that genetic programs can improve real-world social systems that are usually much harder to understand and control than physical systems. Automated peer review is a work in progress for editors as things will unfold as scholarly communication continues in the academe.

(vi) Portable Peer Review Within and Between Publishers: This is a new model for publishers pioneered by BMC in order to increase the efficiency of peer review process for authors, reviewers and editors. They facilitate this type of peer review within and between other publishers and third parties. They also welcome submissions of manuscripts originally peer reviewed by the Peeraga of Science community initiative as well as other manuscripts rejected by other journals based on interest. They also collaborate between manuscripts transfer from participating journals accompany reviewers' reports if they desired.

(vii) Expedited peer review: This is another novel approach in peer reviewing whereby scientifically sound, high quality manuscripts that are turned down from some broad-scope "high-impact" journals based on the issue of "general interest" can be accepted elsewhere provided such manuscript is submitted together with the original peer reviewers' reports, letter of rejection and brief rebuttal of reviewers' comments. Journal like Epigenetics & Chromatin does this presently.

2.3.3.2 Recognition for Peer Review

a. Reviewer's Acknowledgements: peer reviewers are fundamental to scientific communication and so publishing editors need to appreciate these reviewers in order to continue their good works to the scholarly community. Rewarding is a primary goal for scholarly communication and so in the study of Kratz and Strasser (2015), acknowledgements was ranked highly at 93(62%) out of 126 common answers in given credit to reviewers. Publishers and journal editors can appreciate reviewers by publishing annual reviewers' acknowledgments. They can also award them for the good job well done throughout the year also encourage them in many ways for their contribution to the scientific world. Also, recently, in PeerViewer research, monetary compensation is ranked high where the expert in the field can get paid by the editors when they evaluate research articles of scholarly sources from journal publications. This payment would not make the reviewers rich, according to PeerViewer, but shows expression of thanks for their service, time and hard work.

b. Publons: This is a service rendered by a global community of reviewers which seamlessly tracks, verifies, and showcases peer review activity across all disciplines and allow reviewers to showcase their activity. Publons seeks to address the problem of incentive in peer review by turning peer review into measurable research outputs. Publons collects information about peer review from reviewers and publishers to produce reviewer profiles which detail verified peer review contributions that researchers can add to their CVs. They store a record of every manuscript a reviewer handle and manuscript handled by an editor, for a journal in the world, in full compliance with all editorial policies. This set of reviewers need

to be appreciated for this initiative in peer reviewing to scholarly outputs. In 2017 they got award for keeping watch over science and research everywhere, more can be done. To make open peer review a sound and reliable novel science, several options can be employed for example, the work of Smith (2006), provides the urgency open peer review needs in order to make it sound, reliable and retain its kingship in academics as followed: standardizing procedures; opening up the process; blinding reviewers to the identity of authors; reviewing protocols; training reviewers; being more rigorous in selecting and deselecting reviewers; others are using artificial intelligence or electronic review; rewarding reviewers; providing detailed feedback to reviewers; using more checklists; or creating professional review agencies. It might be, however, that the best response would be to adopt a very quick and light form of peer review—and then let the broader world critique the paper or even perhaps rank it in the way that Amazon asks users to rank books and CDs (Ali & Watson, 2016; Wierzbinski-Cross, 2017; Yaffe, 2009). Nevertheless, peer review can only perform credibly well if those involved have a clear idea as to its central drive. From Smith's (2006) options one can deduced that peer reviewing has a lot to correct in scholarly communication and encourage quality and innovation in academics which is the way to make peer review open. Finally, the issues of getting credit for one's reviews and tracking researchers peer review activity that have for sometimes not possible are now possible through publons. The change in scholarly communication culture has encouraged the addition of peer review activity to research applications. According to Salis Amanda in publons, reviewers can now get credits for all their reviews and this is a right thing in the right direction for scholarly communication.

2.4 Readiness and Practices of Open Scholarly Communication

The drives of scholars to make their research findings, data and review open have been supported by the advocates of Open Science. It is about two decades that the open scholarly communications agenda progressed in the scholarship. Yet, researchers are experiencing a strong tendency among all research stakeholders to engage with the practice of open scholarly communication (Pontika et al. 2015). Lately, research funders require the sharing not only of the research results they have funded, but also of the procedures and data that are being generated during the research conduct. Researchers, on the other side, are keen on observing their research results being used for the improvement of the society and are forced by their funders to demonstrate the impact of their research. At the same time, higher academic institutions aim to join the open scholarly agenda as well, since they see the opportunity of great economic benefits and savings. While open scholarly communication is the possible answer to all these factors, hence, the stakeholders' inability to understand the requirements for the application of open science can be a suspensory factor for the open scholarly communication implementation and evolution (Pontika et al. 2015, p8; Tenopir et al., 2020).

There are three main readiness concerns for scholars in open scholarly communication in this study. These are cognitive readiness, conative readiness, and affective readiness toward open scholarly communication in Open Science. For instance, on January 15, 2019, U.S. President D. Trump signed into law H.R. 4174, the Foundations for Evidence-Based Policymaking Act of 2018, which supported implementation of the principles of open scholarly communication in the United States: "[the law] improves evidence-based policy through strengthening Federal agency evaluation capacity; furthering interagency data sharing and Open Data efforts; and improving access to research data for statistical purposes

while protecting confidential information of researchers" (White House, 2019). The goals of open scholarly communication include greater interdisciplinary scientific collaboration, accessibility of data, and greater reproducibility and transparency of scientific work etc., these are dependent on increased Open Access to data and publications, sharing of scientific data and open review. Data sharing is increasingly seen as an essential driver of the direction in which science is moving worldwide and across disciplines (Tenopir, Allard, Douglass, Aydinoglu, Wul, Read et al., (2011); Tenopir, Dalton, Allard, Frame, Pjesivac, Birch et al., (2015); Schmidt, Gemeinholzer, & Treloar (2016)).

Furthermore, in a latest study carried out by Tenopir et al., (2020) on data sharing, management, use, and reuse, practices and perceptions of researchers worldwide shows that many researchers are still not ready in terms of open scholarly communication. In their study, it was gathered that most scholars displayed high and mediocre risk data practices by storing their data on personal computers, departmental servers, or USB drives. More so, a large percentage of scholars' felts that the lack of access to data generated by other researchers could affect their publication progress.

Equally, research conducted with respect to Open Access implementation showed that there are still several components that need to be addressed to support the compliance of funders' Open Access policies and improve the availability of information that could bridge knowledge gaps (EC, 2012). In the study of Pontika et al., (2015) an attempt to provide a solution to this issue by the portal users is to address each problem separately and collaborate with key research stakeholders. Their primary goal is to empower the institutional training capacity and increase the compliance percentage of funders' Open Access policies by combining the research principles and processes with a focus primarily in early career researchers.

Additionally, in a presentation given by Abrizah (2019), on the Malaysian researchers on Open Science readiness: a call to action revealed that researchers in Malaysia supports and are motivated to go for green Open Access, however, the issues of copyrights and plagiarism, traditional work practices and reputational worries, self-archiving, publishers' policy, trust of readers and preservations meet a little resentment and less resistance from researchers. The readiness of Malaysians toward open scholarly communication are positive, but practices lack behind Abrizah (2019). Little sign of them relinquishing their beliefs and ambitions regarding sharing, openness and transparency.

In order to make Malaysia's research scholarly communication a valuable national asset, the Malaysia Open Science Platform (MOSP) was recently launched as "a trusted platform that enables accessibility and sharing of research data aligned with the national priorities and international best practices"[2]. Although Malaysia's readiness towards open data initiative exists and general supports for the concept is encouraging but increasing the sharing of open data among Malaysian researchers is a critical issue to be addressed (Abrizah 2019). Researchers opined that data availability is high, but lack of accessibility is a major challenge when it comes to policy and framework (World Bank Group 2017). In the area of data, reports of World Bank on Malaysia, revealed that Malaysia research institutions are data-rich, but not much high-quality research data is released in practices. Notwithstanding, scientific research resolves around the production, analysis, management and re-use of data. Malaysian researchers need to make their research data open for reusability which can also

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[2] https://www.akademisains.gov.my/mosp/about/

increase accessibility[3]. However, the readiness of Malaysia as a country to meet up with the challenges that may hinder free flow of research data use and re-use is a concern.

On Open Peer Review, there are positive awareness but lack practices. Abrizah report shows that Open Peer Review was not taking root. Lack of guidance, training to help researchers learn how to open-up their reviews and research within a research environment which implicate open science readiness and skills for undertaking responsible research and innovations.

The motivation for this study lies in the reasoning that although there are prospects of increase in the accessibility of Malaysian works, and availability of rich-open data and openness which offers many opportunities for the researchers, no study exists that questions the behaviours, perception and practices of Malaysian researchers in open scholarly communication, and the challenges that often arise. The requisite for open scholarly communication understanding, practices and perception is needed for these to impact research practices, government policies and scientific knowledge, leading to research transparency and accountability, social benefit and economic growth. In the following subsection, the below will review the theories related to open scholarly communication in this study.

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[3] Vice Chancellor of the University of Malaya in 2018, Datuk Ir. (Dr.) Abdul Rahim HJ. Hashim, at the 6th Global higher education forum on "thriving for knowledge, industry and humanity in a dynamic higher education ecosystem"

2.5 Theories Related to Readiness of Open Scholarly Communication

2.5.1 Scholar's readiness to openness in scholarship

A significant gap in the literature showed lack of theoretical support for the ideas of open scholarly communication among the scholars, thereby, inherently affect the issues of how to authenticate openness in individual scholars (Nova, Amin, & Ha diyani, 2018; Weiner, 2009; Anderson, 1986; Farley, 1986; Midgely and Dowling, 1978). It is expected that individuals will reveal a level of understanding to innovation or adoption in terms of their feelings and practices towards open scholarly communication that skewed towards disclosure of open scholarships and this level of understanding to innovation will vary from their level of awareness (cognitive) to practices (conative). For some individuals, the variance across behavioural categories may be minor, for others substantial (Alan, 1989).

Scholar's readiness to openness in scholarship is not independent of one's life circumstances and as scholars communicate through publishing of research output and sharing of data, there are times and circumstances when they are more open to new ideas and others when they are more closed. Consequently, as scholars' communication behaviour increases, we may expect readiness to adopt/innovate or to be modified (practicalized) depending on the nature of importance of the specific status of adoption. However, the modifications may not affect researchers' practices equally (e.g., reading, publishing, citing, sharing, and reviewing) but the changes would be felt across the board. Some will adopt the idea immediately in scholarly communication while others will be skeptical about the changes such as the case of making available publications that was sponsored by public funds by the taxpayers back to the public received a lot of restrictions initially before others started joining the movement.

More so, studies have highlighted that one of the reasons for this gap in the literature, is that majority of studies are usually preoccupied with macro level constructs steaming from forces at the institutional level. In this case, on scholarly communication readiness among researchers, the researcher argued that readiness is a matter of being aware of a task/event which affect their understanding, knowledge. This is in line with Morrison and Fletcher (2002) about the issue at hand, and later or thereafter translating into their feeling and behaviour towards using or practicing it according to the study of McAlister and Pessemier (1982). In this case, scholars need to first aware or have understanding or knowledge about open scholarly communication concepts such as (Open Access, Open Data, and Open Peer Review), which help in understanding individual's actions and interactions or perspective.

According to Armenakis, Harris and Mossholder (1993) readiness for open scholarship denotes individual's beliefs, attitudes, and intentions regarding the extent to which changes are needed, the extent to which individuals have positive views about the need for change and believe that these changes have positive implications for themselves and wider society due to its implementations and practices. A scholar who is ready in his awareness or understanding is one who exhibits a proactive and positive attitude and perception toward the innovation that is available, which can be translated into willingness to support and own the change. An individual readiness depends on whether they perceive the benefits in the readiness to openness as outweighing the anticipated risks in terms of understanding, feelings, and attitude (Abrizah, 2019). In this study, the scholars perceive the significance of openness differently in the scholarly communication and as a result, the readiness level may vary based on what each scholar perceive as the balance between the costs and benefits of the status quo and the costs and benefits of what openness means.

2.5.2 Cognitive, conative, and affective theories that support the readiness of scholars towards open scholarly communication

According to Hodges (2015), who suggests that people's acceptance or support for innovation is partially a function of the degree to which the innovation impacts them personally. Rafferty et al., (2013) propose that an individual's self –perceived readiness for openness is a function of the individual's belief that change is needed, that they have the capacity to undertake change successfully and that the adoption will have positive outcomes for their job/role. So, researchers who are confident about their abilities and are able to cope with rigorous academic events, such as seen openness in scholarly communication (i.e., Open Access, Open Data and Open Peer Reviews) tend to perceive open research as positive and, as a result, they experience high levels of readiness to openness in scholarship.

According to (Morrison & Flecher, 2002), Cognitive readiness means the preparedness of a mental ability that an individual need to establish and aid expert performance in an unpredicted environment. This is presumed on the assumption of scholars' understanding towards open scholarly communication. In the work of Bryson (1997) individuals can be found in the way they use their brains in relation to scholarly communication and approaches given to it. Doing this according to Rowe and Mason (1987) requires mental process. Bryson (1997) explains how the brain works together in the process of choosing how what, why and when to use it in the scholarship. Cognitive theory and awareness, perception and practices are also very relevant to the academics as it affects their productivity. Based on the work of Piaget, cognitive theory 'examine how people think, reason, and make meaning out of their experiences' (Evans, 2003, p. 186).

Cognitive theory is also viewed as sequential and "development occurs when [an individual's] cognitive structure is changed, thus enabling new ways of incorporating

experience" (Creamer, 2000, p. 23). Because cognitive structures vary from one individual to another, individuals may have very different views of a single event (Creamer and Creamer, 1994).

Numerous other cognitive development theories exist which can be linked to the scholarly communication. According to Creamer and Creamer (1994), knowledge/awareness of these theories can provide scholars with a better understanding of scholarly approaches while expressing widely differing views of seemingly similar situations. The theory of mental process also helps academic scholars to understand the trends and expressions of confusion over complex issues in scholarship. In the work of Olajide-Williams & Popoola, (2013) affective/perception is the subjective process of acquiring, interpreting, and organizing sensory information. It refers to how the brain organizes and interprets sensory information. Olajide-Williams & Popoola report that lately perception was considered by the school of psychology called behaviorism to be a largely passive and inevitable response to stimuli. However, relating this to readiness of scholars towards open scholarly communication. Morrison and Fletcher, (2002) see cognitive readiness as a mental preparation (including skills, knowledge, abilities, motivations and personal disposition) an individual needs to establish and sustain competent performance in an unpredicted environment. In their study, they identified ten psychological components or theoretical mechanisms underpinning the concept of cognitive readiness which can be related to open scholarly communications of researchers.

Similarly, Ekvall et al., (2000) posit that perception could be influenced by the intensity and physical dimensions of the stimulus, our own past experiences, how ready we are to respond, and our motivation and emotional state. They further assert that perception has to do with understanding issues. Perception is the cognitive impression that is formed

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of "reality" which in turn influences the individual's actions and behavior towards that object (in our case, open scholarly communication) (Anderson, 1999).

2.6 Summary

Based on the reviewed of the literature in this study, the researcher was able to review the concept of open scholarly communication, the world and Malaysia views of open scholarly communication. It was found in the literature that researchers in Malaysia supports and are motivated to go for green open access, however, the issues of copyrights and plagiarism, traditional work practices and reputational worries, self-archiving, publishers' policy, trust of readers and preservations meet a little resentment and less resistance from researchers. Also, their readiness toward open scholarly communication is positive, but practices were not encouraged. The researcher extensively discussed three pillars of open scholarly communication by examining in detail the Open Access Definition and OA initiative, OA routes, OA use and reuse, Open Data, Open Peer Review and presented new trends in Open Peer Review. The chapter equally looks at the cognitive, conative, and affective readiness of scholars toward open scholarly communication, and the theories that informed the study, Malaysian researchers' landscapes, and MOSP commitment towards open scholarly communication. Discussion of some salient issues raised by the players, scholars, editors, and the publishers in relation to cognitive readiness, conative readiness, and affective readiness of open scholarly communication (i.e., Open Access, Open Data and Open Peer Review). The research gaps in the literature include lack of awareness of open scholarly communication as many of the scholars still swap Open Access for Open Science, lack of practicing Open Data and scholars are not actually practicing Open Peer Review, among others. The next chapter presents the methodology, proposed research framework, and the research design adopted to answer the research questions in this study.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter reports on the methodology used in the present study including the description of research design, research theoretical framework, conceptualization of construct, research instrument development, population and sample, sampling techniques, pilot study, changes made after pilot study, data collection, administration of survey, handling missing values, establishment of its validity and reliability, data analysis and summary.

3.2 Research Design

This is a quantitative study employing survey as a research design. The survey was designed according to the aim and objective of the study and utilizing questionnaire as a data collection technique. Qualitative research methods on the other hand, are developed in the social sciences to enable researchers to study people and the social and cultural contexts within which they live (Myers, 2009). But this study uses survey design because it is a widely used techniques in quantitative and qualitative studies (such as psychology, education, social science etc.) so as to explore researchers' perceptions, opinions and knowledge in seeking answers to the research questions (Yin, Hou, Romanova and Sweedler, 2011). However, not so much of studies have been done in open scholarly communication research fields. Research design requires detailing a master plan outlining the methods and procedures to be use in collecting and analyzing the required data (Malhotra, 2004; Burns, 1989). Without such a plan of study no scientific study is possible. As noted in the study of Yin et al., (2011), research design is

a "logical blueprint" that link research questions, data to be collected, methods for analyzing data and the validity of the research.

According to Sekaran and Bougie (2010), research design should contain the purpose of study, the study setting, type of investigation, the extent to which the research controls the study, time frame for the study, the level of data to be analyzed, sampling method, how data will be collected, measurement of variables and testing of the model or hypothesis. In order to examine the psychological mean differences (cognitive, conative and affective) and demographic differences (gender, discipline and type of researchers) that explain the adoption of scholarly communication practices survey was administered.

The justifications for using this approach stem from it recursive cycle of steps that are based on the establishing, confirming, or validating relationships and to develop a generalization that contribute to the theory. Studies have shown that quantitative research is effective when researchers want to verify whether a cause produces an effect in general (Rubin and Babbie, 2009). Also, the findings in quantitative research can be predictive, explanatory and confirming (Williams, 2007). In this study, the researcher is interested to investigate the readiness of Malaysian academic researchers in open scholarly communication in terms of cognitive, conative and affective open scholarly communication. Few studies conducted on aspect of open scholarly communication research revealed that quantitative approach is easy to gather data from respondents and has been widely used in many fields of study (RIN, 2008 and Witt et al., 2009; Yin et al., 2011; Tenopir et al., 2011; Xia, 2013 p.119; UNESCO 2015; OpenAIRE, 2016; OpenAIRE2020., 2017; Nicholas, Rodriguez-Bravo, Watkinson, Boukacem-Zeghmouri, Herman, Xu, Abrizah, and Swigon, 2017). Based on the above studies, and in line with

the research objective and research questions, quantitative research is proposed for this study.

3.3 Research Framework

The research framework is founded upon theories of cognitive, conative, and affective readiness, as explain in section 2.5 in Chapter 2. This research framework was based on the notion that researchers need to first aware or have understanding or knowledge about open scholarly communication concepts such as (open access, open data and open peer review), which helps in understanding individual's actions and interactions or perspective and so, employing the theory of readiness. The theory of readiness to open scholarly communication helped the researcher to develop the framework for this study. The framework aims to reveal a level of understanding (cognitive) of the researchers in terms of their feelings (conative) and practices (affective) towards open scholarly communication that skewed towards disclosure of open scholarships and this level of understanding will vary from awareness (cognitive) to practices (conative).

Therefore, the proposed theoretical framework comprised the following constructs:

1. Cognitive readiness: is the preparedness of a mental ability (including skills, knowledge, motivations and personal disposition) that an individual need to establish and sustain competent performance in an unpredicted environment (Morrison & Fletcher, 2002). This is gathered through the notion of scholars' awareness/understanding towards open scholarly communication.

2. Affective readiness: is the subjective process of acquiring, interpreting, and organizing sensory information (Anderson, 1986; 1996; 2001; Williams & Popoola, 2013). This is referred to the perception of scholars towards open scholarly communication.

3. Conative readiness: is a process of how the brain works together in choosing how what, why and when to use, act or behave (i.e., the way the attitude we have influences how we act or behave). (McLeod, 2018; Anderson, 1986; 1996; 2001). It was referring to the preparedness to practice scientific communication having understand and get the feeling of open scholarly communication (Manzuma-Ndaaba et al., 2016). The combination of the three constructs (cognitive, conative, and affective readiness) give us the concept of open scholarly communication readiness in open scholarly communication. While the demographical factors are the factors that determine the practices of open scholarly communication. The proposed research framework is presented in Figure 3-1
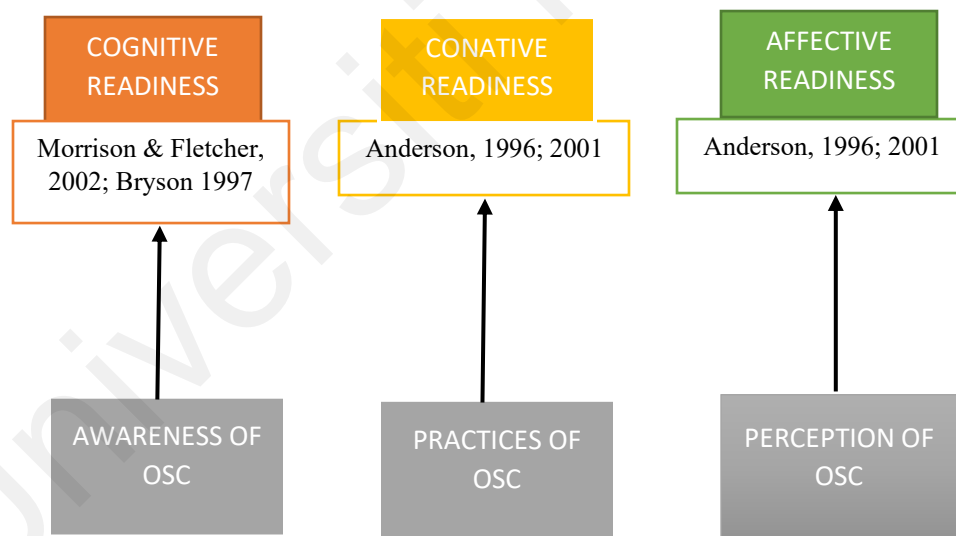
Figure 3-1: Framework of Open Scholarly Communication Readiness

3.4 Research Instrument Development

The most used instrument development technique was proposed by Churchill (1979). He addressed the need of a structured framework and approach for developing multi-item measures and many have followed these guidelines to create scholarly measure scales, especially in e-commerce, websites etc. (Wolfinbarger & Gilly, 2003).

In selecting an initial set of items for a draft, instrument items from theoretical and non-theoretical literature simplifies the designing of the instrument procedure in this present study. However, the simplicity of designing the instrument was based on adapt, adopt and adept approaches. By adapt, the researcher means the item on the instrument was modified. By adopt, the researcher means the item on the instrument was taken from other source and by adept, it means the item on the instrument is a new development. These items on the instrument were adopted and adapted from literature and theory – related to readiness, cognitive, affective and psychomotor domain of awareness, practices and perception theory (Morrison & Flecher, 2002; Bryson, 1997; Anderson, 1996, 2001). While the newly developed items were extracted from scholarly communication and open science literature.

According to Cook and Campbell, (1979), when fully validated instrument is available, replication of the study is possible in heterogenous studies. The instrument is in five parts and all items are on 5 points Likert-scale measurement methods. The demographic information consists of 6 items on the respondent's age, gender, years in academia, academic position, publication in the last 5 years and Research University and 3 other open-ended questions to ask the respondents to write their discipline, their opinion and comment about Open Science and optional email address for acknowledgment purposes only. The variables in the instrument are statement on awareness, perception and practices of Open

Access, Open Data and Open Peer Review as in Table 3-1, Table 3-2, and Table 3-3, and also in Appendix A. The instrument is followed with a consent letter and a cover letter that described the background of the study and researcher's information (see Appendixes A and B for more details on the survey instrument and cover letter). The Framework of Scholarly Communication in Open Science is presented in Figure 3-1, while Table 3-1 presented Awareness (Cognitive) of Open Scholarly Communication; Table 3-2: Practices (Conative) of Open Scholarly Communication and Table 3-3: Perception (Affective) of Open Scholarly Communication.
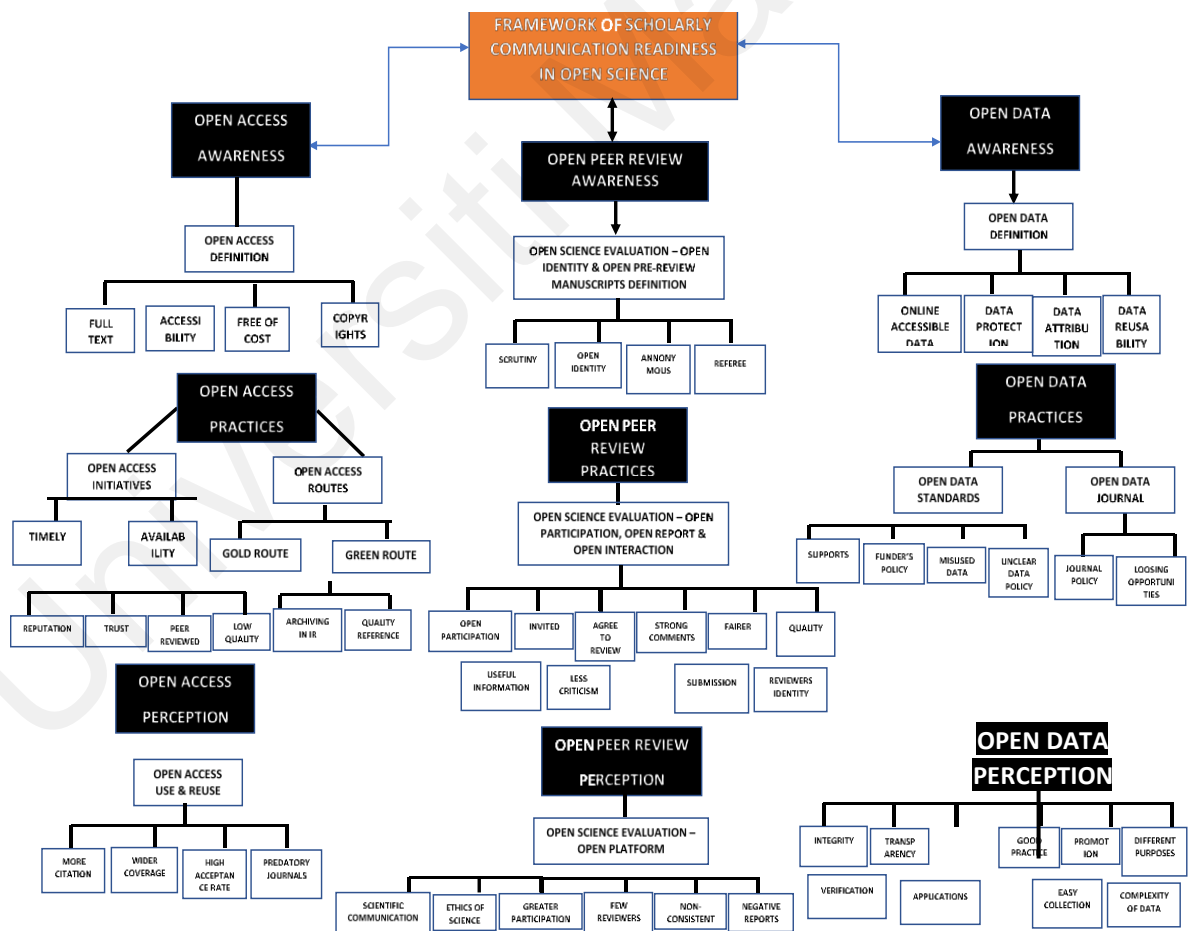
Figure 3-2: Framework of Scholarly Communication in Open Science

Table 3-1: Awareness of Open Scholarly Communication

DIMENSION	QUESTIONNAIRE ITEMS FROM THE SURVEY	REFERENCE
OPEN ACCESS	**I am aware that OA…**	
Full Text	1. provides unrestricted online access to full text of scientific articles	Adopt, FOSTER (2015); BOAI, 2002; Suber, 2012
Accessibility	2. makes available the article immediately at the time of publication	Same as above
Free of Cost	3. provide free of cost access to peer reviewed scientific content	Same as above
Copyright	4. provides access to research output with limited copyright and licensing restrictions	Same as above
OPEN DATA	**I am aware that Open Data…**	
Online accessible data	5. are online, free of cost, accessible data	Adopt, OECD, 2015; FOSTER, 2015;
Data Protection	6. can be shared alike (e.g. download, copy, edit etc.)	Same as above
Data Attribution	7. can be used, reused and redistributed provided that the data source is attributed	Same as above
Data Reusable	8. protect against right in science and research	Same as above
Data Reusable	9. are data that can be used by anyone without technical or legal restrictions	Same as above
OPEN PEER REVIEW	**I am aware that in OPR…**	
Scrutiny	10. author's scholarly works/ideas are subjected to scrutiny of experts and made public their comments	Adopt, OpenAIRE 2016
Open Identity	11. reviewer and author identities are made open in peer review process	Adept, Same as above
Anonymous	12. all review reports will be published, but reviewers will be given the option to remain anonymous	Same as above
Referee 1	13. discussions between authors and reviewers are allowed	Adept, Same as above
Referee 2	14. discussions between reviewers themselves are allowed	Same as above

Table 3-2: Practices of Open Scholarly Communication

DIMENSION	QUESTIONNAIRE ITEMS FROM THE SURVEY	REFERENCE
OPEN ACCESS		
Availability	1. I read OA article because they are made available for all to read, use and reuse for free	Adopt, Nicholas, et al., 2016
	2. I publish in OA journal because of its wider coverage	Adopt, Abrizah et al., 2016 ; and as above
Timely	3. I publish in OA journal because of its promptness in publishing	Adept, Tenopir, et al., 2013 ; and as in 2 above
Reputation	4. I read OA articles Only, if they are of a reputable publisher e.g. PLOS ONE	As in 3 above
Peer Reviewed	5. I cite OA articles if it is peer reviewed	As in 2 above
Trust & High Impact	6. I cite OA articles because they receive higher impact than those of traditional journals	As in 2 above
Low Quality/ Predatory	7. I do not cite OA articles because they are of low quality	Adopt, Wott, et al., 2012;
	8. I do not read OA articles because they are of low quality	Adapt, Wott, et al., 2012; and as in 2 above
	9. I do not publish in OA journal because they are mostly predatory	Adapt, Wott, et al., 2012; and as in 2 above
GOLD ROUTE Payments/ Funder/ Peers	10. I do not publish in OA journal because it requires article processing charge (APC)	As in 2 above
	11. I publish in OA journal because I am encouraged to do so by my employer /funder	As in 2 above
	12. I publish in OA journal because that is the place my peer published	As in 2 above
	13. I publish in OA journal because of its promptness in publishing	As in 2 above
	14. I publish in OA journal because of its wider coverage	As in 2 above
GREEN ROUTE Indexed/ Archiving in IR	15. I publish in OA journal they are indexed by SCOPUS and WoS only	As in 2 above.
	16. I read OA articles If it is from Malaysia Institutional Repositories	As in 2 above.
	17. I read OA articles If it is archive from international repositories	As in 2 above.
Quality Reference	18. I cite OA articles because it has high quality reference	As in 2 above.
OPEN DATA		
Support	19. I share my research data to support open scientific research for reusability	Adopt, OECD, 2015; FOSTER, 2015; Costas, et al., 2013; Mooney and Newton, 2012; Uhlir, 2012; Davies et al., 2011.
Funder's Policy	20. I share my research data as mandated by the policy of funding agencies	Adopt, OpenAIRE, 2016; and above in 16
Mis-Used Data	21. I share my research data to reduce duplication of effort from different researchers attempting to collect the same data sets	Same as in 16 above

Unclear Data Policy	22. I do not share data because my data would be misused by others	Same as in 16 above
	23. I do not share data because there is unclear information on data privacy policy	Same as in 16 above
Journal Policy	24. I share my research data as mandated by the journal policy.	Adopt, FOSTER, 2015; OpenAIRE, 2016
Loosing Opportunity	25. I do not share data because the probability of losing publication opportunity	Adopt, Kim and Stanton, 2012; OpenAIRE, 2016
OPEN PEER REVIEW		
Open Participation	26. In OPR, as an open peer reviewer I should be allowed to choose whether or not to make my participation open	Adopt, OpenAIRE 2016
Agree to Review	27. In OPR, as an open peer reviewer I always choose to make my peer review open	Same as in 23 above
	28. In OPR, as an open peer reviewer I always agree to review OPR journal	Same as in 23 above
Strong Comments	29. In OPR, as an open peer reviewer I always make strong comments in OPR	Same as in 23 above
Useful Information	30. In OPR, as an open peer reviewer I published review reports in order to provide useful information for the reader.	Same as in 23 above
Quality	31. In OPR, as an open peer reviewer I published review reports to increase the quality of reviews	Same as in 23 above
Less Criticism	32. In OPR, as an open peer reviewer making my identity open will make me less likely make strong criticisms.	Same as in 23 above
Submission	33. In OPR, as an author I am likely to submit to journals that make the reviewers' participation open.	Same as in 23 above
Invited	34. In OPR, as an author I am more likely to review if I am invited.	Same as in 23 above
Interaction	35. In OPR, as an author interaction between me and reviewers will result in better publications.	Same as in 23 above
Fairer	36. In OPR, as an author making my identity open is fairer to me as an author.	Same as in 23 above
Reviewer's Identity	37. I am less likely to agree to review for journals that make reviewer identities open.	Same as in 23 above
Commentary	38. In OPR, as an author make post –publication commentary on blogs and other social media	Same as in 23 above

Table 3-3: **Perception of Open Scholarly Communication**

DIMENSION	QUESTIONNAIRE ITEMS FROM THE SURVEY	REFERENCE
OPEN ACCESS		
More Citation	1. I believe that Open Access publication receive more citation than the non-open access publication	Adapt, Abrizah et al., 2016; Nicholas, et al., 2016; OECD, 2015; FOSTER, 2015;
Wider Coverage	2. I believe that Open Access publication have high visibility and wide dissemination of published articles	Same as in 1 above
Trustworthy	3. I believe that Open Access publication makes trustworthy research accessible in countries where journal subscriptions cannot be afforded	Same as in 1 above
High Acceptance Rate	4. I believe that Open Access publication acceptance rate for publishing is relatively high	Same as in 1 above
Copyright	5. I believe that Open Access publication create challenges of copyright and intellectual property among scholars	Same as in 1 above
Deceitful Journal	6. I believe that Open Access publication have some deceitful journals with no quality	Same as in 1 above
OPEN DATA		
Integrity	7. I believe that Open Data increases research integrity	Adept, FOSTER, 2015; OpenAIRE, 2016
Transparency	8. I believe that Open Data improves publishing transparency	As above in 6
Data Management	9. I believe that Open Data may contribute to improve data collection and management	As above in 6
Verification	10. I believe that Open Data allows verification of scientific results	As above in 6
Different Purposes	11. I believe that Open Data allows re-analysis of data for different purposes from the ones originally conceive	As above in 6
Promotion	12. I believe that Open Data promotes competition of ideas and research	As above in 6
Good Practices	13. I believe that Open Data fosters good scientific collaboration	Adopt, Kim and Stanton, 2012; OpenAIRE, 2016
Easy Collection	14. I believe that Open Data helps to undertake expensive data collection efforts easily	Adopt, Jahnke, 2012; Yoon, 2014 and above in 12
Complexity of Data Application	15. I believe that Open Data contain sensitive or copyrighted information, which has disclosure	Adept: Nature, 2015; Robert Storer (2015)
Standards	16. I believe that Open Data lack well-defined technical standards that discourage sharing and reuse of data	Adept: above in 14
Data Volumes	17. I believe that Open Data volumes of data might discourage scholars from sharing data	Adept: above in 14
Developing nations	18. I believe that Open Data practices are very hard to execute especially in developing nations	12. Adopt, Cortis et al., 2014; Jeng and Lyon, 2016; Kim and Stanton, 2016
OPEN PEER REVIEW		
Scientific Communication	19. I believe that Open peer review helps in ensuring control in scientific communication	Adopt, OpenAIRE, 2016
Ethics of Science	20. I believe that Open peer review upholds the integrity of science by making the reviewers' identities known to authors	above in 18

Greater Participation	21. I believe that Open peer review helps reviewers to play an active role in the community participation	above in 18
Few Reviewers	22. I believe that Open peer review is unsustainable because there are too few willing reviewers	above in 18
Non-Consistent	23. I believe that Open peer review timing is not consistent in some journals	above in 18
Negative Reports	24. I believe that Open peer review receives unanimous negative reviews/reports	above in 18

3.5 Population and Sample

Respondents were gathered from five research universities in Malaysia and the survey was distributed from February to August 2018. Respondents are mainly academic researchers (staff) namely: University of Malaya (UM) (2,270 with PhDs), University of Sains Malaysia (USM) (1,806 with PhDs), National University of Malaysia (UKM) (2,045 with PhDs), University of Putra Malaysia (UPM) (1,784 with PhDs) and University of Technology, Malaysia (UTM) (1,394 with PhDs) totaled 9,299 were the population for this study. These universities were selected because they have demonstrated to be research institutions in recent times especially been in top 5 universities in Malaysia closed to a decade (Nooraini and Noordini, 2017) (see Table 3-4).

Upon ethical and various institutional approvals were sought, an invitation e-mail that included the link to the survey (using google.com/forms) with brief introduction to the survey which hoped to encourage cooperation from the participants was distributed to various researchers via their institutional email by the researcher. These academic researchers comprise of Professors, Associate Professors and Senior Lecturers in various disciplines, and they were chosen under the assumption that they had completed research and were likely to be publishing in open scholarly journals.

Considering the characteristics of researchers' universities population, Convenience sampling was adopted. A convenience sampling is a method of sampling that relies on data collection from population members who are conveniently available to participate in the

study (Safahieh, 2012). In this type of sampling, no inclusion criteria identified prior to the selection of the subjects. All members' shared attributes or characteristics where everyone in the study population was invited to participate in the study (Abrizah, et al., 2016).

Table 3-4: Sample by University VS Gender VS Discipline

Variable	University	Gender		Discipline	
		Male	Female	Science	Non-Science
UM	34	25	9	26	8
USM	54	18	36	49	5
UPM	20	5	15	18	2
UKM	16	5	11	7	9
UTM	11	5	6	6	5
Total	135	58	77	106	29

Table 3-5: Survey response rate

Total population	9,299
Sample size	368-370
Oversample size	400
Clicked on the survey link	300
Incomplete survey	165
Non-completion rate	66.3%
Completed survey	135
Response rate	33.75%

Table 3-6: Sample Techniques for Research Institutions

RESEARCH INSTITUTIONS	DESIRED SAMPLE SIZE (n)	RESPONSE	PERCENT
UM	80	35	25.9
USM	80	54	40.0
UKM	80	20	14.8
UPM	80	16	11.9
UTM	80	10	7.4
TOTAL (N)	400	135	100.0

Therefore, UM = 35/135 * 100 = 0.259 (25.9%),

USM = 54/135 * 100 = 0.4 (40.0%),

UKM = 20/135 * 100 = 0.148 (14.8%),

UPM = 16/135 * 100 = 0.119 (11.9%), and

UTM = 10/135 * 100 = 0.074 (7.4%).

To satisfy the guidelines of this sampling technique and achieve the desired sample size of 80 in each of the university, a minimum of 33.75 percent response from the researchers were selected for the entire survey. This sample size is in –line with the study of Gravetter and Forzano (2009) that online survey response rate like this needs a returned and completed filled survey, with about 18 percent and this corresponds with Krejcie and Morgan' (1970) suggestion and has a response rate of 20.0 percent. Table 3-5 shows the survey response rate, while Table 3-6 shows the details of sample techniques/research institutions used in the study. After several rounds of distributions and appeals, responses were received from 400 respondents (33.7%), out of which 135 were completed and used for analysis.

3.6 Pilot Study

In order to detect weaknesses in the design of the research instrument and understandability of the questions, it was necessary to conduct a pilot study prior to the main data collection. This pilot test was carried out to ascertain the clarity of the wordings and format of the questionnaire. According to Ticehurst and Veal (2000), the purpose of pilot survey is to tests the questionnaire wording, tests questionnaire sequencing, tests questionnaire layout, gains familiarity with the respondents, tests field work arrangements (if required), estimates response rate, estimates questionnaire/interview completion time and testing analysis procedures. Cooper and Schindler (2003) indicated that the size of pilot group may range from 25 to 100 subjects.

This instrument sampled 30 academic scholars in the faculty of science, languages and linguistics as well faculty of computer science and information technology University of Malaya and each item was discussed for clarity and comprehension. The study is divided

into five (5) parts namely: Part 1: General experience about publishing practices in open science, Part 2 on Open Access was sub-divided into (3) three; 2a: level of awareness on Open Access; 2b: Practices towards Open Access Scholarly Publication and 2c: Belief on the perception of Open Access Publishing.

Part 3: Open Data was equally sub-divided into three. 3a: Level of awareness of Open Data; 3b: Practices towards Open Data and 3c: Belief on the perception of Open Data. Part 4 was on Open Peer Review and, also sub-divided into three as well. 4a: Understanding on awareness of Open Peer Review; 4b: Practices towards Open Peer Review and 4c: Belief on the perception of Open Peer Review while Part 5 was on Demographic information of the respondents.

In this study, not many changes were made after pilot study. Changes like article "a", "the", and reconstruction of sentences in the instrument were made. The statements that were altered from the questionnaire before the final distribution are listed below:

i. The demographic information such as gender, discipline on the research instrument was adjusted to address other research universities. In the pilot, only UM was piloted, in the final distribution other universities were incorporated into the questionnaire.

ii. Statement that Open Access (OA) articles are made available for all to use, reuse for free was taking back to the awareness of open access section.

iii. I read OA articles only if they are of a reputable publisher e.g., PLOS ONE.

iv. I do not read OA articles because some of the articles hide under being open access publications.

v. I cite OA articles because they receive higher impact than those of traditional journals.

vi. I do not publish in an OA journal because it requires article processing charge (APC)

vii. I do not publish in an OA journal because they are predatory.

viii.   I believe that OA publication have some deceitful journals with no quality.

ix. I believe that OA publication create challenges of copyright and intellectual property among scholars.

x. I share my research data to support open scientific research for reusability.

xi. I share my research data as mandated by the policy of funding agencies.

xii. I share my research data as mandated by the journal policy.

xiii.   I share my research data to reduce duplication of effort from different researchers attempting to collect the same datasets.

xiv.   I am aware that in OPR the author's scholarly work/ideas are subjected to scrutiny of experts and made public their comments.

xv. I am aware that in OPR, reviewer and author identities are mad open in peer review process.

xvi.   In OPR, as an open peer reviewer I always agree to review OPR journal.

xvii. In OPR, as an open peer reviewer I always make strong comments in OPR.

3.6.1   Handling of Missing Values

Missing data is a challenge in applied research because virtually all standard statistical methods assume complete information for all the variables included in the analysis. A quite few absent variations on some constructs can significantly decrease the sample size. By this, the exactness of confidence intervals is affected, statistical power wanes and the parameter estimates may be biased. Aptly, dealing with missing can be challenging as it requires a careful examination of the data to identify the type and pattern of missingness, and a clear understanding of how the different imputation methods work (Soley-Bori, 2013).

3.6.2 Procedure for Missing Value and Its Effect on the Study

The Missing Value procedure performs three primary functions according to MaryAnn (1997):

a) Examines the pattern of missing data: where the missing values are located, how extensive they are, whether pairs of variables tend to have values missing in different cases, whether data values are extreme, and whether values are missing randomly

b) Estimates means, standard deviation, covariances, and correlations using a listwise, pairwise, regression, or EM (expectation-maximization) method. The pairwise method also displays counts of pairwise complete cases and

c) Fills in (imputes) missing values with estimated values using regression or EM methods. Missing value analysis helps address several concerns caused by incomplete data. Cases with missing values that are systematically different from cases without missing values can obscure the results.

Also, missing data may reduce the precision of calculated statistics because there is less information than originally planned. Another concern is that the assumptions behind many statistical procedures are based on complete cases, and missing values can complicate the theory required. Data can be categorical or quantitative. For each variable, missing values that are not coded as system-missing must be defined as user-missing. For example, if a questionnaire item has the response Don't know coded as 5 and you want to treat it as missing, the item should have 5 coded as a user-missing value. Assumptions. Listwise and pairwise estimation depends on the assumption that the pattern of missing values does not depend on the data values. (This condition is known as missing completely at random, or MCAR.) Violation of this assumption can lead to biased

estimates. Regression and EM estimation depend on the assumption that the pattern of missing data is related to the observed data only. (This condition is called missing at random, or MAR.)

This assumption allows estimates to be adjusted using available information. Related procedures. Many procedures in SPSS allow you to use listwise or pairwise estimation. Linear Regression and Factor allow replacement of missing values by the mean values. In the SPSS Trends option, several methods are available to replace missing values in time series. To code user-missing values, choose Define Variable from the Data menu. In this study, the missing value is less than 2%, therefore, which does not affect the study. Some studies say a missing value higher than 5-10% cannot impact the result of the study (Newsom, 2017; Enders, 2010; Arbuckle, 1996). However, the effect is not felt in this case.

3.7 Data Collection

Prior to main data collection in order to determine the sample size and secure a permission to carry out this research, a visit was made to the universities. Based on the information received from the five research institutions, a total of 9,299 researchers were observed at the time of data collection in this study, following the scientific guideline recommended by Krejcie and Morgan (1970). With population of 9,299 researchers in the five research universities in Malaysia, the sample size was determined as 370, but oversampled to be 400 (confidence level=95%, margin of error =2.5%).

In the first month of instrument distribution, only 12 respondents filled the questionnaire online, in the second month, the researcher sent a reminder to these staff and got 58 respondents. The third month received 16 respondents and a reminder was equally sent, personal appealing messages and calls were made to these staff and IT personnel to

help resend those questionnaires from their various institutions on my behalf, this effort yielded 25 more responses in May, after the seventh months, the researchers was able to gather 135 respondents in all. This was used for the analysis on a simple percentage (see Figure 3.3).
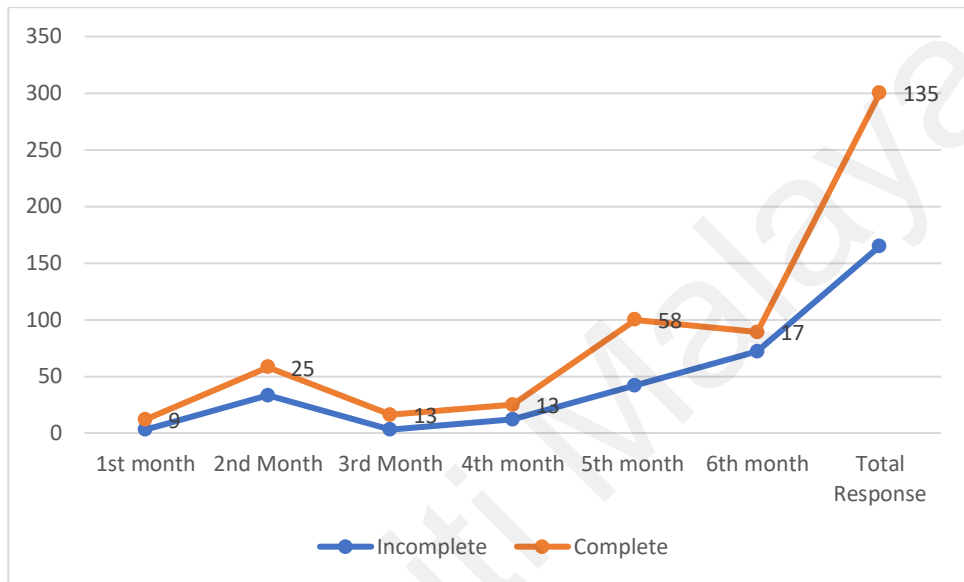
Figure 3. 3: Distribution and data collection period from February - August 2018

University of Malaya shows 34 on discipline (i.e. Science 26, Non-Science 8), University Putra Malaysia were 20 on discipline (Science 18, Non-Science 2), University Technology Malaysia were 11 on discipline (Science 6, Non-Science 5), University Sains Malaysia were 54 on discipline (Science 49, Non-Science 5), and National University of Malaysia got 16 on discipline (Science 7, Non-Science 9). Also, taking a sample of discipline by gender, it shows that discipline by gender were 59 (while Science is 46, Non-Science 13). More so, Males were 46 while females were 63 in the sample.

3.8 Validity and Reliability

This section discusses the validity and reliability of the research instrument. The type of validity – content validity, face validity, evaluation of I-CVI, S-CVI for relevancy and clarity, expert validity. Reliability and pilot test, exploratory factor analysis and reliability of research instrument.

3.8.1 Validity of the Research Instrument

Validation and reliability of the instrument was done via the content and face validations (expert validations processes), running of pilot test, data cleaning, and exploratory factor analysis. These are explained in the following sub-headings.

At present, open scholarly communication research instrument design and validation is lacking. There has not any study on instrument validation in open scholarly communication research. From the review done, virtually no research discusses validation and reliability of instrument in open scholarly communication research, but this is very available in other fields like education, psychology and some social sciences fields. For almost three decades that Straub raised the issue of whether researchers were sufficiently validating their instruments (Straub, 1989). This has created a lot of challenges and prospects for researchers in different fields. However, since, year 2002 that the word open science rings bell in scholarly arena, no single research work has centered on validating the instrument used to gather data from the respondents (either for quantitative or some open -ended qualitative studies) in open science (Budapest Open Access Initiative, 2002; Peter Suber, 2003). This study is the first in open scholarly communication. Thus, without strong validation of

instrument that will be used for data collection and upon which findings and interpretations are based, the very scholarly communication field is in trouble.

Validation of instrument in open scholarly communication will help to repeatedly measure the variables in the questionnaire using the same instrument, thereby reflecting the true value of the constructs measured in the instrument in the first place (Chua, 2016, p.298). With validated instruments, researchers can measure the same research concepts in the same procedure, allowing better-quality measurement of independent and dependent variables and, in the end helping to reduce the bewildering that troubles many scholars (Straub, 1989; p148). According to Bagozzi, attention to the instrument issues gives greater clarity to the formulation and interpretation of the research questions. Also, the final analysis gives constant comparison of theory and practice in the procedure for validating instruments outcome in a more "theoretically meaningful" constructs and variable relationships (Bagozzi, 1980).

Therefore, lack of validation in this study could raise the specter that no single finding in the study can be trusted. Hence, thorough scientific review is needed for preference in open scholarly communication instrument research design. Validity is high when research item measures the true value of the variable, any deviation from the true value is referred to as measuring error. This occurs when there is a mistake in the measurement.

Fundamentally, validity assesses the use by which an indicator is being put. Put differently, is the degree through which a test or measuring instrument measures what it tends to measure or how well a test or a measuring instrument fulfils its function (Anastasi & Urbina, 1997). However, today's validity does not lay emphases on the instrument itself but on the interpretation and measuring of the scores derived from the instrument (– an

indicator of some abstract concept is valid to the extent that it measures what it intends to measure). For instance, Ary, Jacobs and Razavieh (2002) conceptualize validity as the extent to which theory and evidence support the proposed interpretation of scores for an intended purpose.

Relatedly, McBurney & White (2007) view validity as an indication of accuracy in terms of the extent to which a research conclusion corresponds with reliability. Also, Carmines & Zeller (1987) and Oluwatayo (2012) view validity as a matter of degree to which evidence and theory support the interpretation of test scores proposed by the users of the test. In Oluwatayo (2012), validity lies on the extent to which meaningful and appropriate inferences or decisions are made on the basis of scores derived from the instrument used in a research.

Validity n this study focuses on two types face validity and content validity. These validity types were concurrently assessed by a panel of experts for about four weeks to complete.

3.8.1.1 Content Validation of the Instrument

An instrument can be deemed invalid on grounds of the content of the measurement items. An instrument valid in content is one that has drawn representative question from a universal pool (Cronbach, 1971). With representative content, the instrument will be more expressive of the true mean than one that has drawn idiosyncratic questions from set of all possible items. Any bias generated from unrepresented instrument will have a negative effect on the outcome of the entire study. Cronbach (1971) suggests a review process whereby experts in the field familiar with the content universe evaluate versions of the instrument, again and again until a form of consensus is reached. In this study, to evaluate the content validity, panels are supposed to rate the items on the instrument based on scoring

guide of relevancy and clarity. The scores are rated on relevancy scales ranging from 4 (Very Relevant), 3 (Relevant but needs minor revision), 2 (Item needs some revision) and 1 (Not Relevant) while clarity scales ranging from 4 (Very Clear), 3 (Clear, but needs minor revision), 2 (Item needs some revision) and 1 (Not Clear).

The experts were enjoined to write their comments (if need be) based on the scoring guide. If constructs are valid in this way, one can expect high correlations between measures of the same construct using different methods and low correlations between measures of constructs that are expected to differ (Campbell and Fiske, 1959). The construct validity of an instrument can be obtained through multitrait-multimethod (MTMM) methods or techniques such as Confirmatory Factor Analysis (CFA) or Principal Components Factor Analysis (PCFA) (Campbell and Fiske, 1959). The measures termed "traits" is refers to convergent validity when correlation of the same trait and varying techniques is significantly different from zero and happens to demand supplementary description (Campbell and Fiske, 1959, p.82). However, the evidence that is higher than correlations of that trait and different traits using both same and different techniques shows that the measure has discriminant validity. Table 3-7 and Table 3-8 below showed the evaluation of I-CVI of items on Open scholarly communication for relevancy and clarity (See Appendix A for more details). Content validity focuses on the extent to which the instrument of measurement shows evidence of fairly and comprehensive coverage of the domain of items that it purports to cover. This part is analyzed using 2 techniques:

1. Individual item level content validity index method I-CVI, and

2. Total scale content validity index method S-CVI

Coher Manion and Morrison (2008) define content validity as a form of validity that ensures that the elements of the main issue to be covered in a research are both a fair

representation of the wider issue under investigation and that the elements chosen for the research sample are addressed.

Table 3-7: Evaluation of I-CVI of items on Open scholarly communication general experience about Publishing Practices based on Relevancy

Item	Panel1	Panel2	Panel3	Panel4 `	Panel5	Panels in agreement	I-CVI	Interpretation
1	4	4	4	4	2	4	0.80	Need for revision
2	4	4	4	4	3	4	0.80	Need for revision
3	3	3	4	4	2	2	0.40	Need for revision
4	3	3	4	4	2	2	0.40	Need for revision
5	4	4	4	4	4	5	1.00	Relevant
6	4	4	4	4	4	5	1.00	Relevant
7	4	4	4	4	3	4	0.80 0.74	Need for revision Relevancy

Table 3-8: Evaluation of I-CVI of items on open scholarly communication general experience about Publishing Practices based on Clarity

Item	Panel1	Panel2	Panel3	Panel4 `	Panel5	Panels in Clarity (Rating 3 or 4)	Panels in Unclear (Rating 1 or 2)	I-CVI	Interpretation
1	4	4	4	4	2	4	1	0.80	Need for revision
2	4	4	4	4	3	5	0	1.00	Appropriate
3	3	3	4	4	1	4	1	0.80	Need for revision
4	3	3	4	4	1	4	1	0.80	Need for revision
5	4	4	4	4	4	5	0	1.00	Appropriate
6	4	4	4	4	4	5	0	1.00	Appropriate
7	4	4	4	4	2	4	1	0.80 0.89	Need for revision Clarity

To calculate an item-level Content Validity Index (I-CVI), Panels were asked to rate the relevance of each item that is on 4-point scale. The scores are rated on relevancy scales ranging from 4 (Very Relevant), 3 (Relevant but needs minor revision), 2 (Item needs some revision) and 1 (Not Relevant) while clarity scales ranging from 4 (Very Clear), 3 (Clear, but needs minor revision), 2 (Item needs some revision) and 1 (Not Clear). Schilling, Dixon and Knafi, et al (2007). However, for every item, the I-CVI is measured as the number of panels giving a rating of either 3 or 4, divided by the proportion of the panels in agreement about relevance of the question and scale giving.

In his work, determination and quantification of content validity, Lynn (1986) provided widely acceptable way of calculating I-CVI, -if there are 5 or fewer panels, the I-CVI must be 1.00 -that is, all panels must unilaterally agree that the item is content valid. However, if the panels are more than five, there can be reasonable amount of disagreement, for instance, if the panels are 6, the I-CVI must be at least 0.83 showing a disagreement or better agreement among the panels (Davis, 1992 p.197). In this study, a conservation value of >= .74 are used for relevancy and clarity. This is correlated with Paul, et al, (2016), and this study reworded items that are below .80 based on the panel's comments. Eleven items are remarked as relevance but need some revisions, seven items need some revision, three items are rated not relevant and seven not clear while the rest 64 items are rated very relevant and very clear. The overall analysis of the items initiates 11 items are that are rated 0.80 for relevancy and 10 items are rated below 0.80 for clarity. A total of 16 items are reworded or revised for clarity and none was eliminated. Table 3-9 described the analysis of the S-CVI for inter-ratter agreement and evaluation of S-CVI /Average.

Table 3-9: Scale-level content validity index (S-CVI)

Item	Experts in agreement	CVI	Item	Experts in agreement	CVI	Item	Experts in agreement	CVI
1	4	0.8	32	5	1	63	5	1
2	5	1	33	4	0.8	64	4	0.8
3	3	0.6	34	5	1	65	4	0.8
4	3	0.6	35	5	1	66	5	1
5	5	1	36	4	0.8	67	4	0.8
6	5	1	37	5	1	68	3	0.6
7	4	1	38	4	0.8	69	5	1
8	5	1	39	4	0.8	70	4	0.8
9	5	1	40	5	1	71	5	1
10	5	1	41	5	1	72	5	1
11	5	1	42	5	1	73	4	0.8
12	5	1	43	5	1	74	5	1
13	5	1	44	4	0.8	75	5	1
14	5	1	45	4	0.8	76	5	1
15	4	0.8	46	5	1	77	5	1
16	4	0.8	47	5	1	78	5	1
17	4	0.8	48	5	1	79	5	1
18	5	1	49	5	1	80	5	1
19	4	0.8	50	5	1	81	4	0.8
20	4	0.8	51	4	0.8	82	5	1
21	4	0.8	52	4	0.8	83	5	1
22	4	0.8	53	4	0.8	84	5	1
23	5	1	54	5	1	85	5	1
24	5	1	55	5	1	86	5	1
25	5	1	56	5	1	87	5	1
26	5	1	57	5	1	88	5	1
27	5	1	58	5	1	89	5	1
28	5	1	59	4	0.8	90	5	1
29	5	1	60	5	1	91	5	1
30	5	1	61	5	1			
31	5	1	62	5	1		S-CVI/AVE	0.95

Measuring a scale's content validity (S-CVI) is a crucial aspect of improving the construct validity of an instrument (Haynes, Richard & Kubany, 1995). In line with Polit, Beck & Owen (2007) studies, the S-CVI (Scale-level Content Index) of this study is therefore evaluated. In their studies, the value of S-CVI should be greater than .80 or 80% agreement of the experts. Therefore, in this study instrument, the S-CVI is 0.95 and considered achieved "high-level agreement" which is acceptable and consistent.

3.8.1.2 Face Validation of the Instrument and Reviewing Processes

The instrument was sent to identify panel of experts in scholarly communication for validation. The expert eligibility is set based on their awareness, practices and perception in scholarly communication of published works (especially those who are experts in open scholarly communication, actively publishing in open access, advocating open data and have experienced in open peer review). Their fields and qualifications were included in Table 3-11 on the assumption that they had research experience in scholarly communication and are academic experts. Their inputs, suggestions and comments were subsequently incorporated in the final draft of the instrument before the main survey was carried out. Below Tables 3-10 and Table 3-11 described the items and constructs for content validity and expert panels, respectively.

Table 3-10: Items and construct for content validity

Name of Construct	Total Items	Number of Items
Experience about publishing practices	7	1-7
Open Access – Awareness	4	8-11
Open Access– Practices	15	12-26
Open Access– Perception	5	27-32
Open Data- Awareness	5	32-37
Open Data- Practices	7	38-44
Open Data – Perception	12	45-56
Open Peer Review – Awareness	5	57-61
Open Peer Review – Practices	13	62-74
Open Peer Review – Perception	6	75-80
Demographic Information	9	81-89

Table 3-11: Panel of Experts

Panel	Field of Expert	Qualification/Position in Academia
Academician	Software Engineering	Associate Professor
Academician	Information Systems	Senior Lecturer
Academician	Architecture and Built Environment	Senior Lecturer
Academician	Library and Information Science	Senior Lecturer
Academician	Strategic Planning	Senior Lecturer

An invitation e-mail was sent to the panels to seek their consent to participate in the validation process. The instrument and assessment score guide were sent upon obtaining their consent and agreement. The face validity criteria were provided based on the suggestion of Oluwatayo (2012). They include: 1. Appropriateness of grammar, 2. The clarity and unambiguity of items, 3. The correct spelling of words, 4. The correct structuring of sentences, 5. Appropriateness of font size, 6. Structure and format, 7. Appropriateness of difficulty level for respondents, and 8. Adequacy of instruction on the instrument. They are required to read and understand the statement in order to agree or disagree with the content in the instrument based on the criteria and give comments on where needs improvements.

Table 3-12: Reliability of the Pilot Instrument

Reliability Statistics	
Cronbach's Alpha	No of Items
.811	89

3.8.1.3 Exploratory Factor Analysis (EFA)

Factor analysis is often used to assess validity of the constructs, removing unloading variables in the instrument. However, before conducting factor analysis it required to determine suitability of data for factor analysis. In the present study, the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity were calculated to examine appropriateness of the data for analysis and measure of sampling adequacy.

The KMO is an important initial statistic in the factor analysis process (George and Mallery, 2005) that provides an index (between 0.0 and 1.0) to measure the appropriateness of data for factor analysis. The highest value between (0.5 and 1.0) indicate factor analysis

is appropriate, the value below 0.5 imply that factor analysis may not be appropriate. (Malhotra, 2004).

Once KMO and Bartlett's test of sphericity showed the appropriateness of the data for factor analysis, a series of factors analysis in the shape of Principle Component Analysis was used to test for validity of the measurements. According to Hair, (2006), factors analysis is an interdependence method that is mainly used to define the underlying structure among the variables in the analysis. It extracts the factors based upon the correlations among items to ascertain whether the questionnaire measures the construct it is supposed to be measuring.

Using IBM Statistical Package for Social Science (SPSS) version 24, this study used Principle Component Analysis PCA) with Varimax rotation techniques. The PCA is one of the most used methods by the researchers as an exploratory technique to extract the structure of a set of research variable (Tabachinck and Fidell, 2007). Factor analysis helps to analyze scale items of each construct in order to ensure their validity, to reduce the number of interrelated variables and produce smaller number uncorrelated variable for use in subsequent multivariate analysis (Malhotra, 2004) and to meet the statistical assumptions of the research framework (Zikmund, 2003). In factor analysis, the simple correlations between the variables and the factors is called factor loading (Malhotra, 2004 p.561).

Factor loading greater than 0.3 are considered to meet the minimal level; loading 0.4 are considered more important, and if greater than or 0.5, they are considered as practically significant, and the larger the size of the loading the more important the loading explaining the factor matrix (Hair et al., 2006). And so, items with less than 0.4 loadings were removed in this study.

Table 3-13: Component Matrix and Factor Loading of Publishing Practices Experience of

Researchers

Constructs	Coding	Items	Component Loading
Publishing Practices Experience (PPE)	HOUOPR	How often you open peer reviewed in Journal	.830
	HOUMDO	How often you Make Data open	.771
	MDOB4	Makes Data Open Before	.729
	OPRB4	Open Peer Review Before	.681
	POAB4	Published in OA Journal B4	.862
	HOPOAJ	How often you publish in OA Journal	.636
	SIRB4	Submitted in IR Before	.910
Kaiser-Meyer-Olkin Measure of Sampling Adequacy			.505
Bartlett's Test of Sphericity Approx. Chi-Square			69.350
Df			21.000
Cronbach's Alpha			.790
Sig.			.000
Variance Explained			77.200
Eigenvalues			2.770

As shown in the Table 3-13, component with eigenvalues of 2.770 exceeding the recommended value of 1 was extracted. The component explains 77.2% of the variance. Since the evaluation of Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.505 in line with the study of George and Mallery, (2005) and Bartlett's Test of Sphericity reaches statistical significance the factorability of the correlation matrix is supported. This shows that the appropriateness of factor analysis is adequately supported.

Constructs	Items coding	Awareness Loading	Practices Loading	Perception Loading
		Component		
Awareness of Open Access Scholarly Publishing (AWOA)	Acc	.490		
	Foc	.703		
	Timly	.531		
	FullText	.723		
Practices of Open Access Scholarly Publishing (PRACOA)	Promptpub		.760	
	PeerPublish		.719	
	WiderCover		.698	
	HigherAccept		.607	
	Encofunder		.560	
	LowQuality2		.618	
	LowQuality		.606	
	PeerReview		.537	
	Trust		.688	
	ArIR		.430	
	QuaRef		.498	
Perception of Open Access Scholarly Publishing (PEROA)	MoreCitation			-.788
	Highvis			-.763
	Noquality			-.749
	AcceptHigh			.434
	MTRUST			.442

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.130
Bartlett's Test of Sphericity	Approx. Chi-Square	563.390
	Df	351.000
Sign		.000
Eigenvalues		11.800
Variance Explained		43.600

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 5 iterations.

Principle Component Analysis was employed to identify factors underlying direct determinant the readiness of scholars in terms of Cognitive, Conative and Affective. The total of 27 items assessing the three determinants (constructs) were subjected to factor analysis with Varimax rotation approach. However, three of the result for perception of Open Access Publishing loading in a negative form but were very high and so the researcer retained the

items for further exploits in CFA, if otherwise, it shall be removed completely. The Varimax rotation method is recommended by Hair et al., (2006) because it is powerful enough to obtain orthogonal factors. Table 3-14 represents the result of the factor analysis.

Table 3-15: Component Matrixª and Factor Loading of Cognitive (Awareness), Conative (Practices) and Affective (Perception) of Open Data

| Constructs | Component | | | |
	Items coding	Awareness Loading	Practices Loading	Perception Loading
Awareness of Open Data (AWOD)	UNU	.739		
	SA	.736		
	OFA	.630		
	PROTECT	.549		
	WR	.481		
Practices of Open Data (PRACOD)	IDSBM		.801	
	LP		.732	
	UNCLEAR		.711	
Perception of Open Data (PEROD)	DP			.906
	CTDM			.877
	UED			.886
	TSP			.880
	Verification			.850
	FC			.767
	Competition			.734
	VOD			.723
	IINT			.690
	WDT			.635
	SR			.603
	PVH			.556
Kaiser-Meyer-Olkin Measure of Sampling Adequacy. .385				
Bartlett's Test of Sphericity	Approx. Chi-Square 650.275			
	Df 276.000			

Table 3-15: Component Matrix^a and Factor Loading of Cognitive (Awareness), Conative (Practices) and Affective (Perception) of Open Data

Constructs	Component			
	Items coding	Awareness Loading	Practices Loading	Perception Loading
Sign .000 Eigenvalues 14.700 Variance Explained 60.100				

Extraction Method: Principle Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 5 iterations.

The interpretation of the result shown in Table 3-15 above indicates that items used to measure awareness of open data (AWOD), practices of open data (PRACOD) and perception of open data (PEROD) are loading on to three different components. The results of factor analysis (PCA) for Awareness, Practices and Perception of Open Data revealed 5 iteration components account for 60.1 % of the total variance. Kaiser-Meyer-Olkin (KMO) was 0.385 and Bartlett's Test of Sphericity was significant for factorability of the correlation matrix is equally supported. The inspection of the extracted factors and rotated solution showed that items of the factors of awareness, practices and perception of open data strongly load on their own relevant factors. That means the result and the scale of the analysis is very good and appropriate for factor analysis.

Table 3-16: Component Matrix^a and Factor Loading of Awareness, Practices and Perception of Open Peer Review

Constructs	Items coding	Component Awareness Loading	Practices Loading	Perception Loading
Awareness of Open Peer Review (AWOPR)	EDA	.744		
	DER	.694		
	OANNOY	.483		
Practices of Open Peer Review (PRACOPR)	RIIV		.827	
	MLS		.784	
	IQ		.748	
	UI		.712	
	BP		.707	
	SJ		.683	
	FAIRER		.648	
	MPP		.592	
	AC		.501	
	ATC		.418	
	LLR		.415	
Perception of Open Peer Review (PERCOPR)	US			.845
	FC			.836
	NR			.818
	CP			.803
	NC			.763
	UIIT			.663

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.
.324

Approx. Chi-Square
560.951
Bartlett's Test of Sphericity   Df
276.000
Sign
.000
Eigenvalues
11.200
Variance Explained
52.500

Extraction Method: Principle Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 10 iterations.

The interpretation of the result shown in Table 3-16 above indicates that items used to measure awareness of open peer review (AWOPR), practices of open peer review (PRACOPR) and perception of open peer review (PEROPR) are loading on to three different

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components. The results of factor analysis (PCA) for Awareness, Practices and Perception of Open Peer Review showed 10 iteration components account for 52.5 % of the total variance. Kaiser-Meyer-Olkin (KMO) was 0.324 and Bartlett's Test of Sphericity was significant for factorability of the correlation matrix is equally supported. The eigenvalue is also greater 1.0. The inspection of the extracted factors and rotated solution showed that items of the factors of awareness, practices and perception of open peer review strongly load on their own relevant factors. That means the result and the scale of the analysis is very good and appropriate for factor analysis.

Table 3-17: Evaluation of the expert Validity

CRITERIA	EXP1	EXP2	EXP3	EXP4	EXP5	INTERPRETATION
1. Appropriateness of Grammar	Disagree	Agree	Agree	Agree	Disagree	Need for revision
2. The clarity and unambiguity of items	Disagree	Agree	Agree	Agree	Disagree	Need for revision
3. The correct spelling of words	Agree	Agree	Agree	Agree	Agree	Appropriate
4. The correct structuring of sentences	Disagree	Agree	Agree	Agree	Disagree	Need for revision
5. Appropriateness of font size	Agree	Agree	Agree	Agree	Agree	Appropriate
6. Structure and format	Agree	Disagree	Agree	Agree	Agree	Need for revision
7. Appropriateness of difficulty level for respondents	Agree	Agree	Agree	Agree	Agree	Appropriate
8. Adequacy of instruction on the instrument	Disagree	Agree	Agree	Agree	Agree	Need for revision

3.8.1.4 Experts Validation Processes of the Instrument

This section discusses the analysis and the outcome of the validation processes. The experts' validity evaluation analysis is reported in Table 3-17 with the description of the 8 criteria in the assessment.

From the comments of the experts, there are five (5) criteria needed revision and improvement. The appropriateness of grammar received two disagreements with revisions in item 3, 4 and 68 for minor grammatical errors. The clarity and unambiguity of items received two disagreements in item 3, 4 and 68 with need for some revisions as a comment. The correct structuring of sentences received a disagreement and corrected items are 23, 59, 64 and 70. While Appropriateness of difficulty level for respondents received an agreement from all the experts but one pointed on items 1, 3 and 4 for easy comprehension. Criteria 8 in Table 3-17 (adequacy of instruction on the instrument) received a disagreement with a comment on "the first page needs little correction. The subtitle instructions look heeding. Bold though italics in the subtitle with OPR and be sure OPR is first describe. Looks confusing and demographic information issues". The overall comments on the appearance of the instrument was good and can be administered if the observation raised on the instrument are attended to. The instrument then undergone a revision exercise, according to the recommendations (see Table 3-17 for changes in the questionnaire and interpretations; sub-section 3.6.1 shows the changes made).

3.8.2 Reliability of the Research Instrument

Essentially, reliability concerns the extent to which an experiment, test, or any measuring procedure yields the same results on repeated trials (Carmines & Zeller, 1987,

p11). Reliability also refers to random error in measurement. It indicates the accuracy or precision of the measuring instrument (Chua, 2016). The degree to which results of a study is consistent over a repeated measurement. Any measuring instrument is relatively reliable if it is minimally affected by chance disturbances (i.e., random measurement error). Reliability of a questionnaire is usually carried out using a pilot test. The pilot test seeks to answer the question, does the questionnaire consistently measure what it means? The use of reliability test (test-retest, split-half, alternate form, internal consistency) depends on the nature of data (nominal, ordinal, interval/ratio). For example, to assess reliability of questions measured on the interval/ratio scale, internal consistency is appropriate to use, and to assess reliability of knowledge questions, test-re-test or split-half correlation value is appropriate (Chua, 2016, p339).

Reliability is established using a pilot test by collecting data from 20 to 30 respondents not included in the sample (Chua, 2016, p341). Data collected from pilot test is analyzed using SPSS. SPSS provides 2 key pieces of information. These are "correlation matrix" and "view alpha if item deleted" column. However, one should be careful to make sure that items/statements that have 0s and 1s and negatives are eliminated. Then view "alpha if item deleted" column to determine if alpha can be raised by deletion of items. Delete items that substantially improve reliability. To preserve content, delete not more than 20% of the items, the reliability coefficient (alpha) or Cronbach-Alpha can range from 0 to 1 with 0 representing an instrument with full of error and 1 representing total absence of error. Cronbach-Alpha is used for estimating the internal consistency of an instrument in which the items are not scored dichotomously (such as Yes/No, True/False, Agree/Disagree). It is also used when instrument for collecting data have items that are scored on a range of values (for example, Not at all

aware=1, Slight Aware=2, Somewhat Aware=3, Moderately Aware=4, Extremely Aware=5) as it takes into consideration the variance of each item. Whiston (2005) emphasized that if scoring items are not dichotomous, the appropriate method for calculating reliability is Cronbach-Alpha. A reliability coefficient (alpha) of .70 or higher is considered accepted reliability (Chua, 2016; Nunnally, 1994). In this study, the Cronbach Alpha is 0.811 (Table 3-12). This means the instrument is reliable and can be replicate elsewhere.

3.9 Data Analysis and Technique

The data analysis techniques include two main components which are descriptive data analysis to answer the following RQ1 to RQ 3 and inferential statistics analysis (parametric test) to answer RQ4 as shown in Table 3-18. An independent sample t-test was adopted for the hypothesis testing. As a rule of thumb, when the dependent variable's level of measurement is nominal (i.e., categorical) or ordinal, then parametric test is desirable. In this study, there are 2 groups each for gender, disciplines, and type of researchers. Therefore, to meet the assumption of independent sample t-test which assesses for differences in a continuous dependent variable between two groups (Chua, 2016). Independent Samples t-test compares the means between two unrelated groups on the same continuous, dependent variable (Thomas, Paula, Scott, and Lu, 2002). For example, using independent sample t-test to determine if there are statistically significant differences between gender and Malaysia academic researchers' scholarly communication (i.e., DV in this case is "Malaysia academic researchers scholarly communication" and IV "Gender" – which has two groups: male and female) same things applicable to discipline – science and

non-sciences while types of researchers are grouped into early career researchers and established researchers.

Table 3.18: Research Questions and Research Hypotheses

RQ1: To what extent are Malaysian academic researchers aware of open scholarly communication as regards to open access, open data and open peer review?

RQ2: What are the practices exhibited by Malaysian academic researchers towards Open Access, Open Data and Open Peer Review?

RQ3: To what extent do Malaysian academic researchers perceive the capability and ability of Open Access, Open Data and Open Peer Review for open scholarly communication?

RQ4: Is there a significant difference between gender, types of researchers, and discipline among Malaysian academic researchers and readiness of open scholarly communication?

Hypotheses for RQ4:

H1: There is a significant difference between gender of Malaysian academic researchers and their readiness for open scholarly communication (Open Access, Open Data and Open Peer Review)

H1a: There is a significant difference between gender of Malaysian academic researchers and cognitive readiness for Open Access.

H1b: There is a significant difference between gender of Malaysian academic researchers and conative readiness for Open Access,

H1c: There is a significant difference between gender of Malaysian academic researchers and affective readiness for Open Access.

H1d: There is a significant difference between gender of Malaysian academic researchers and cognitive readiness for Open Data.

H1e: There is a significant difference between gender of Malaysian academic researchers and conative readiness for Open Data.

H1f: There is a significant difference between gender of Malaysian academic researchers and affective readiness for Open Data.

H1g: There is a significant difference between gender of Malaysian academic researchers and cognitive readiness for Open Peer Review

H1h: There is a significant difference between gender of Malaysian academic researchers and conative readiness for Open Peer Review

H1i: There is a significant difference between gender of Malaysian academic researchers and affective readiness for open scholarly communication Open Peer Review

H2: There is a significant difference between discipline of Malaysian academic researchers and their readiness for open scholarly communication (Open Access, Open Data and Open Peer Review)

H2a: There is a significant difference between discipline of Malaysian academic researchers and cognitive readiness for Open Access.

H2b: There is a significant difference between discipline of Malaysian academic researchers and conative readiness for Open Access,

H2c: There is a significant difference between discipline of Malaysian academic researchers and affective readiness for Open Access.

H2d: There is a significant difference between discipline of Malaysian academic researchers and cognitive readiness for Open Data.

H2e: There is a significant difference between discipline of Malaysian academic researchers and conative readiness for Open Data.

H2f: There is a significant difference between discipline of Malaysian academic researchers and affective readiness for Open Data.

H2g: There is a significant difference between discipline of Malaysian academic researchers and cognitive readiness for Open Peer Review

H2h: There is a significant difference between discipline of Malaysian academic researchers and conative readiness for Open Peer Review

H2i: There is a significant difference between discipline of Malaysian academic researchers and affective readiness for open scholarly communication Open Peer Review

H3: There is a significant difference between types of Malaysian academic researchers and their readiness for open scholarly communication (Open Access, Open Data and Open Peer Review)

H3a: There is a significant difference between types of Malaysian academic researchers and cognitive readiness for open scholarly communication Open Access.

H3b: There is a significant difference between types of Malaysian academic researchers and conative readiness for Open Access.

H3c: There is a significant difference between types of Malaysian academic researchers and affective readiness for Open Access.

H3d: There is a significant difference between types of Malaysian academic researchers and cognitive readiness for Open Data.

H3e: There is a significant difference between types of Malaysian academic researchers and conative readiness for Open Data.

H3f: There is a significant difference between types of Malaysian academic researchers and affective readiness for Open Data.

H3g: There is a significant difference between types of Malaysian academic researchers and cognitive readiness for Open Peer Review

H3h: There is a significant difference between types of Malaysian academic researchers and conative readiness for Open Peer Review

H3i: There is a significant difference between types of Malaysian academic researchers and affective readiness for open scholarly communication Open Peer Review

Assumptions of Independent Samples T-Test for the hypothesis are:

i. The dependent variable should be measured at the ordinal or continuous level (interval or ratio). Ordinal level includes Likert scales (e.g. 5-point scale from "extremely aware" to "not at all aware") amongst other ways of ranking categories in this study.

ii. The independent variables should consist of two categorical independent groups. (e.g., ECRs (<30-40 Years), ERs (>= 41 years)); Disciplines (2 groups (Science and Non- Science) in this study.

iii. There should be independence of observations, which means that there is no relationship between the observation in each group or between groups themselves

(e.g., there must be different participants in each group with no participant being in more than one group: - UM, USM, UTM, UKM and UPM).

iv.   There should be no significant outliers – this can have negative effect on the independent t-test, reducing validity of the results.

v.   The DV should be normally distributed for each group of independent variables.

vi.   There is need for the homogeneity of variances – using Levene's test of homogeneity of variance (i.e., p>.05).

3.10 Measuring Readiness for Open Scholarly Communication

To measure the readiness of the scholars, the researcher adopts Vagias (2006), to measure the cognitive (awareness), conative (practices), affective (perception) readiness, mean scores and standard deviation was calculated while grouping them based on extremely ready or not at all ready as shown in Table 3.19.

Table 3-19: Readiness of Scholars toward Open Scholarly Communication

Scales	Ratings	Degree of Awareness	Degree of Practices	Degree of Perception	Readiness
1	1.0-1.8	Not at all Aware	Never	Very untrue of me	Not at all Ready
2	1.9-2.6	Slightly Aware	Almost Never	Untrue of me	Rarely Ready
3	2.7-3.4	Somewhat Aware	Sometimes	Somewhat true of me	Somewhat Ready
4	3.5-4.2	Moderately Aware	Almost Every time	True of me	Moderately Ready
5	4.3-5.0	Extremely Aware	Frequently	Very true of me	Extremely Ready
Legend: 5 –(>4.6-5.0) Extremely Ready (ER), 4 –(>3.7-4.5) Moderately Ready (MR), 3 –(>2.8-3.6) Somewhat Ready (SR) 2 –(>1.9-2.7) Rarely Ready (RR), 1 –(1.0-1.8) Not at all Ready (NaaR)					

3.11 Summary

Open Scholarly Communication is a process through which scholars openly exchange information with each other and publishing their findings so that they are available to the wider academic community and beyond (Nielson, 2011; Friesike, Widenmayer, Gassmann, et al. 2015). Validity and reliability of such instrument that will be available for all and sundry must receive scholarly acceptance through (I-CVI and S-CVI) validity and reliability coefficient (alpha) test. Validity and reliability are words that have definite constructive implications in gaining approval in a scientific research. For instrument to be characterized as valid and reliable, it is to be in an agreement with scholarly procedures. The same applies to the type of test, experiment or measuring method used. When an instrument is valid and reliable, it means it has passed through a long way of gaining acceptance scientifically. This instrument was developed with a comprehensive reading in the literature of open scholarly communication, and understanding theory of readiness, Blooms and Krathwohl's taxonomies and models. The validity and reliability of this study is essential to the open scholarly communication awareness, practices, and perception, especially to academic researchers in Malaysia where practices are not profound. The instrument and the outcomes are considered having a good content validity for both the I-CVI and S-CVI and reliability coefficient. The next chapter will present the analysis of the cognitive readiness of open scholarly communication.

CHAPTER 4: COGNITIVE READINESS OF OPEN SCHOLARLY COMMUNICATION

4.1 Introduction

This chapter presents the demographic information of the respondents and answers the Research Question 1 i.e. "To what extent are Malaysian academic researchers' aware of open scholarly communication as regards to Open Access, Open Data and Open Peer Review?". It summarizes its reports based on the findings obtained from the study and gauged the degree of understanding of open scholarly communication reflecting the cognitive readiness based on the mean score, while concluding the chapter.

4.2 Demographics Information of the Respondents

This section analyses the demographic characteristics of the respondents in terms of gender, research experience, academic position, and academic discipline. Table 4-1 describes the study demographics from 135 responses of the questionnaire. Five research universities were involved in this study and responses show the most percentage coming from USM (54, 40.0%) followed by UM (34, 25.9%). There were 50 (37.0%) male respondents and 85 (63.0%) female respondents. Senior lecturers and other cadres were 106 (78.5%) while Professors and Associate Professors were only 29 (21.5%). The age of the respondents and the number of years in academia are used to identify whether they are early career researchers (ECRs) or established researchers (ERs). A total of 62 (45.9%) of the respondents were between <= 30-40 years, while 73 (54.1%) of the respondents were 41 years and above. A total of 75 (55.6%) respondents had 11 years and above working experience in academia as compared to 60 (44.4%) who had between 1 and 10 years.

According to the working definition of Malaysian ECRs, they are "researchers between 30-39 years old, who are not more than ten years from receiving their doctorates operating without tenure" (Abrizah, Shah and Nicholas 2016, p.76). Established researchers in this study are researchers in their prime who have developed a level of independence or those that are leading in their research areas. These are researchers aged between 41 years and above and have experience more than 10 years on the academic job – as defined by the Vitae European Researchers Framework (2016, p.5.). Given these definitions, 62 (45.9%) respondents were grouped as early career researchers (ECRs) and another 73 (54.1%) were established researchers (ERs).

Regarding academic discipline, Science researchers were 94 (69.6%), while 41(30.4%) were from Non-Science disciplines i.e., either social sciences, arts and humanities. The respondents were asked to indicate the number of publications they had in the last 5 years. Seventy-five (56.4%) reported more than 7 publications, while 58 (43.6%) reported less than or equal to 6 publications, reporting an average of publications of 28 while the highest number of publications a respondent had was 38.

Table 4-1: Demographic Characteristics of the Sample (N=135)

Demographics		Number	Percentage
Gender	Female	85	63.0%
	Male	50	37.0%
Research experience	Early career researcher	62	45.9.%
	Established researcher	73	54.1%
Academic Position	Senior Lecturers	106	78.5%
	Professors & Associate Professors	29	21.5%
Academic discipline	Sciences	94	69.6%
	Non-sciences	41	30.4%
University	University of Malaya (UM)	34	25.9%
	University of Science Malaysia (USM)	54	40.0%
	National University of Malaysia UKM	20	14.8%
	University of Putra Malaysia (UPM)	16	11.9%
	University of Technology Malaysia (UTM)	11	7.4%

4.2 Malaysian Academic Researchers' Cognitive Readiness of Open Scholarly Communication

Cognitive readiness of the Malaysian researchers is gauged through their awareness i.e., their knowledge and understanding on open scholarly communication as regards to Open Access, Open Data and Open Peer Review is happening or exists. Mean values for the awareness statements were calculated based on numeric values of the scale item with "not at all aware" being 1 and "extremely aware" being 5.

4.2.1 On the Awareness of Open Access

This section reports the findings on Malaysia researchers' awareness of Open Access. Figure 4-1 presents the descriptive analysis of four item statements which is aimed at providing detail understanding into respondents' awareness of Open Access. Considering the mean responses that reflect researchers' awareness of Open Access (Figure 4-1), currently there is a reasonably positive (extremely aware/moderately aware) and high level ($M > 4.0$) of awareness that:

a) Open access provides unrestricted online access to full text of scientific articles (M=4.26; $S.D$= 1. 058; 74 (54.8%) extremely aware; 36 (26.7%) moderately aware)

b) Open access provides free of cost access to peer review scientific content (M= 4.2; $S.D$ =1.094; 69 (51.1%) extremely aware; 39 (28.9%) moderately aware)

However, the following statements on Open Access received a much lower mean value of level of awareness:

(a) Open access provides access to research output with limited copyright and licensing (M= 3.65; $S.D$ =1.177; 49 (36.3%) moderately aware).

(b) Open access makes available the article immediately at the time of publication (*M*= 3.95; *S.D* =1.222; 55 (40.7%) extremely aware).

Nevertheless, there is a concern for those researchers who were not aware of Open Access. The unawareness or rather lack of awareness of these researchers may possibly be as a result of the journals that they submit to are not Open Access journals (e.g., gold, platinum or bronze open access journals) or do not exercise open access options, such as those offered by hybrid journals, and these scholars may have never been involved in open access publishing. For example, the statement that "I am aware that open access provides access to research output with limited copyright and licensing" received about 21 percent (n=28) of indecision levels, slight misunderstanding 11.1 percent (n=15) and those who are not aware at all received about 7 percent (n=9) of understanding probably because the researchers found it difficult to agree with the statement "limited copyright and licensing."
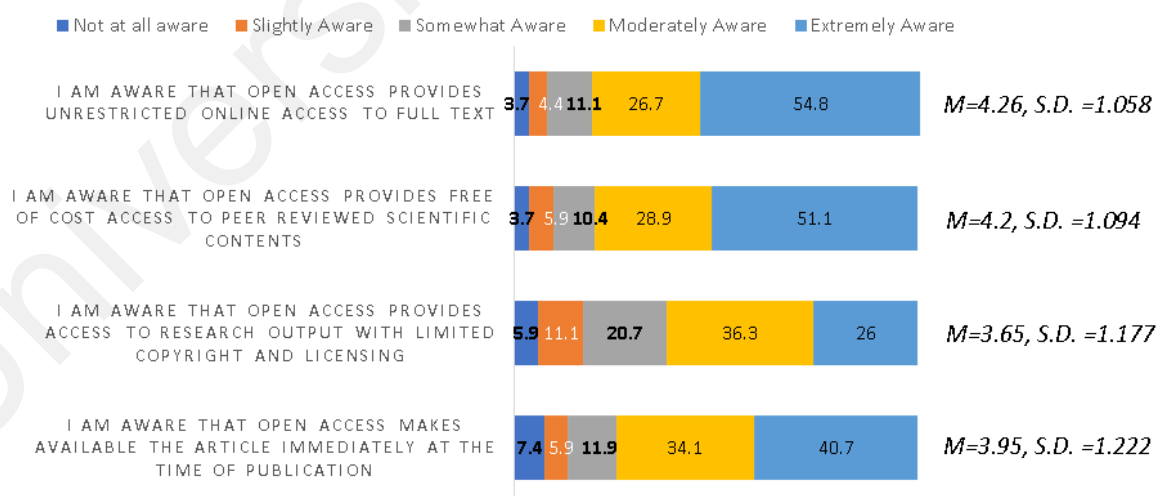
Note: 1 – "Not at all aware", 2 – "Slightly Aware", 3 – "Somewhat Aware", 4 – "Moderately Aware" and 5 – "Extremely Aware".

Figure 4.1 Awareness of Open Access, according to Malaysian Researchers

(N=135)

4.2.2   On the Awareness of Open Data

This section examines the Malaysian researchers' awareness of Open Data. It is important to be aware that the concept of open data speaks directly to basic questions of ownership, responsibility, and control (Wouters and Haak 2017). Open Data awareness in this study covers the understanding on awareness that open data are freely accessible; can be shared alike; can be used, reused and redistributed; protects against rights in science; and can be used by anyone without restriction.

Figure 4.2 presents the descriptive analysis of five item statements which is aimed at providing detail understanding into the awareness of researchers towards Open Data. Considering the mean responses that reflect researchers' awareness of open data sharing, currently there is a reasonably positive great extent of awareness that:

i.   Open data are online, free of cost, accessible data (M=3.76, $S.D.$ =1.172; 23(30.4%) extremely aware; 26(35.6%) moderately aware).

ii. Open data can be shared alike through download, copy, edit etc. (M= 3.60, $S.D.$ =1.254; 20(26.7%) extremely aware; 25(34.1%) moderately aware)

However, in terms of awareness that Open Data can be used, reused and redistributed provided that the data source is attributed (M= 3.33, $S.D.$ =1.234); awareness that open data protects against right in science and research (M=3.30, $S.D.$ =1.256); and awareness that Open Data are data that can be used by anyone without technical or legal restrictions (M= 3.25, $S.D.$=1.170) garnered less than 10 percent of extreme awareness respectively. From the findings, it is concluded that although Open Data awareness among Malaysian researchers is still low, a substantial portion of Malaysian researchers are still not aware or have limited awareness of Open Data and the potential benefits, as well as show that concerns over copyright infringement.
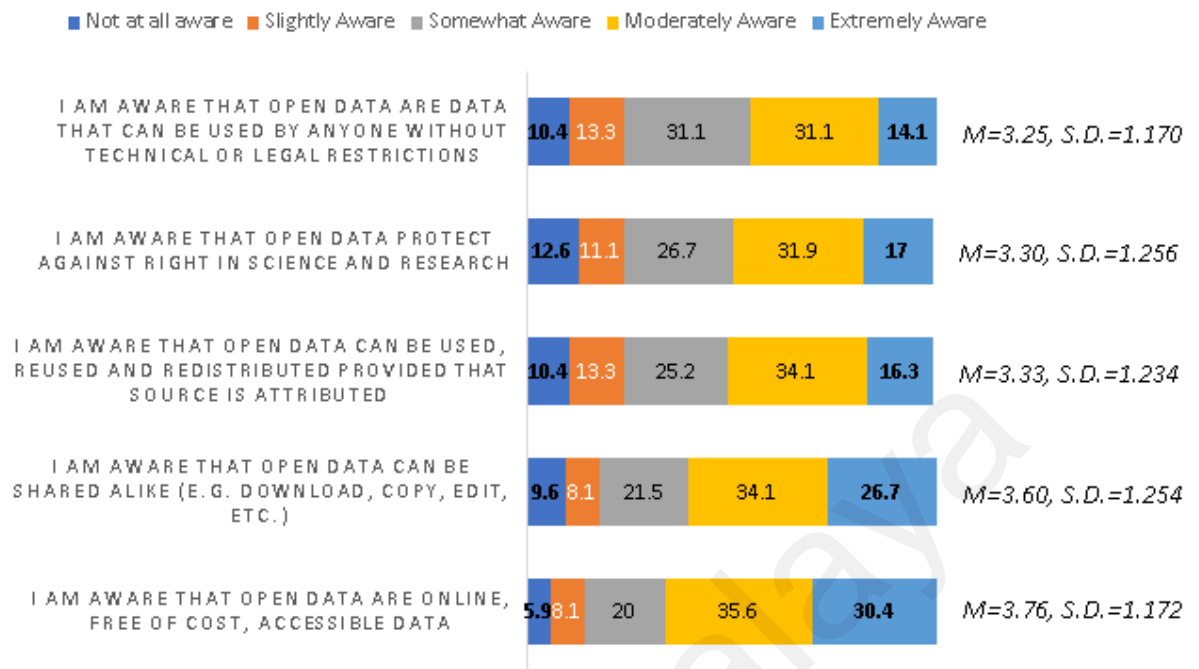
Figure 4.2. Awareness of Open Data, according to Malaysian Researchers (N=135)

4.2.3 On the Awareness of Open Peer Review

This section examines Malaysian researchers' awareness of Open Peer Review (OPR). OPR awareness in this study covers the understanding which include making reviewer and author identities open, publishing review reports, and enabling greater participation in the peer review process – the concept of open peer review that speaks directly to the ethos of Open Science (OpenAIRE, 2016; Ross-Hellauer et al. 2017). Figure 4-3 presents five item statements describing aspects of OPR that one might expect a researcher to know, based on the Likert scale of 1-5 (from not at all aware to extremely aware). One finds that the overall mean score of 3.57 for the awareness that OPR enables discussion between reviewers themselves (16.2% extremely aware; 39.3% moderately aware), giving it a first-place rank among mean scores. Only 4.5% acknowledged unaware

that in OPR interaction exists among reviewers. Researchers also exhibit slight awareness on the open peer review concept that:

a) Author's scholarly works/ideas are subjected to scrutiny of experts and made public their comments (*M*= 3.12, *S.D* =1.310; 10(14.1%) extremely aware; 24(32.6%) moderately aware).

b) Reviewer and author identities are made open in peer review process (*M*= 3.04, *S.D.* =1.309; 9 (11.9%) extremely aware; 24(32.6%) moderately aware).

c) However, the following concepts received a much lower mean value (M <3.0) and slight misunderstanding about OPR (i.e., more than one third of the respondents were not aware at all), that in OPR:

d) Discussion between authors and reviewers is allowed (*M* 2.61, *S.D.* =1.332; 23(31.1%) not aware at all).

e) All review reports will be published, but reviewers will be given the option to remain anonymous (*M* 2.61, *S.D.*=1.265; 19(25.2%) not aware at all).

The mixed awareness shows that researchers may be grasping the aspects of OPR, which may indicate that the journals they submit to do not exercise OPR, and many of them have never been involved in OPR. The statement that in OPR, "all review reports will be published, but reviewers will be given the option to remain anonymous" received the little understanding probably because the researchers find it difficult to agree with the statement "to remain anonymous", as in line with the advocates of open review, somebody making an important judgement on the work of others should not do so in secret. It is also argued that reviewers will produce better work and avoid offhand, careless or rude comments when their identity is known (Gieneisen and Zhang, 2012).
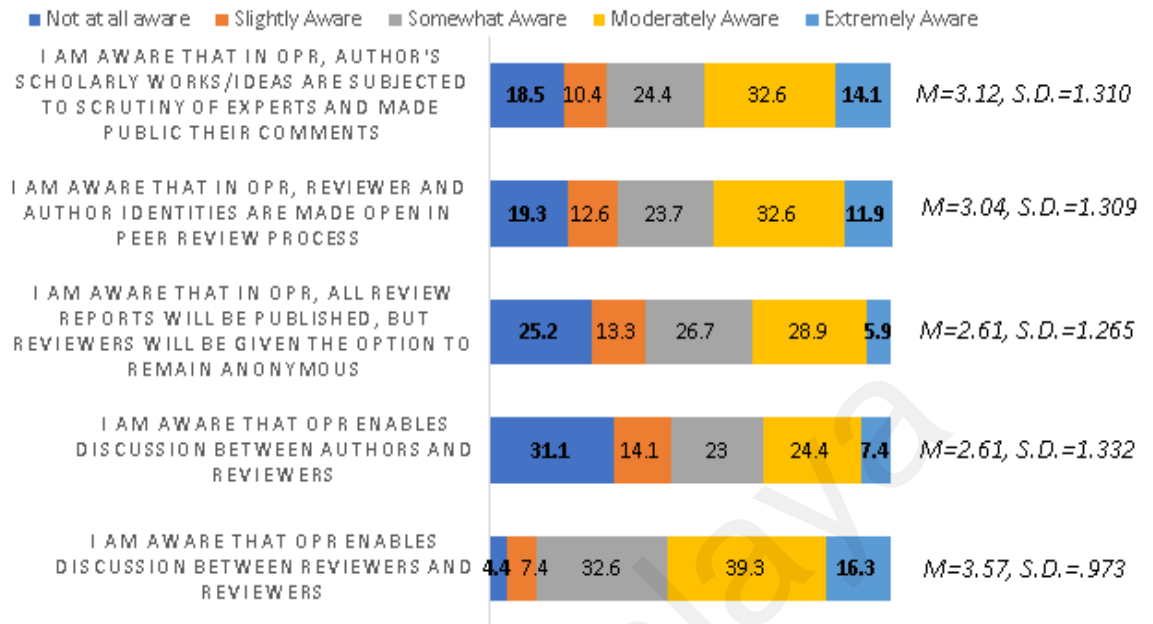
Note: 1 – "Not at all aware", 2 – "Slightly Aware", 3 – "Somewhat Aware", 4 – "Moderately Aware" and 5 – "Extremely Aware".

Figure 4.3. Awareness of Open Peer Review, according to Malaysian Researchers (N=135)

4.3 Respondents' Comments on Awareness of Open Scholarly Communication

Only 39 respondents provided additional comments in the survey questionnaire. A list of comments is available in Appendix C. These comments were analyzed based on positivity or negativity responses on awareness. In all, only 15 (38.46%) of the comments were to positive toward open scholarly communication while the other 24 (61.54%) were negative about open scholarly communication. However, the subsections below grouped their responses based on the three pillars of open scholarly communication.

Overall, respondents' comments on the awareness are more on open access include statements such as '*it is good, but to publish in open access journal is very expensive*', One of the comments which showed lack of understanding for article processing charge (APC) for open access publishing reads, "*it is new for me, could you explain to me?*" This shows

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that although open access publishing has been around for quite some time, there are still researchers in Malaysia who do know what open access is all about. Also, in terms of discoverability, one commented that '*Open access journal is a good venue for researchers to share their scientific findings, however the fees are varied*', and it is '*good for knowledge dissemination*', all the advantages highlighted by Wouters and Haak (2017). Other responses were on disincentivizing the awareness of open scholarly communication and suggestion on improvements with understanding to free access, reduction in fees for publishing were provided. Again, statements on issues on APCs such as '*needs to address page charges - they are too high compared to our grant funding* and "*university does not give enough support to allow us to fully open publish.*' were highlighted However, few of the respondents showed some reservations (See Appendix C) such as '*Open access requires funding, which unfortunately not all programmes have access to*', '*Only if trust-able system is implemented, this will be a good future to knowledge development*', '*it will be better if page charges being reduced.* Furthermore, the comments reflected that open access movement is/may further enrich publishers unless and until publishing fees are negotiated downwards, (e.g., '*it is good, but to publish in open access journal is costly and unaffordable).* Respondents also expressed the issue of quality (e.g., "*allows research to reach the widest audience, however, need to be very aware of predatory journal*', '*It has both positive and negative side to it and needs to be monitored to maintain the quality of the information and to avoid plagiarism*'. One commented that open access publishing should also be encouraged ('*Should be encouraged at top authority level (for the university & ministry which considered more on citations on ISI journals for ranking purposes*)'. From the on-going, it is concluded that there is low level support for open scholarly communication among the scholars based on their responses, issues that were also reported

in other studies (Wicherts, 2016; Wouters and Haak 2017). Hence, more awareness training programmes is needed for researchers to understand the benefits of open access and how it will improve their transparency, reproducibility and visibility of open scholarly communication in Malaysia.

4.4 Cognitive Readiness of Open Scholarly Communication

This section presents the cognitive readiness of the researchers towards open scholarly communication based on the findings obtained. Each of the three pillars of open scholarly communication is captured in answering the research question in this chapter. The statements captured the key elements of open scholarly communication in the context of the level of awareness of Open Access, Open Ddata and OPR. Additionally, the awareness statements described served as the inputs to the topology that generated the five scales for great or little extent of awareness of Open Access, Open Data and OPR. Therefore, for measuring the extent of awareness i.e., their understanding, about Open Access, Open Data and OPR, their mean and standard deviation were calculated while grouped them based on extremely aware or not at all aware in the indicator. The rating was based on 5 – Likert scales and if a researcher scores 1, his or her rating will be 1.0 – 1.8, if s/he scores 2, his/her rating is between 1.9-2.7. The score of 3 is between 2.8-3.6, while 4 and 5 are between 3.7-4.5 and between 4.6-5.0 respectively. This measurement procedure has been detailed in Chapter 3, Table 3.19.

The cognitive readiness was calculated based on the five-point scale reflecting the degree of understanding of open scholarly communication. Table 4.2 shows the mapping of the degree of awareness to cognitive readiness based on the mean score. For example, if the respondent scored an overall awareness mean of between (1.0 -1.8) he or she is said to have

no knowledge (misunderstanding) about open scholarly communication and is considered not at all ready.

Table 4.2: Mapping of the Degree of Awareness to Cognitive Readiness

Scale	Degree of Awareness	Mean Range	Cognitive Readiness
1	Not at all Aware	1.0 - 1.8	Not at all Ready
2	Slightly Aware	1.9 - 2.7	Not Ready
3	Somewhat Aware	2.8 - 3.6	Somewhat Ready
4	Moderately Aware	3.7 - 4.5	Moderately Ready
5	Extremely Aware	4.6 - 5.0	Extremely Ready

4.4.1 Cognitive Readiness of Open Access

Table 4-3 shows the comparison between the mean scores of the four statements on Open Access awareness that clearly revealed the overall understanding of Malaysian researchers in this study on their cognitive readiness toward Open Access. The overall weighted mean for cognitive readiness of scholars toward Open Access (*M= 4.02)* revealed that Malaysian scholars are moderately ready in terms of their knowledge as shown in Table 4-3. This is also reflected from the overall weighted median (*Mdn*=4.5). This implies that Malaysia researchers are moderately ready in terms of cognitive readiness of Open Access as gauged through their awareness i.e. their knowledge and understanding that open access is happening or exists.

Table 4-3: Mapping the Mean Score of Open Access Awareness to Cognitive Readiness of Open Access

I am aware that Open Access …	MEDIAN	MEAN	SD	COGNITIVE READINESS
1. Provides unrestricted online access to full text	5.00	4.26	1.058	Moderately Ready
2. Provides free of cost access to peer reviewed scientific contents	5.00	4.20	1.094	Moderately Ready
3. Provides access to research output with limited copyright and licensing	4.00	3.65	1.177	Moderately Ready
4. Makes available the article immediately at the time of publication	4.00	3.95	1.222	Moderately Ready
OVERALL AWARENESS OF OPEN ACCESS	**4.5**	**4.02**	**MODERATELY READY**	

4.4.2 Cognitive Readiness of Open Data

Table 4-4 shows the comparison between the mean scores of the five statements on Open Data awareness that clearly revealed the overall understanding of Malaysian researchers in this study on their cognitive readiness towards Open Data. The overall weighted mean for cognitive readiness of scholars toward open data (*M= 3.45)* revealed that Malaysian scholars are somewhat ready in terms of their knowledge as shown in Table 4-4. This is also reflected from the overall weighted median (*Mdn*=3.6). This implies that Malaysia researchers are somewhat ready in terms of cognitive readiness of Open Data as gauged through their awareness i.e. their knowledge and understanding that open data is happening or exists.

Table 4-4: Mapping the Mean Score of Open Data Awareness to Cognitive Readiness of Open Data

I am aware that Open Data …	MEDIAN	MEAN	SD	COGNITIVE READINESS
1. Are online, free of cost, accessible data	4.00	3.76	1.172	Moderately Ready
2. Can be shared alike (e.g., download, copy, edit etc.)	4.00	3.60	1.254	Somewhat Ready
3. Can be used, reused and redistributed if data source is attributed	4.00	3.33	1.234	Somewhat Ready
4. Protects against right in science and research	3.00	3.30	1.256	Somewhat Ready
5. Are data that can be used by anyone without technical or legal restrictions	3.00	3.25	1.170	Somewhat Ready
OVERALL AWARENESS OF OPEN DATA	**3.6**	**3.45**		**SOMEWHAT READY**

4.4.3 Cognitive Readiness of Open Peer Review

Table 4-5 shows the comparison between the mean scores of the five statements on OPR awareness that clearly revealed the overall understanding of Malaysian researchers in this study on their cognitive readiness towards OPR. The overall weighted mean for cognitive readiness of scholars toward Open Peer Review (*M= 3.02)* revealed that Malaysian scholars are somewhat ready for Open Peer Review in terms of their knowledge as shown in Table 4-5. This is also reflected from the overall weighted median (*Mdn*=3.6). This implies that Malaysia researchers are somewhat ready in terms of cognitive readiness of OPR as gauged through their awareness i.e. their knowledge and understanding that OPR is happening or exists.

Table 4-5: Mapping the Mean Score of Open Peer Review Awareness to Cognitive Readiness of Open Peer Review

I am aware that in OPR….	MEDIAN	MEAN	SD	COGNITIVE READINESS
1. Author's scholarly works/ideas are subjected to scrutiny of experts and made public their comments	3.00	3.12	1.310	Somewhat Ready
2. Reviewer and author identities are made open in peer review process	3.00	3.04	1.309	Somewhat Ready
3. All review reports will be published, but reviewers will be given the option to remain anonymous	3.00	2.75	1.265	Somewhat Ready
4. Enables discussion between authors and reviewers	3.00	2.61	1.332	Not Ready
5. Enables discussion between reviewers themselves.	4.00	3.57	.973	Somewhat Ready
OVERALL AWARENESS OF OPR	**3.2**	**3.02**	**SOMEWHAT READY**	

4.5 Summary of Chapter 4

This chapter presents the demographic information of the respondents and describes the awareness of Malaysian academic researchers towards open scholarly communication associated with three open science pillars: Open Access, Open Data, and Open Peer Review. There are higher levels of awareness of open access which reflects an overall moderate cognitive readiness. Further, there is a moderate understanding and readiness in terms of open data while. Malaysia researchers are somewhat ready in terms of cognitive readiness toward open peer review as gauged through their awareness i.e., their knowledge and understanding that open scholarly communication is happening or exists. Their median score also testifies to their awareness toward open scholarly communication in general. The next chapter

presents findings on the open scholarly communication practices of Malaysian academic researchers which constitutes their conative readiness.

CHAPTER 5: CONATIVE READINESS OF OPEN SCHOLARLY COMMUNICATION

5.1 Introduction

This chapter answers the second research question of this study: "What are the practices exhibited by Malaysian academic researchers towards Open Access, Open Data and Open Peer Review?". It describes the practices exhibited by Malaysian researchers regarding these three pillars of Open Science. The discussion starts with analysis on their general experiences in open scholarly publishing, frequency of practices, levels of practices and what disincentives the practices of open scholarly communication.

5.2. Malaysian Academic Researchers' Conative Readiness of Open Scholarly Communication

Conative readiness of the Malaysian researchers is gauged through their open scholarly communication practices i.e., the behavioral tendency by an individual and it consists of actions or observable responses that are the result of an attitude, which include awareness. Mean values for the Open Access, Open Data and Open Peer Review practice statements were calculated based on numeric values of the scale item with "very untrue of me" being 1 and "very true of me" being 5.

5.3 Respondents' General Experiences in Open Scholarly Practices

Out of 135 respondents, an overwhelming majority indicate "Yes" with 92(68.1%), that they had published in open access journals before. Surprisingly, close to one-third of them 33(24.4%) choose "No But Considered" while only 10 (7.4%) choose "No, and Not

Considered" to the statement (*M*=2.61; *SD*=.624 (see Table 5-1). This implies that even though majority of these researchers have published in open access journals before, many of their peers are still not publishing there, and this could be as a result of the researchers' lack of understanding and opinion concerning Open Access and Open Science. More so, researchers were asked whether they have submitted their publications to an institutional repository before. A majority of the respondents in this study choose "Yes" (76, 56.3%), 39 (28.9%) say "No, but considered", while 20(14.8%) say "No, and not considered" (*M*=2.41; *SD*=.737).

This shows that many of the researchers considered open access publishing but there is a concern on those who indicated "No, and not considered". This could be as a result of lack of awareness on the purposes and benefits of institutional repositories in their respective institutions. Also, statement that "have you make/share data openly before" revealed 36 (26.7%) of the respondents indicated "No, and not considered", 38 (28.1%) of the respondents indicated "No but considered" while 61(45.2%) of the respondents say "Yes" (*M*= 2.19; *SD*=.830) (see Table 5-1). From the on-going, one can conclude that opening of data by these scholars are not so evident with close to half of the respondents in various studies were not opening up their data (Wicherts, Borsboom, Kats and Molenaar, 2006; Wolnis, 1962; Graig & Reese, 1973).

Furthermore, researchers were asked whether they have open peer reviewed for journal before. An overwhelming majority of them choose "Yes, (83,61.5%), 33 (24.4%) say "No, but considered", while only 19(14.1%) of them say "No, and not considered" (*M*=2.47; *SD*=.733). (see Table 5-1). This shows that many of the researchers have open peer reviewed before. However, there is a concern on those who say "No, and not

considered". Further analysis could discover why this is so and could probably be as a result of lack of incentivizing reviewers to part take in open peer reviewing process.

Table 5-1 General Experiences in Open Scholarly Communication Practices (N=135)

	No, and not Considered	No, but Considered	Yes	Mean	Median	SD
Have you published in open access before?	10 (7.4%)	33 (24.4%)	92 (68.1%)	2.61	3.00	.624
Have you submitted articles to IR before?	20 (14.1%)	39 (28.9%)	76 (56.3%)	2.41	3.00	.737
Have you make/share data openly before?	36 (26.7%)	38 (28.1%)	61 (45.2%)	2.19	2.00	.830
Have you open peer review in a journal before?	19 (14.1%)	33 (24.4%)	83 (61.5%)	2.47	3.00	.733
General Experiences on Open Scholarly Practices				**2.42**	**2.75**	-
Note: No, and not considered= 1; No, but considered =2; Yes= 3.						

Table 5-1 shows the comparison between the mean and median scores to the four Yes/No questions. It clearly revealed that the general experience in open scholarly communication practices of researchers was moderate (M=2.42), which implies that, Malaysia researchers open scholarly communication experience, as denoted by Open Access, Open Data and Open Peer Review is low, but effort is on to make it a regular practice. In addition, Table 5-2 compares the mean and median scores of three statements on the frequency of practicing Open Access (M=2.50, Mdn=3.00), Open Data (M=2.12, Mdn= 2.00) and Open Peer Review (M=2.70, Mdn=3.00). The results revealed that in

general Malaysian researchers rarely practice open scholarly publishing with an overall mean of 2.47, however efforts are on to make them a practice, as described in the following sections.

Table 5-2 Frequency of Open Scholarly Communication Practices (N=135)

Practices of Publishing	Frequency of Practice	F (%)	Mean	Median	SD
How often do you publish in Open Access Journal?	Never	36 (26.7%)			
	Rarely	27 (20.0%)	2.50	3.00	1.184
	Sometimes	51 (37.8%)			
	Often	11(8.1%)			
	Always	10(7.4%)			
How often do you make your data Open?	Never	53(39.3%)			
	Rarely	30(22.2%)			
	Sometimes	30(22.2%)	2.21	2.00	1.236
	Often	14(10.4%)			
	Always	8(5.9%)			
How often do you Open Peer Review in a Journal?	Never	33(24.4%)			
	Rarely	20(14.8%)			
	Sometimes	45(33.3%)	2.70	3.00	1.245
	Often	27(20.0%)			
	Always	10(7.4%)			
Note: Never = 1.0-1-8; Rarely= 1.9-2.7. Sometimes = 2.8-3.6; Often= 3.7-4.5; Always= 4.6-5.0			2.47	2.67	

5.4 Researchers' Practices of Open Access

Respondents were asked how often they publish in open access journals. Although a high majority reported that they have published in open access before (Table 5-1), only a small number reported Often (11, 8.1%) and Always (10, 7.4%) (see Table 5-2) as a practice. More than one-third indicated that they sometimes (51, 37.8%) published in open access journals. There were also substantial numbers who reported Rarely (27, 20.0%) and Never (36, 26.7%). This may imply that there are researchers who implies open access in

terms of archiving their pre-prints or post-prints (Green Open Access) in repositories but

have never published in open access journals (Gold Open Access) before.

Table 5-3 Comparison between Discipline, Academic Position, and Type of Researchers and * Frequency of Publishing in Open Access Journal (N=135)

Practices of Publishing	**Frequency**	Science	Mean	Median	Non-Science	Mean	Median	F (%)
Comparison between Discipline and * Frequency of Publishing in Open Access Journal	Never	28 (20.7 %)	2.43	2.50	9 (6.7%)	2.61	3.00	37 (27.4%)
	Rarely	19 (14.1%)			8 (5.9%)			27 (20.0 %)
	Sometimes	34 (25.2%)			16 (11.9%)			50 (37.0%)
	Often	5 (3.7%)			6 (4.4%)			11 (8.1%)
	Always	8 (5.9%)			2 (1.5%)			10 (7.4%)
	Total	94 (69.6%)			41 (30.4%)			135 (100.0%)
Comparison between Academic Position and * Frequency of Publishing in Open Access Journal	**Frequency**	Senior Lecturer & Others	2.55	3.00	Professors & Associate Professor	2.24	2.00	F(%)
	Never	27 (20.0%)			10 (7.4%)			37 (27.4 %)
	Rarely	21 (15.6%)			6 (4.4%)			27 (20.0 %)
	Sometimes	40 (29.6%)			10 (7.4%)			50 (37.0%)
	Often	9 (6.7%)			2 (1.5%)			11 (8.1%)
	Always	9(6.7%)			1(0.7%)			10(7.4%)
		106 (78.5%)			29 (21.5%)			135 (100.0%)
Comparison between Type of Researchers and * Frequency of Publishing in Open Access Journal	**Frequency**	Early Career Researchers	2.45	3.00	Established Researchers	2.51	3.00	F(%)
	Never	19 (14.1%)			18 (13.3%)			36 (26.7%)
	Rarely	10 (7.4%)			17(12.6%)			27 (20.0%)
	Sometimes	22 (16.3%)			28 (20.7%)			51 (37.8%)
	Often	8(5.9%)			3(2.2%)			11(8.1%)
	Always	3(2.2%)			7(5.2%)			10(7.4%)
		62 (45.9%)			73 (54.1%)			135 (100.0%)
Note: Never = 1.0-1-8; Rarely= 1.9-2.7. Sometimes = 2.8-3.6; Often= 3.7-4.5; Always= 4.6-5.0								

Table 5-3 shows the comparison between the discipline, academic position, and type

of researchers and frequency of publishing in open access journal statements.

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Respondents were asked how often they publish in open access journals. Although a high majority reported that they have published in open access before (Table 5-3), only a small number reported Often (11, 8.1%) and Always (10, 7.4%) (see Table 5-3) as a practice. Majority indicated that they sometimes (50, 37.0%) published in Open Access journals. There were also substantial numbers who reported Rarely (27, 20.0%) and Never (37, 27.4%).

It clearly revealed that the practices of publishing comparison between discipline, academic position and types of researchers and frequency of publishing in open access journal were sometimes frequent (Discipline M=2.52), (Academic Position M=2.40), and (Type of Researchers M=2.48) respectively, which implies that, Malaysia researchers Open Access practices is low, but effort is on to make it a regular practice. In addition, Table 5-3 compares the mean and median scores of three variables (discipline, academic position and types of researchers) on the frequency of practicing Open Access (Science M=2.43, Mdn=2.50; Non-Science M=2.61, Mdn=3.00), (Professors and Associate Professor M=2.24, Mdn= 2.00; Senior Lecturers M=2.55, Mdn=3.00) and (M=2.70, Mdn=3.00). The results revealed that in general Malaysian researchers rarely practice Open Access in relation to discipline, academic position or from various type of researchers, however efforts are on to make them a practice.

5.5 Researchers' Practices of Open Data

In terms of practices around data sharing, the survey shows that more than one-third (39.3%) of the researchers did not share data at all. This reflects the finding that data sharing practices vary considerably among researchers with only about 16 percent researchers who acknowledged always or often make their research data open, and a high majority (45%)

either sometimes or rarely share their research data (Table 5-4). Although the tendency to share data openly is a concern as shown from their response, findings indicate that open research data is a more established practice among the sciences and early career researchers. When cross-tabulate between variables (Table 5-4), what emerges is a picture of very scattered practices and it is observed that:

a) More females have the tendency to make their research data open (n= 14), compared to the males (n=8).

b) More scientists always or often make their research data open (n=18), compared to the non-sciences (n=4)

c) More Senior Lecturers (n=16) always or often make their research data open compared to the Professors and Associate Professors (n=6)

d) More early career researchers (n=12) always or often make their research data open compared to established researchers (n=10)

Table 5-4: Cross-tabulation between Demographics and Frequency of Making/Sharing Open Data (N=135)

Demographics	Never	Rarely	Sometimes	Often	Always	Total
Male	18 (13.3)	11 (8.1%)	13 (9.6%)	5 (3.7%)	3 (2.2%)	50 (37.0%)
Female	35 (25.9%)	19 (14.1%)	17 (12.6%)	9 (6.7%)	5 (3.7%)	85 (63.0%)
Science	36 (26.7%)	19 (14.1%)	21 (15.6%)	10 (7.4%)	8 (5.9%)	94 (69.6%)
Non-science	17 (12.6%)	11 (8.1%)	9 (6.7%)	4 (3.0%)	0 (0.0%)	41 (30.4%)
Senior Lecturers	45 (33.3%)	22 (16.3%)	23 (17.0%)	10 (7.4%)	6 (4.4%)	106 (78.5%)
Professors & Associate Professors	8 (5.9%)	8 (5.9%)	7 (5.2%)	4 (3.0%)	2 (1.5%)	29 (21.5%)
Early career researchers	27 (20.0%)	8 (5.9%)	13 (9.6%)	9 (6.7%)	3 (2.2%)	60 (44.4%)
Established researchers	26 (19.3%)	22 (16.3%)	17 (12.6%)	5 (3.7%)	5 (3.7%)	75 (55.6%)

Further analysis was conducted on those who reported having experience sharing data (82, 60.7%) and responded to four item statements regarding their reasons for data sharing based on a 5-point response scale (Figure 5-1).

    a. I share my research data to support open scientific research for reusability,

    b. I share my research data as mandated by the policy of funding agencies

    c. I share my research data as mandated by journal policy, and

    d. I share my research data to reduce duplication of effort from different researchers.

Considering the mean responses that reflect researchers' reasons for open data sharing, currently open data sharing mainly occurs because of (in ranked order):

    a. Compliance with journal or publisher requirements (M=3.15; SD=1.114)

    b. Compliance with funder mandates (M=3.08; SD=1.153)

    c. Reducing unnecessary duplication of research (M= 3.07; SD=1.076)

Interestingly, while the emphasis of open data is to support reusability of research, this does not often practice as being important (M=2.94, SD=1.202). Research data is perceived as personally owned and decisions on sharing are driven by researchers, not by institutes or funders. Findings seem to indicate that open data is a reality for publishers and research funders but has not yet come a reality for researchers.
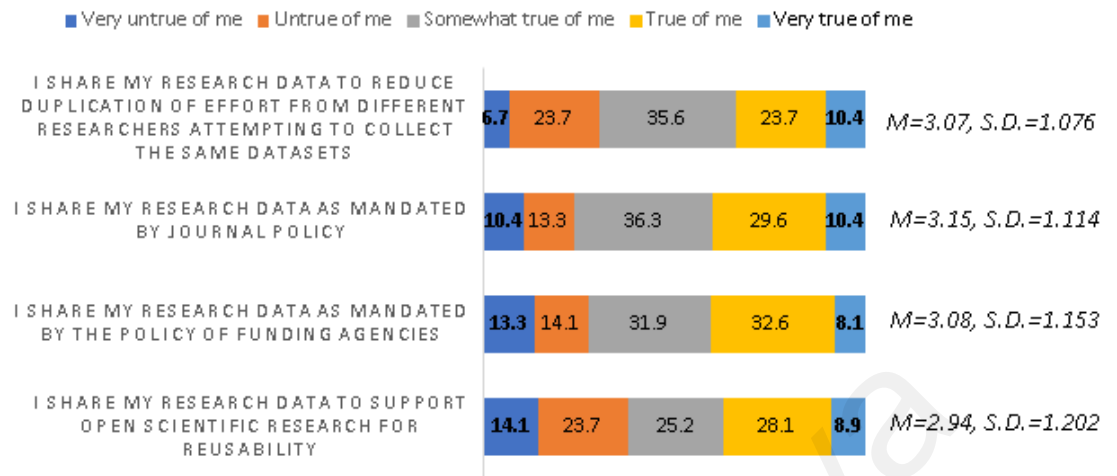
Figure 5-1 Practices of Open Data, according to Malaysian Researchers (N=135)

5.6 Researchers' Attitudes towards Open Data

Findings on Malaysian researchers' attitude towards open data converge towards the fact that the researchers have generally accepted the idea of data sharing and that they consider it as globally beneficial for science. Consistent with other studies on open science attitude (Maciej 2014), the deficiencies of the current system that could be overcome by open data, the implications of open data, and the barriers to the promotion and positioning of open data were analysed. These questions allow this study to determine researchers' attitudes towards Open Data in 12 item statements (Figure 5-2).

Malaysian researchers considered the following to be the deficiencies of the current system that open data could overcome improved publishing transparency (69.6%; M=3.76, SD=.866); allows re-analysis of data for different purposes from the ones originally conceived (66.7%; M=3.72, SD=.843)); improved data collection and management (65.9%; M=3.73, SD=.866)); allows verification of scientific results (65.2%; M=3.7, SD=.831);

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increases research integrity (61.5%; *M*=3.64, *SD*=.869)); and helps to undertake expensive data collection efforts easily (48.1%; *M*=3.39, *SD*=.955)). They believed that the implications of open science and its impact on research are as follow: it promotes competition of ideas and research (66%; *M*=3.73, *SD*=.950)); and fosters good scientific collaboration (60.7; *M*=3.63, *SD*=.855)).

Based on these results, it can be said that respondents viewed open data sharing in a positive way while the benefits of sharing data may be recognized, the barriers are clear as well. They believed (very transformative) that the barriers to the promotion and positioning of open data are identified as follows: contains sensitive or copyrighted information, which has disclosure (41.5%; *M*=3.3, *SD*=.947)); lack well-defined technical standards that discourage sharing and reuse of data (44.4%; *M*=3.27, *SD*=.956)); volumes of data might discourage researchers from sharing data (50.4%); and open data practices that are very hard to execute (51.9%; *M*=3.39, *SD*=1.197)).
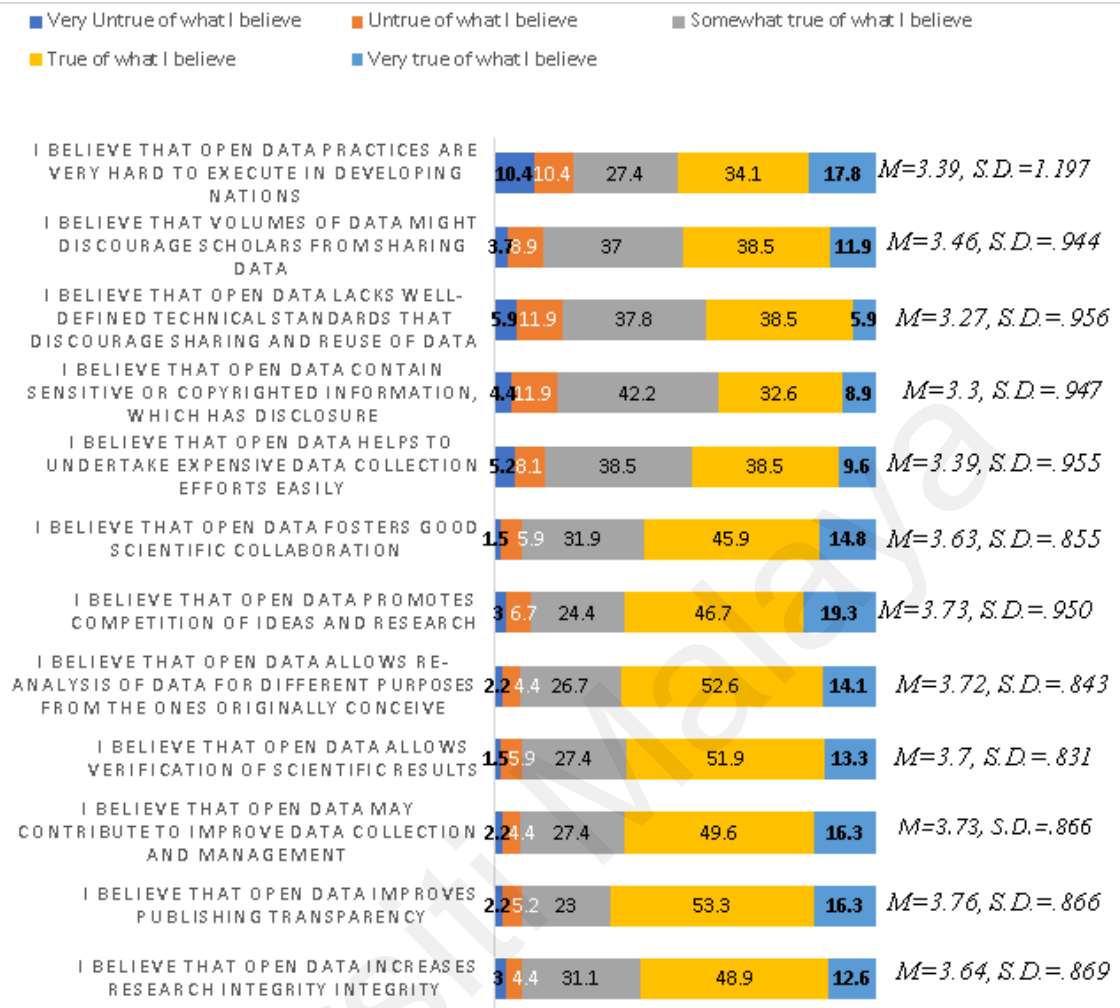
Figure 5-2 Attitudes towards Open Data, according to Malaysian Researchers (N=135)

5.7 Disincentives to Open Data Sharing

This question is a continuation of the attitudes of scholars towards open data sharing. The survey shows that one third of researchers did not share data at all. Since Open Data has not become a reality for many Malaysian researchers, one would expect, at a minimum, that barriers to sharing would discourage and disincentivize Open Data and slow the uptake of Open Data practices. Respondents were asked to rate three statements that relate to why they are not favour of sharing or publishing data, and whether these researchers share a

common research profile or disciplinary background. Figure 5-3 illustrates that the majority of Malaysian researcher acknowledge that they do not share their research data because of:

a) the probability of losing publication opportunity 54(73.4%), $M = 2.79$; $SD=1.168$

b) the concern that their data would be misused by others 58(77.8%), $M = 2.78$; $SD=1.056$

c) unclear information on data privacy policy 63(85.2%), $M = 2.66$; $SD=1.016$

These finding indicate that the researchers have clear beliefs about who owns data, they feel that as the data owner prior to publication, they have more ownership over data than an institute, department, or funder. On publication of data, many researchers feel (incorrectly) that they would be losing publication opportunity 54(73.4%). Legal and ethical concerns are cited as reasons for not publishing research data alongside an article: a substantial proportion of the respondents answered that they do not like the idea that others might abuse (let alone take credit for it) 58(77.8%) and a high majority were unclear about data privacy policy 63(85.2%).
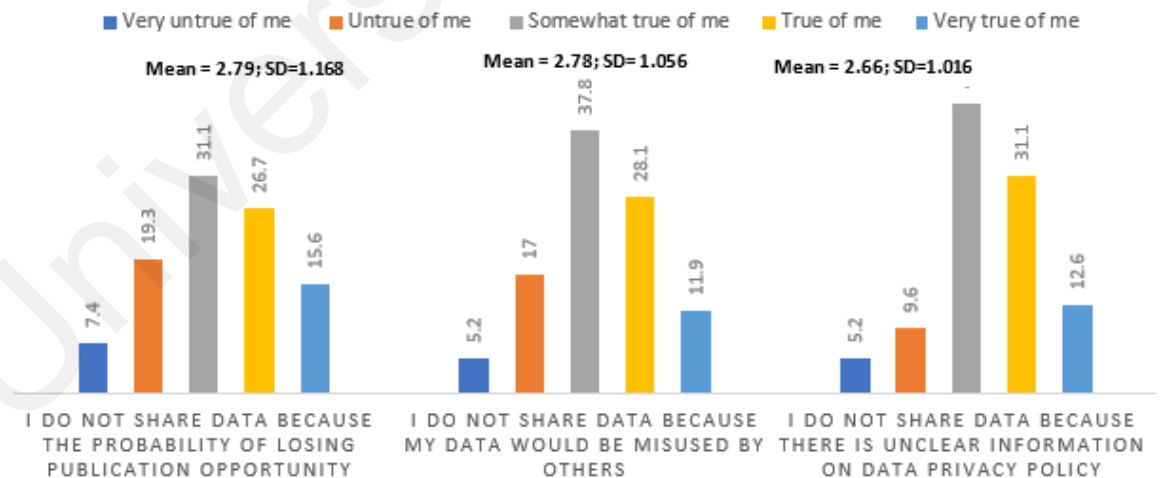
Note: 1 - Very untrue of me, 2 - Untrue of me, 3 - Somewhat True of me, 4 - True of Me, 5 - Very true of Me.

Figure 5.3 What Disincentivize Malaysian Researchers toward Open Data Sharing

(N=135)

Table 5-5 Cross-tabulation between Demographics and major concerns of Researchers towards Making/Sharing Open Data (N=135)

Demographics	Concern about losing publication opportunity	Concern about data misused by others	Concern about data privacy
Male	38 (28.1%)	39 (28.9%)	44 (32.6%)
Female	61 (45.2%)	66 (48.9%)	71 (52.6%)
Science	70 (51.9%)	74 (54.8%)	80 (59.3%)
Non-science	29 (21.5%)	31 (23.0%)	35 (25.9%)
Senior Lecturers	79 (58.5%)	82 (60.7%)	90 (66.7%)
Professors & Associate Professors	20 (14.8%)	23 (17.0%)	25 (18.5%)
Early career researchers	45 (33.3%)	48 (35.6%)	51 (37.8%)
Established researchers	54 (40.0%)	57 (42.2%)	64 (47.4%)

Further analysis was conducted on those who have major concerns about making or sharing data openly. It was evidence that females have more concerns in our findings. For instance, concern about losing publication opportunity received (n=61), concerns about data misuse by others received (n=66) while concern about data privacy received (n=71) on sharing research data as compared to their male counterparts respectively. Accordingly, Established Researchers (ERs) were more in the study and their concerns about sharing data is relatively high for example concern about losing publication opportunity garnered (n=54), concerns about data misuse by others received (n=57) while concern about data privacy received (n=64) as compared to the Early Career Researchers (ECRs) for the same feelings (n=45), (n=48) and (n=51) respectively. More so, in terms of discipline, sciences have more concerns about losing publication opportunity (n=70), concerns about data misuse by others received (n=74) while concern about data privacy received (n=80) as compared to non-science disciplines. On the contrary, fewer professors and associate professors have less concerns about losing publication opportunity (n=20), probably because they had already

been established in their chosen careers and so that may not concern them as much, concerns about data misuse by others just received (n=23) while concern about data privacy received (n=25) as compared to the senior lecturers in terms of academic position who had (n=79), (n=82) and (n=90) respectively. As illustrated above research data is perceived as personally owned and decisions on sharing are driven by researchers, not by institutes or funders. Findings seem to indicate that concern for sharing data is a reality for researchers, especially among the established, science and female researchers Table 5-5.

5.8 Experiences with Open Peer Review

This section reports to what extent have Malaysian authors personally experienced Open Peer Review in terms of discipline and research experience. Table 5-6 below present the descriptive analysis of researchers' experience toward Open Peer Review in terms of discipline and research experience. Considering the mean responses that reflect researchers' experience towards Open Peer Review, at present, there is a mixed feeling in experience toward Open Peer Review among Malaysia researchers, however, there is a concern for those that chose rarely or never experience open peer review. Table 5-6 shows the comparison between the discipline, academic position, and type of researchers and frequency of experiences in open peer review journal statements. It clearly revealed that the experiences in practices comparison between discipline, academic position and types of researchers and frequency of open peer review in a journal were sometimes frequent (Discipline $M=2.67$), (Academic Position $M=2.55$), and (Type of Researchers $M=2.67$) respectively, which implies that, Malaysia researchers open peer review practices is low, but effort is on to make it a regular practice.

Table 5-6 Comparison between Discipline, Academic Position, and Type of Researchers and * Frequency of Open Peer Review   (N=135)

Experiences With OPR	**Frequency**	Science	Mean	Median	Non-Science	Mean	Median	F (%)
Comparison between Discipline and * Frequency of Open Peer Review in a Journal	Never	26(19.3%)	2.67	3.00	9(6.7%)	2.66	3.00	35 (25.9%)
	Rarely	11(8.1%)			9(6.7%)			20 (14.8%)
	Sometimes	31(23.0%)			14(10.4%)			45 (33.3%)
	Often	20(14.8%)			5(3.7%)			25(18.5%)
	Always	6(4.4%)			4(3.0%)			10(7.4%)
	Total	94 (69.6%)			41 (30.4%)			135 (100.0%)
Comparison between Academic Position and * Frequency of Open Peer Review in a Journal	**Frequency**	Senior Lecturer & Others	2.75	3.00	Professors & Associate Professor	2.34	3.00	F(%)
	Never	24(17.8%)			11(8.1%)			35 (25.9%)
	Rarely	18(13.3%)			2(1.5%)			20 (14.8%)
	Sometimes	34(25.2%)			11(8.1%)			45 (33.3%)
	Often	20(14.8%)			5(3.7%)			25(18.5%)
	Always	10(7.4%)			6(4.4%)			10(7.4%)
		106 (78.5%)			29 (21.5%)			135 (100.0%)
Comparison between Type of Researchers and * Frequency of Open Peer Review in a Journal	**Frequency**	Early Career Researchers	2.69	3.00	Established Researchers	2.64	3.00	F(%)
	Never	18(13.3%)			17(12.6%)			35 (25.9%)
	Rarely	7(5.2%)			13(9.6%)			20 (14.8%)
	Sometimes	18(13.3%)			27(20.0%)			45 (33.3%)
	Often	14(10.4%)			11(8.1%)			25(18.5%)
	Always	5(3.7%)			5(3.7%)			10(7.4%)
		62 (45.9%)			73 (54.1%)			135 (100.0%)
Note: Never = 1.0-1-8; Rarely= 1.9-2.7. Sometimes = 2.8-3.6; Often= 3.7-4.5; Always= 4.6-5.0								

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In addition, Table 5-6 compares the mean and median scores of three variables (discipline, academic position, and types of researchers) on the frequency of practicing open peer review (Science *M*=2.67, *Mdn*=3.00; Non-Science *M*=2.66, *Mdn*=3.00), (Professors and Associate Professor *M*=2.34, *Mdn*= 3.00; Senior Lecturers *M*=2.75, *Mdn*=3.00); and (Early Career Researchers *M*=2.69, *Mdn*=3.00; Established Researchers *M*=2.64, *Mdn*=3.00). The results revealed that in general Malaysian researchers rarely practice open peer review in relation to discipline, academic position or from various type of researchers, however efforts are on to make them a practice.

5.9 Conative Readiness of Researchers toward Open Scholarly Communication

This section presents the conative readiness of the researchers toward open scholarly communication based on the findings obtained. Each of the three pillars of open scholarly communication is captured in answering the research question two in this chapter. The statements captured the key elements of open scholarly communication in the context of the degree of practices of open access, open data and OPR. Additionally, the practices statements described served as the inputs to the topology that generated the five scales for never or frequently practicing open access, open data and OPR. Their mean and standard deviations were calculated while grouped them based on frequently or never practice in the indicator. The rating was based on 5 – Likert scales and if a researcher scores 1, his or her rating will be 1.0 – 1.8, if s/he scores 2, his/her rating becomes 1.9-2.7. The score of 3 becomes 2.8-3.6, while 4 and 5 become 3.7-4.5 and 4.6-5.0, respectively. This measurement procedure has been detailed in Table 3.19 (Chapter 3). The conative readiness was calculated based on the five-point scale reflecting the degree of practices of open scholarly communication. Table 5-7 shows the mapping of the degree of practices to conative

readiness based on the mean score. For instance, if the respondent scored an overall awareness mean of between (1.0 -1.8) he or she is said to have never practice open scholarly communication and is considered not at all ready; while if he or she scored between (4.6-5.0), he or she is said to have frequent practice of open scholarly communication and is considered extremely ready.

Table 5-7 Mapping of the Degree of Practices to Conative Readiness

Scale	Degree of Practices	Mean Range	Conative Readiness
1	Never	1.0-1.8	Not at all Ready
2	Almost Never	1.9-2.7	Rarely Ready
3	Sometimes	2.8-3.6	Somewhat Ready
4	Almost Every time	3.7-4.5	Moderately Ready
5	Frequently	4.6-5.0	Extremely Ready

5.9.1 Conative Readiness of Open Access

Table 5-8 shows the comparison between the mean scores of the fifteen statements on Open Access awareness that clearly revealed the overall practices of Malaysian researchers in this study on their conative readiness towards Open Access, with an overall weighted mean score of 3.14. This implies that Malaysia researchers are somewhat ready in terms of conative readiness of Open Access as gauged through their practices that Open Access is happening or exists.

Table 5-8 Mapping the Mean Score of Open Access Awareness of to Conative Readiness of Open Access

I read OA articles…	MEDIAN	MEAN	SD	CONATIVE READINESS
1. Because they are made available for all to read, use and reuse for free	4.00	4.33	0.702	Moderately Ready
2. Only, if they are of a reputable publisher e.g. PLOS ONE	4.00	3.52	1.085	Moderately Ready
3. If it is from Malaysia Institutional Repositories	3.00	2.93	1.108	Somewhat Ready
4. If it is archive from international repositories	3.00	3.43	1.014	Somewhat Ready
I publish in OA journal…				Somewhat Ready
5. Because of its promptness in publishing	3.00	2.78	1.144	Somewhat Ready
6. Because of its wider coverage	4.00	3.64	1.054	Moderately Ready
7. Because I am encouraged to do so by my employer/funder	3.00	3.24	1.084	Somewhat Ready
8. Because that is the place my peer published	4.00	3.53	1.174	Moderately Ready
9. That are indexed by SCOPUS and WoS only	3.00	3.12	1.159	Somewhat Ready
I do not publish in OA journal…				
10. Because it requires article processing charge (APC)	3.00	2.93	1.108	Somewhat Ready
11. Because they are mostly predatory	2.00	2.61	0.970	Rarely Ready
I cite OA articles…				
12. If it is peer reviewed	3.00	3.17	1.076	Somewhat Ready
13. Because it has high quality reference	2.00	2.19	0.886	Rarely Ready
14. Because they receive higher impact than those of traditional journals	4.00	3.83	0.910	Moderately Ready
I do not cite OA articles…				
15. Because they are of low quality	2.00	2.04	0.823	Rarely Ready
	3.13	3.14		
OVERALL PRACTICES OF OPEN ACCESS		**3.14**		**SOMEWHAT READY**

The overall weighted mean for conative readiness of scholars toward Open Access revealed that Malaysian scholars are somewhat ready (*M= 3.14*, *Mdn=3.13*) reflect somewhat ready for Open Access in terms of their knowledge about it as shown in Table 5-8.

5.9.2 Conative Readiness of Open Data

Table 5-9 shows the comparison between the mean scores of the seven statements on Open Data practices that clearly revealed the overall practices of Malaysian researchers in this study on their conative readiness towards Open Data, with an overall weighted mean

score of 2.92 (*Mdn=3.00*). This implies that Malaysia researchers are somewhat ready in terms of conative readiness of Open Data as gauged through their practices that Open Data is happening or exists.

Table 5-9: Mapping the Mean Score of Open Data Practices of to Conative Readiness of Open Data

I share my research data…	MEDIAN	MEAN	SD	CONATIVE READINESS
1. To support open scientific research for reusability	3.00	2.94	1.202	Somewhat Ready
2. As mandated by the policy of funding agencies	3.00	3.08	1.153	Somewhat Ready
3. To reduce duplication of effort from different researchers attempting to collect the same data sets	3.00	3.07	1.076	Somewhat Ready
4. Mandated by the journal policy.	3.00	3.15	1.114	Somewhat Ready
I do not share data…				
5. Because my data would be misused by others	3.00	2.78	1.056	Somewhat Ready
6. Because there is unclear information on data privacy policy	3.00	2.66	1.016	Somewhat Ready
7. Because of losing publication opportunity	3.00	2.79	1.168	Somewhat Ready
	3.00	2.92	-	
OVERALL PRACTICES OF OPEN DATA		**2.92**	**SOMEWHAT READY**	

5.9.3   Conative Readiness of Open Peer Review

Table 5-10 shows the comparison between the mean scores of the thirteen statements on OPR awareness that clearly revealed the overall practices of Malaysian researchers in this study on their conative readiness towards OPR, with an overall weighted mean score of 3.08. This implies that Malaysia researchers are somewhat ready in terms of conative readiness of OPR as gauged through their practices that OPR is happening or exists. Their median and mode also testify to their practices towards Open Peer Review.

Table 5-10 Mapping the Mean Score of Open Peer Review Awareness to Conative Readiness of Open Peer Review

In OPR, as an open peer reviewer…	MEDIAN	MEAN	SD	CONATIVE READINESS
1. I should be allowed to choose whether, or not to make my participation open	3.00	2.99	0.977	Somewhat Ready
2. I always choose to make my peer review open	3.00	3.08	0.961	Somewhat Ready
3. I always agree to review OPR journal	3.00	2.99	0.977	Somewhat Ready
4. I always make strong comments in OPR	3.00	3.07	0.997	Somewhat Ready
5. I published review reports in order to provide useful information for the reader	3.00	3.06	1.042	Somewhat Ready
6. I published review reports to increase the quality of reviews	3.00	2.95	0.972	Somewhat Ready
7. Making my identity open will make me less likely make strong criticisms	3.00	3.13	1.018	Somewhat Ready
In OPR, as an author…				
8. I am likely to submit to journals that make the reviewers' participation open	4.00	3.48	1.028	Moderately Ready
9. I am more likely to review if I am invited	3.00	3.39	1.022	Somewhat Ready
10. Interaction between me and reviewers will result in better publications	3.00	3.05	1.067	Somewhat Ready
11. Making my identity open is fairer to me as an author	3.00	3.07	0.997	Somewhat Ready
12. I am less likely to agree to review for journals that make reviewer identities open	2.00	2.37	1.170	Rarely Ready
13. I make post –publication commentary on blogs and other social media	4.00	3.41	0.988	Moderately Ready
	3.08	3.08	-	
OVERALL PRACTICES OF OPEN PEER REVIEW		**3.08**		**SOMEWHAT READY**

The overall weighted mean for conative readiness of scholars toward open peer review revealed that Malaysian scholars are both (*M= 3.08*, *Mdn= 3.08*) reflect somewhat ready for Open Peer Review in terms of practices as shown in Table 5-10.

5.10. Summary of Chapter 5

This chapter has described the practices of the Malaysian researchers towards open scholarly communication related to Open Access, Open Data, and Open Peer Review. It is evident that the practice of researchers toward open scholarly communication is still low especially on Open Data and Open Peer Review, probably that they don't want to be associated with bad comments syndrome in science, they are not practicing Open Data

sharing as shown in their mean scores (not consistent) and are not keen about whether to make their review open or not i.e. they displayed somewhat practices respectively. The chapter also has presented the overall readiness of the scholars towards practices open scholarly communication, as well as general experience in open scholarly practices and compare their levels of participation in open access publishing, open data sharing and open peer reviewing and the frequency of practices. The next chapter discusses the perception of the scholars towards open scholarly communication.

CHAPTER 6: AFFECTIVE READINESS OF OPEN SCHOLARLY COMMUNICATION

6.1 Introduction

This chapter answers the third research question of this study: "What are the perceptions exhibited by Malaysian researchers towards Open Access scholarly publishing, Open Data and Open Peer Review?" It describes the affective experience exhibited by Malaysian researchers that leads to how they perceive these three pillars of open science and make decision about them. Perception in this regard refers to positive and negative feelings of scholars towards open scholarly communication. It presents the findings of the study and gauged the degree of perception of open scholarly communication reflecting the affective readiness based on the mean score, while concluding the chapter.

6.2 Malaysian Academic Researchers' Affective Readiness of Open Scholarly Communication

Affective readiness of the Malaysian researchers is gauged through their perception i.e. the feelings, beliefs and understanding of individual toward the benefits of open scholarly communication, which include awareness. Mean values for the perception statements were calculated based on numeric values of the scale item with "very untrue of what I believe" being 1 and "very true of what I believe" being 5.

6.2.1   On the Perception towards Open Access

This section presents the descriptive analysis of four item statements which is aimed at providing detail perception of researchers towards Open Access. Open Access perception

covers the feelings of scholars that Open Access publications receive more citation than non-open access publications; acceptance rate for publishing is relatively high; makes trustworthy accessible in countries where journal subscriptions cannot be afforded; and that Open Access publications have high visibility and wide dissemination of published articles. Considering the mean responses that reflect researchers' perception of Open Access (Figure 6-1), currently there is a unpredictive feeling (Neutral/ Somewhat true of what I believe) (M>3.0) about the perception of Malaysian researchers in terms of Open Access in that scholars believed that Open Access publications:

a) receive more citation than non-open access publications; (M= 3.41, $S.D$=1.051; 75(55.6%) True of what I believe; 25(18.5%) Neutral/ Somewhat true of what I believe).

b) have high visibility and wide dissemination of published articles (M= 3.72, $S.D$=.939; 55(41.0%) True of what I believe; 52(39.0%) Neutral/ Somewhat true of what I believe).

c) makes trustworthy accessible in countries where journal subscriptions cannot be afforded (M= 3.84, $S.D$=.910; 46(34.1%) True of what I believe; 47(35.5%) Neutral/ Somewhat true of what I believe)).

d) leads to acceptance rate for publishing that is relatively high (M= 3.62, $S.D$=0.854; 63(47.4%) True of what I believe; 35(26.0%) Neutral/ Somewhat true of what I believe).

From the findings, it is interpreted that although the level of perception is very positive on Open Access among the Malaysian researchers, yet, many of them still have mixed feelings about Open Access. As it shows in their responses and mean score, which

is not consistent, many of them hide under unpredictive/neutral i.e. Somewhat true of what I believe.
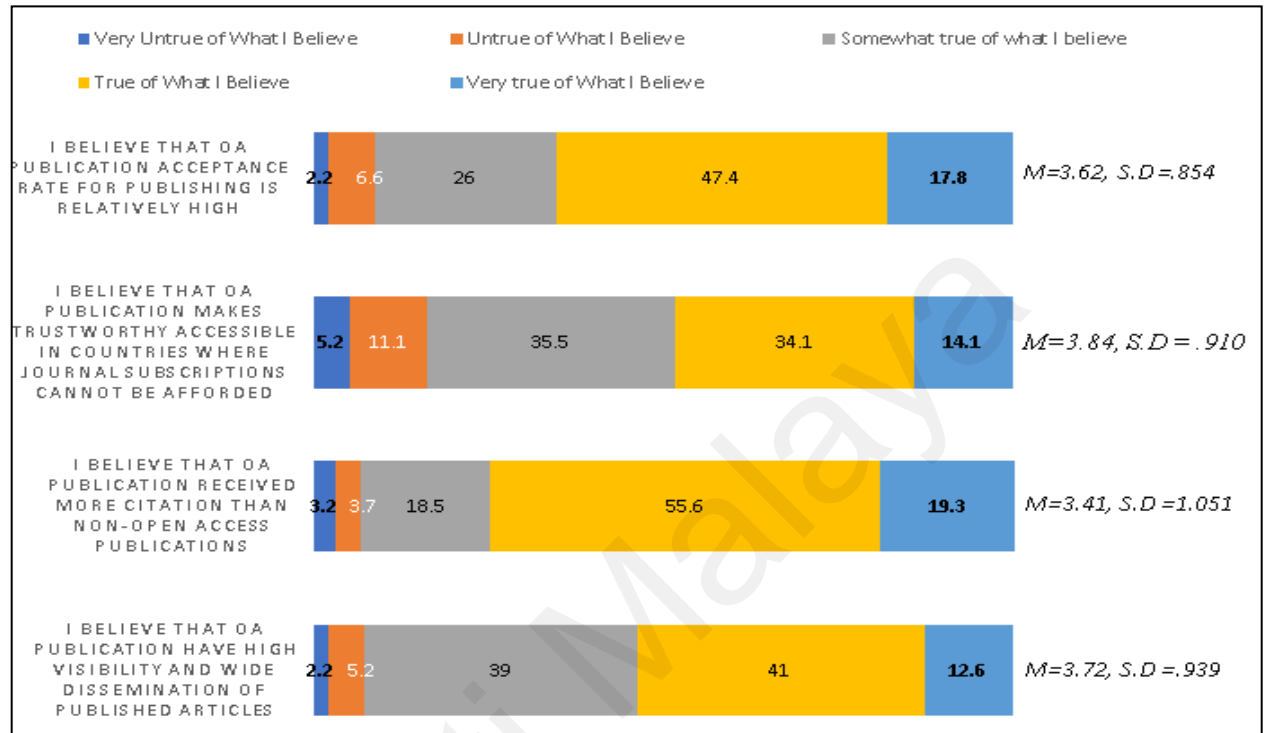
Note: 1= Very untrue of what I believe, 2= untrue of what I believe, 3= Neutral/ Somewhat true of what I believe 4= True of what I believe 5= Very true of what I believe

Figure 6-1: Malaysian Researchers' Perception toward Open Access Publishing

6.2.2 On the Perception towards Open Data

This section gives the overall perception of Malaysia researchers towards Open Data. Perception of Open Data covers the diverse motivations to share their data driven by personal decision. Consistent with other studies on Open Science perception (Zuiderwijk and Spiers 2019; Curty et al. 2017; Fecher, Friesike and Hebing 2015). Figure 6-2 presents the descriptive analysis of twelve item statements which is aimed at providing detail perception of Malaysian academic researchers towards Open Data. Considering the mean

responses that reflect researchers' practices towards Open Data, currently there is a transformative feeling about open data sharing by the scholars in that researchers:

a) believe that Open Data improves publishing transparency (*M*=3.76, *S.D*=.866; 72 (53.3%) True of what I believe; 31 (23.0%) Neutral/ Somewhat true of what I believe).

b) believe that Open Data may contribute to improve data collection and management (*M*=3.73, *S.D* =.866; 67 (49.6%) True of what I believe; 37 (27.4%) Neutral/ Somewhat true of what I believe).

c) believe that Open Data promotes competition of ideas and research (*M*=3.73, *S.D* =.950; 63 (46.7%) True of what I believe; 33 (24.4%) Neutral/ Somewhat true of what I believe).

d) believe that Open Data allows re-analysis of data for different purposes from the ones originally conceive (*M*=3.72, *S.D* =.843; 71 (52.6%) True of what I believe; 36 (26.7%) Neutral/ Somewhat true of what I believe).

e) believe that Open Data allows verification of scientific results (*M*=3.70, *S.D* =.831; 70 (51.9%) True of what I believe; 37 (27.4%) Neutral/ Somewhat true of what I believe).

f) believe that Open Data fosters good scientific collaboration (*M*=3.67, *S.D* =.855; 62 (45.9%) True of what I believe; 43 (31.9%) Neutral/ Somewhat true of what I believe).

g) believe that Open Data increases research integrity (*M*=3.64, *S.D* =.869; 83 (61.5%) Very True of what I believe; 66 (48.9%) True of what I believe).

However, believing that volumes of data might discourage scholars from sharing data received a lower belief score (*M*=3.46, *S.D* =.944; 52 (38.5%) True of what I believe; 50 (37.0%) Neutral/ Somewhat true of what I believe). Likewise, the statement "Open Data practices are very hard to execute in developing nations" has a lower belief score (*M*=3.39, *S.D* =1.197; 46 (34.1%) True of what I believe; 37 (27.4%) Neutral/ Somewhat true of what

I believe). Further analysis revealed that the respondents in general do not highly regard that Open Data helps to undertake expensive data collection efforts easily (*M*=3.39, *S.D* =.955; 13 (9.6%) Very true of what I believe; 52(38.5%) True of what I believe, and Neutral/ Somewhat true of what I believe respectively). There is this negative perception that Open Data contains sensitive or copyrighted information, which has disclosure (*M*=3.30, *S.D* =.947; 44 (32.6%) True of what I believe; 57 (42.2%) Neutral/ Somewhat true of what I believe), and that Open Data lacks well-defined technical standards that discourage sharing and reuse of data (*M*=3.27, *S.D* =.956; 52 (38.5%) True of what I believe; 51 (37.8%) Neutral/ Somewhat true of what I believe).

These findings show that although the level of perception towards Open Data among the Malaysian researchers is relatively low, however, a substantial portion of them still have a reservation as seen in their responses and mean scores (Figure 6-2).
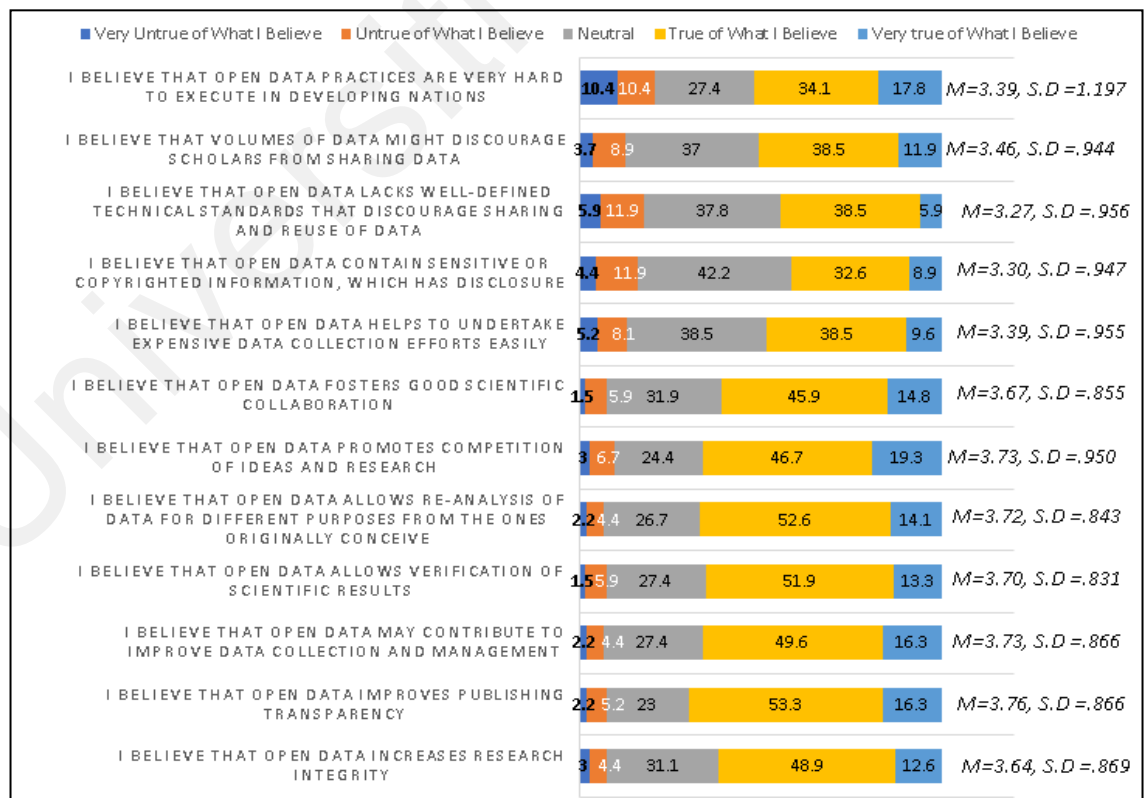
Note:1=Very untrue of what I believe, 2= Untrue of what I believe, 3= Neutral/ Somewhat True of what I believe, 4= True of what I believe 5=Very true of what I believe

6.2.3 On the Perception towards Open Peer Review

This section reports on the perception of Malaysian researchers on Open Peer Review. It covers the feelings that scholars believe that Open Peer Review helps in ensuring control in scientific communication; upholds the integrity of science by making the reviewers' identities known to authors; helps reviewers to play an active role in the community participation; is unsustainable because there are too few willing reviewers; timing is not consistent in some journals and; receives unanimous negative reviews/reports (Bravo et al. 2019; Segado-Boj, Martin-Quevedo and Prieto-Gutierrez, 2018; Ross-Hellauer, 2017; van Rooyen et al. 2010). Figure 6-3 presents the descriptive analysis of six item statements which is aimed at providing detail researchers' perception towards Open Peer Review. Considering the mean responses that reflect researchers' perception towards Open Peer Review, at present, there is a mixed feeling in perception of Open Peer Review among Malaysia researchers ($M < 3.7$), although, some are still skeptical about Open Peer Review:

a) I believe that OPR upholds the integrity of science by making the reviewers' identities known to authors ($M=3.52$, $S.D =.880$; 65 (48.1%); 43 (31.9%) Neutral/ Somewhat true of what I believe).

b) I believe that OPR helps in ensuring control in scientific communication ($M=3.48$, $S.D =.880$; 57 (42.2%); 51(37.8%) Neutral/ Somewhat true of what I believe).

c) I believe that OPR helps reviewers to play an active role in the community participation ($M=3.33$, $S.D =.937$; 46 (34.1%); 51(37.8%) Neutral/ Somewhat true of what I believe).

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d) I believe that OPR is unsustainable because there are too few willing reviewers (*M*=3.31, *S.D* =.902; 45 (33.3%); 58 (43.0%) Neutral/ Somewhat true of what I believe).

e) I believe that OPR timing is not consistent in some journals (*M*=3.15, *S.D* =.851; 34(25.2%); 71(52.6%) Neutral/ Somewhat true of what I believe).

f) I believe that OPR receives unanimous negative reviews/reports (*M*=2.50, *S.D* =1.196; 36(26.7%) Untrue of what I believe; 34(25.2%) Neutral/ Somewhat true of what I believe).

These findings show that there is a higher unpredictive/neutral level of perception of Open Peer Review among the Malaysian researchers, probably the respondents find it difficult to agree with the statement to being open as many of them were indifferent in their responses towards the statements (Figure 6.3).
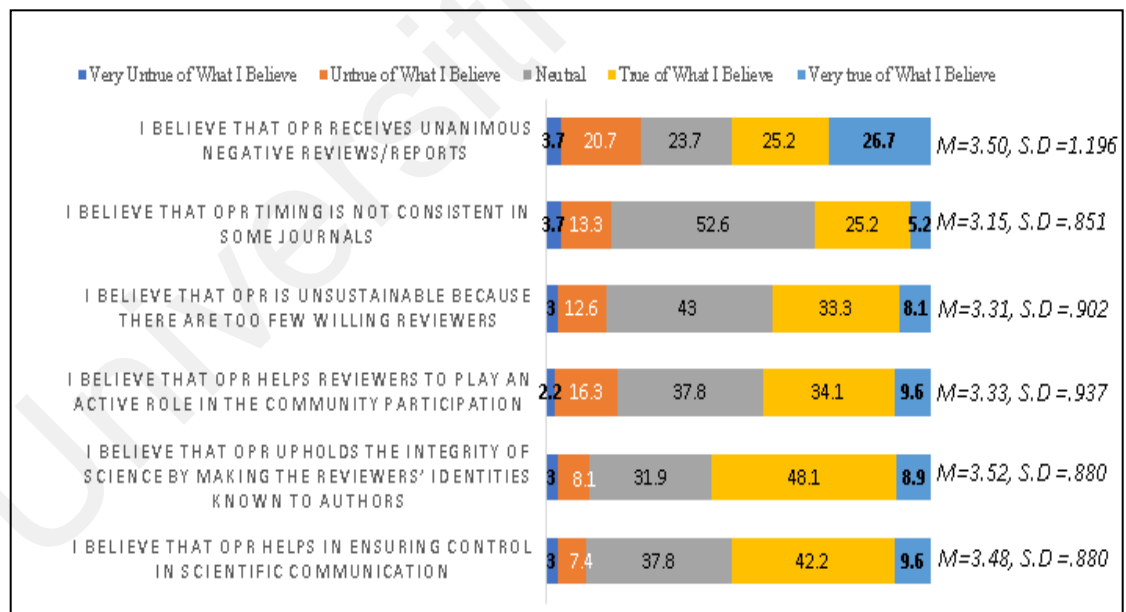
Note:1=Very untrue of what I believe, 2= Untrue of what I believe, 3= Neutral/Somewhat true of what I believe, 4= True of what I believe 5=Very true of what I believe

Figure 6-3: Malaysian Researchers' Perception Toward Open Peer Review (N=135)

6.3 Perceived Disincentives of Open Scholarly Communication

This section presents findings that reflect the disincentives perceived by researchers deterring them from practicing open scholarly communication. Subsection 6.3.1 discusses the perceived disincentives of Open Access; 6.3.2 on the disincentives of Open Data, while sub-section 6.3.3 discusses the disincentives of Open Peer Review as reviewers and authors.

6.3.1 Disincentives of Open Access

This section is a continuation of the respondents' perceptual experience in Open Access publishing where earlier findings in Chapter 5 found that Malaysia researchers are somewhat ready in terms of conative readiness of Open Access as gauged through their Open Access publishing practices. Therefore, one would expect, at a minimum, that there are barriers that would discourage or disincentivize Open Access publishing and slow its the uptake. Respondents were asked to rate four statements that relate to why they are not favouring Open Access publishing. Figure 6.4 illustrates that at least 45 percent Malaysian researchers (from the total percentage of Very True of Me, True of Me and Somewhat True of Me) do not:

(a) read Open Access articles not because of low quality (M= 2.04, $S.D$ = .823)

(b) cite article published in Open Access because of low quality (M= 2.62, $S.D$ =1.015)

(c) publish in an Open Access journals because it requires article processing charge (APC), (M= 2.93; $S.D$=1.108).

(d) publish in Open Access journals because most are predatory (M=2.93, $S.D.$=1.108)
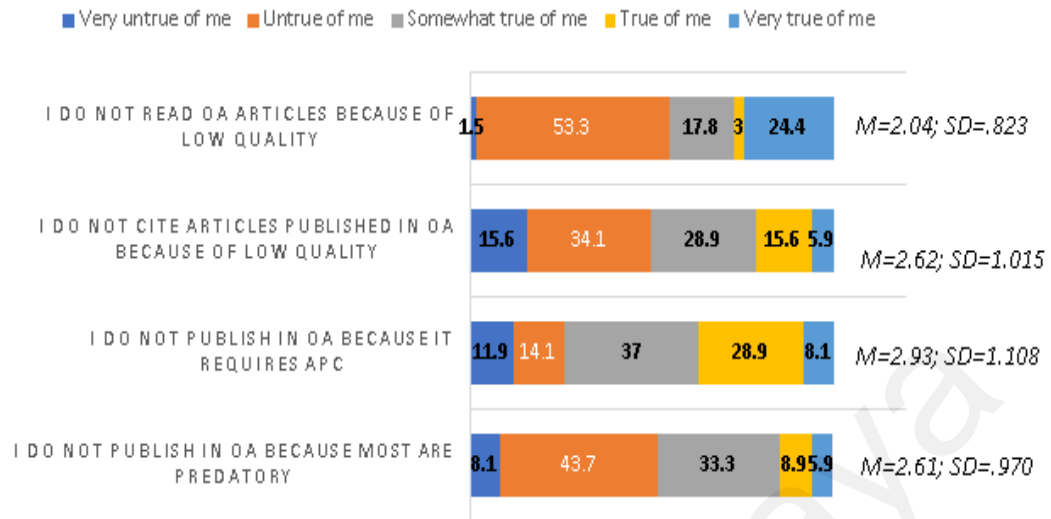
I DO NOT READ OA ARTICLES BECAUSE OF LOW QUALITY	1.5	53.3	17.8 3	24.4	M=2.04; SD=.823
I DO NOT CITE ARTICLES PUBLISHED IN OA BECAUSE OF LOW QUALITY	15.6	34.1	28.9	15.6 5.9	M=2.62; SD=1.015
I DO NOT PUBLISH IN OA BECAUSE IT REQUIRES APC	11.9 14.1	37	28.9	8.1	M=2.93; SD=1.108
I DO NOT PUBLISH IN OA BECAUSE MOST ARE PREDATORY	8.1	43.7	33.3	8.9 5.9	M=2.61; SD=.970

Note:1=Very untrue of me, 2= Untrue of me, 3= Somewhat true of me, 4= True of me 5=Very true of me

Figure 6-4: Disincentives of Open Accesss Perceived by Malaysian Researchers (N=135)

6.3.2   Disincentives of Open Peer Review as Reviewers/Authors

This section explores what disincentivize reviewers and authors from Open Peer Review. Figure 6-5 reflects the incentivize responses of the reviewers and authors on what disincentivize them from practicing OPR. Considering the mean responses that reflect the respondents' practices toward OPR. The survey showed reviewers exhibiting somewhat more interest to "less likely to agree to review for journals that make reviewer identities open" (M=3.13; SD =1.018). This expression seems to be more reluctance to accept OPR practices. They also show somewhat true belief that as an author making the identity open will result in less likely to make strong criticism (M=2.37; $S.D.$=1.170). this shows that actions speak volumes of the respondents' practices toward OPR. There seems to be a rather strong push back against OPR. This reflects that for both statements, the majority (about 65%) shows little interest of OPR as a tool to foster Open Science by

making the classical peer review more transparent and accountable, characteristics which connects OPR to Open Science.

From the foregoing, the findings reveal that the majority of the reviewers and authors were not actually practicing openness judging from their responses and mean scores in the analysis which is not consistent. Also, the higher their mean score and standard deviation, the more disincentives to researcher's readiness to practice Open Peer Review. Therefore, journal editors and funders as well as advocates of openness in research and scholarly communication should create more awareness and training both for the reviewers and the editors themselves in order to compel authors with the policies of openness.

Also, incentives for encouraging openness should be enforced as can be seen with some journals that have visible presence in Publons that verifies and showcases peer review activity across all disciplines and allow reviewers to showcase their activity. Publons seeks to address the problem of incentives in peer review by turning peer review into measurable research outputs, and so more enlightenment is needed and both reviewers and authors should be recognized and acknowledged for their great efforts in order to encourage openness.
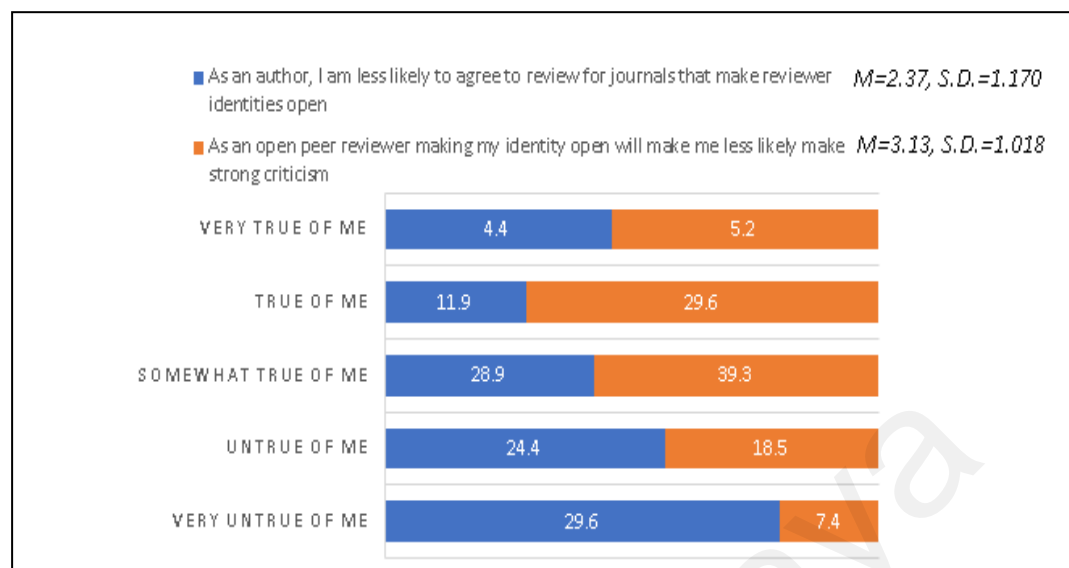
Note: 1=Very untrue of me, 2= Untrue of me, 3= Somewhat true of me, 4= True of me, 5= Very True of me

Figure 6-5: Disincentives of Open Peer Review as Perceived by Malaysian Researchers (N=135)

6.3.3 Other comments

The survey also has open-ended questions that capture Malaysian academic researchers' perception toward open scholarly communication (i.e., Open Access, Open Data, and Open Peer Review). Out of the comments given, statements reflecting positivity are such as 'Open Access should be a standard practice in the future', 'It is a good effort', 'very, very good'. One respondent has this to say, 'Open Peer Review is a good way to improve the quality of manuscript, but it might interrupt the review process (my opinion only)'. Few of them perceived that Open Access, Open Data and Open Peer Review are 'Too expensive and not objective', 'Publish low quality manuscripts and thus gives poor perception among researchers on Open Science', reflecting negative perceptions. To sum all their comments as said in the beginning, many of them were not in full support of open scholarly communications, probably because of lack of awareness and practices.

However, more effort is needed to transform their understanding and perception, that will eventually lead to practices open scholarly communication.

6.4 Affective Readiness of Open Scholarly Communication

This section presents the affective readiness of the researchers toward open scholarly communication based on the findings obtained. Each of the three pillars of open scholarly communication is captured in answering the research question three in this chapter. The statements captured the key elements of open scholarly communication in the context of the degree of perception of Open Aaccess, Open Data and OPR. Additionally, the perception statements described served as the inputs to the topology that generated the five scales for very pessimistic or very transformative about Open Access, Open Data and OPR. Their mean and standard deviations were calculated while grouped them based on very transformative or very pessimistic perception in the indicator. The rating was based on 5 – Likert scales and if a researcher scores 1, his or her rating will be 1.0 – 1.8, if s/he scores 2, his/her rating becomes 1.9-2.7. The score of 3 becomes 2.8-3.6, while 4 and 5 become 3.7-4.5 and 4.6-5.0, respectively. This measurement procedure has been detailed in Chapter 3, Table 3.19. The affective readiness was calculated based on the five-point scale reflecting the degree of perception of open scholarly communication. Table 6-1 shows the mapping of the degree of perception to affective readiness based on the mean score. For instance, if the respondent scored an overall perception mean of between (1.0 -1.8) he or she is said to be very untrue toward the feeling for open scholarly communication and is considered not at all ready while if he or she scored between (4.6-5.0), he or she is said to be very true toward the feeling for open scholarly communication and is considered extremely ready.

Table 6-1 Mapping of the Degree of Perception of to Affective Readiness

Scale	Degree of Perception	Mean Range	Affective Readiness
1	Very Untrue of Me	1.0-1.8	Not at all Ready
2	Untrue of Me	1.9-2.7	Rarely Ready
3	Somewhat True of Me	2.8-3.6	Somewhat Ready
4	True of Me	3.7-4.5	Moderately Ready
5	Very True of Me	4.6-5.0	Extremely Ready

6.4.1 Affective Readiness of Open Access

Table 6-2 shows the comparison between the mean scores of the nine statements on open access perception that clearly revealed the overall feelings of Malaysian researchers in this study on their affective readiness toward Open Access, with an overall weighted mean score of 3.17. This is also reflected from the overall weighted median (*Mdn*=3.20). This implies that Malaysia researchers are somewhat ready/unpredictive in terms of affective readiness of Open Access as gauged through their perception that Open Access is happening or exists.

Table 6-2 Mapping the Mean Score of Open Access Awareness to affective Readiness of Open Access

S/N	I believe that OA publication …	MEDIAN	MEAN	SD	AFFECTIVE READINESS
1	Received more citation than non-open access publications	4.00	3.84	.910	Moderately Ready
2	Acceptance rate for publishing is relatively high	4.00	3.72	.939	Moderately Ready
3	Create challenges of copyright and intellectual property among scholars	4.00	3.72	.939	Moderately Ready
4	Have high visibility and wide dissemination of published articles	4.00	3.62	0.854	Moderately Ready
5	Makes trustworthy accessible in countries where journal subscriptions cannot be afforded	3.00	3.41	1.051	Somewhat Ready
	I do not…				
6	Read Open Access article because they are of low quality	2.00	2.04	.823	Rarely Ready
7	Cite article published in OA Journal because they are of low quality	3.00	2.62	1.015	Somewhat Ready
8	Publish in an OA Journals because it requires article processing charge APC	3.00	2.93	1.108	Somewhat Ready
9	Publish in an OA Journals because they are mostly predatory	2.00	2.61	.970	Rarely Ready
OVERALL PERCEPTION OF OPEN ACCESS		3.20	3.17	-	**SOMEWHAT READY**

The overall weighted mean for affective readiness of scholars toward Open Access revealed that Malaysian scholars are both somewhat ready (*M= 3.17*, *3.20* median) reflect unpredictive ready for Open Access in terms of their opinion about it as shown in Table 6-2.

6.4.2 Affective Readiness of Open Data

Table 6-3 shows the comparison between the mean scores of the fifteen statements on open data perception that clearly revealed the overall feelings of Malaysian researchers in this study on their affective readiness towards Open Data, with an overall weighted mean

score of 3.40. This implies that Malaysia researchers are somewhat ready/unpredictive in terms of affective readiness of open data as gauged through their opinion/feelings that open data is happening or exists.

Table 6-3 Mapping the Mean Score of Open Data Perception to Affective Readiness of Open Data

S/N	STATEMENTS	MEDIAN	MEAN	SD	AFFECTIVE READINESS
1	I believe that Open Data increases research integrity	4.00	3.64	.869	Moderately Ready
2	I believe that Open Data improves publishing transparency	4.00	3.76	.866	Moderately Ready
3	I believe that Open Data may contribute to improve data collection and management	4.00	3.73	.866	Moderately Ready
4	I believe that Open Data allows verification of scientific results	4.00	3.70	.831	Moderately Ready
5	I believe that Open Data allows re-analysis of data for different purposes from the ones originally conceive	4.00	3.72	.843	Moderately Ready
6	I believe that Open Data promotes competition of ideas and research	4.00	3.73	.950	Moderately Ready
7	I believe that Open Data fosters good scientific collaboration	4.00	3.67	.855	Moderately Ready
8	I believe that Open Data helps to undertake expensive data collection efforts easily	3.00	3.39	.955	Somewhat Ready
9	I believe that Open Data contain sensitive or copyrighted information, which has disclosure	3.00	3.30	.947	Somewhat Ready
10	I believe that Open Data lacks well-defined technical standards that discourage sharing and reuse of data	3.00	3.27	.956	Somewhat Ready
11	I believe that volumes of data might discourage scholars from sharing data	4.00	3.46	.944	Moderately Ready
12	I believe that Open Data practices are very hard to execute in developing nations	4.00	3.39	1.197	Moderately Ready
13	I do not share data because the probability of losing publication opportunity	3.00	2.79	1.168	Somewhat Ready
14	I do not share data because my data would be misused by others	3.00	2.78	1.056	Somewhat Ready
15	I do not share data because there is unclear information data policy	3.00	2.66	1.016	Somewhat Ready
OVERALL DEGREE OF AFFECTIVE OF OPEN DATA		3.60	3.40		**SOMEWHAT READY**

The overall weighted mean for affective readiness of scholars toward Open Data revealed that Malaysian scholars are somewhat ready (*M= 3.40, 3.60* median) reflect somewhat ready/unpredictive ready for open data in terms of their opinion about it as shown in Table 6-3.

6.4.3   Affective Readiness of Open Peer Review

Table 6-4 shows the comparison between the mean scores of the eight statements on Open Peer Review perception that clearly revealed the overall feelings of Malaysian researchers in this study on their affective readiness towards Open Peer Review, with an overall weighted mean score of 3.10. This implies that Malaysia researchers are somewhat ready/Unpredictive ready in terms of affective readiness of Open Peer Review as gauged through their opinion/feelings that Open Peer Review is happening or exists.

Table 6-4 Mapping the Mean Score of OPR Perception of to Affective Readiness of OPR

S/N	STATEMENT	MEDIAN	MEAN	SD	AFFECTIVE READINESS
1	I believe that OPR helps in ensuring control in scientific communication	4.00	3.48	.880	Moderately Ready
2	I believe that OPR upholds the integrity of science by making the reviewers' identities known to authors	4.00	3.52	.880	Moderately Ready
3	I believe that OPR helps reviewers to play an active role in the community participation	3.00	3.33	.937	Somewhat Ready
4	I believe that OPR is unsustainable because there are too few willing reviewers	3.00	3.31	.902	Somewhat Ready
5	I believe that OPR timing is not consistent in some journals	3.00	3.15	.851	Somewhat Ready
6	I believe that OPR receives unanimous negative reviews/reports	4.00	2.50	1.196	Somewhat Ready
7	As an open peer reviewer making my identity open will make me less likely make strong criticism	3.00	3.13	1.018	Somewhat Ready
8	As an author, I am less likely to agree to review for journals that make reviewer identities open	4.00	2.37	1.170	Somewhat Ready
OVERALL PERCEPTION OF OPEN PEER REVIEW		3.50	**3.10**		**SOMEWHAT READY**

The overall weighted mean for affective readiness of scholars toward open data revealed that Malaysian scholars are somewhat ready (*M= 3.10*, *3.50* median) reflect unpredictive ready for open peer review in terms of their opinion about it as shown in Table 6-4.

6.5 Summary of Chapter 6

This chapter presented the analysis and findings on the perception of Open Scholarly Communication among Malaysian scholars. From the analysis, there is evident that many

of the researchers in Malaysia believed Open Peer Review will ensure transparent, provide honest feedback, increased motivation and improve science, but the issue of timing in reviewing is a challenge and fear of negative comments is a concern to them. There is transformative belief that Open Data increases integrity, improve publishing transparent and used for different purposes yet, many of them were still skeptical about the sensitive or copyrighted information, which has disclosure there is evidence that many of the authors does not believe in openness in peer review. There is a mixed feeling in their levels of evidence that many of the authors do not like criticism and wrong or negative review reports on them. Therefore, funders and advocates of Open Science must look for ways of encouraging researchers and authors to involve in open scholarly communication.

Furthermore, the chapter describes the steps taken to gauge the readiness of Malaysian academic researchers towards open scholarly communication. The findings showed that Malaysian researchers are somewhat ready for Open Access, Open Data and Open Peer Review respectively in terms of affective readiness.

CHAPTER 7: DIFFERENCES BETWEEN GENDER, DISCIPLINE AND TYPES OF RESEARCHERS' SCHOLARLY COMMUNICATION

7.1 Introduction

This chapter answers the fourth research question on difference between gender, discipline, and types of researchers among Malaysian academic researchers and readiness of open scholarly communication. In order to answer this RQ4, a total number of 27 sub-hypothesis were postulated using independent sample t-test. The chapter summarizes its reports based on the findings obtained from the study while concluding the chapter.

7.2 Descriptive Analysis of Participants' Cognitive, Conative and Affective Readiness

This section presents the cognitive, conative, and affective readiness of the researchers toward open scholarly communication based on the findings obtained. Each of the three pillars of open scholarly communication is captured in answering the research hypothesis in this chapter. The statements captured the key elements of open scholarly communication in the context of the degree/level of awareness of Open Access, Open Data and Open Peer Review also, the statement described in this section served as the inputs to the topology that generated the five scales for the readiness of Malaysia academic researchers' awareness of Open Access, Open Data and Open Peer Review.

Table 7-1: Overall mean cognitive, conative, and affective readiness of the researchers' gender toward Open Access, Open Data, and Open Peer Review

Open Access	Gender	N	Mean	Std. Deviation	Std. Error Mean
Cognitive Readiness	M	50	4.17	1.217	0.172
	F	85	3.88	1.081	0.117
Conative Readiness	M	50	3.00	1.050	0.148
	F	85	3.04	1.004	0.111
Affective Readiness	M	50	3.57	1.069	0.152
	F	85	3.57	0.941	0.242
Open Data					
Cognitive Readiness	M	50	3.58	1.020	0.144
	F	85	3.35	0.991	0.107
Conative Readiness	M	50	4.25	0.458	0.065
	F	85	4.36	0.471	0.051
Affective Readiness	M	50	3.50	0.675	0.095
	F	85	3.48	0.539	0.058
Open Peer Review					
Cognitive Readiness	M	50	3.01	0.782	0.111
	F	85	3.04	0.663	0.072
Conative Readiness	M	50	2.89	0.489	0.069
	F	85	2.85	0.505	0.055
Affective Readiness	M	50	4.68	0.367	0.052
	F	85	4.73	0.375	0.041

Note:1=Male; 2=Female
Note: Not at all ready= 1.0-1-8; Not ready= 1.9-2.7. Somewhat ready= 2.8-3.6;
Moderately ready= 3.7-4.5; Extremely ready= 4.6-5.0

Table 7-1 shows the overall mean, standard deviation and standard error for cognitive, conative, and affective readiness of researchers' gender toward Open Access (*cognitive readiness reveals male M= 4.17, S.D= 1.217; on conative readiness female M= 3.04, S.D= 1.004, while on affective readiness male M= 3.57, S.D= 1.069); on* Open Data (*cognitive*

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readiness male M= 3.58, S.D= 1.020; conative readiness shows female M= 4.36, S.D= 0.471, while affective readiness male M= 3.50, S.D= 0.675); and on Open Peer Review (*cognitive readiness female M= 3.04, S.D= 0.663; conative readiness male M= 2.89, S.D= 0.489; while affective readiness reveals female M= 4.73, S.D= 0.375.* This result implies that Malaysia researchers (male or female) are somewhat ready in terms of cognitive, conative, and affective readiness of open scholarly communication as gauged through their readiness toward open scholarly communication i.e., Open Access, Open Data, and Open Peer Review.

7.3 Findings from Hypotheses Testing

This section reports on the three main hypothesis and 27 sub-hypotheses.

7.3.1 H1: There is a significant difference between gender of Malaysian academic researchers and their readiness for open scholarly communication (i.e. Open Access, Open Data and Open Peer Review)

i)   Cognitive, Conative, and Affective Readiness of Open Access

In Table 7-2, an independent -samples t-test was conducted to determine cognitive, conative, and affective readiness for Open Access in relation to gender and Malaysia academic researchers.

Table 7-2: The *difference between Gender and* Cognitive, Conative and Affective Readiness for Open Access among *Malaysian academic researchers*

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
COGNITIVE READINESS OF OPEN ACCESS	Equal variances assumed	1.126	.291	1.697	133	.092	1.142	.673	-.190	2.474
	Equal variances not assumed			1.599	85.325	.113	1.142	.714	-.278	2.562
CONATIVE READINESS OF OPEN ACCESS	Equal variances assumed	.860	.355	-.540	133	.590	-.575	1.065	-2.681	1.530
	Equal variances not assumed			-.511	85.994	.611	-.575	1.126	-2.815	1.664
AFFECTIVE READINESS OF OPEN ACCESS	Equal variances assumed	3.360	.069	.261	133	.794	.147	.562	-.965	1.259
	Equal variances not assumed			.237	75.859	.813	.147	.620	-1.087	1.381

Based on Table 7-1, the results suggest the following:

H1a: There is a significant difference between gender of Malaysian academic researchers and cognitive readiness for Open Access.

There was no significant difference in scores for gender *(Male= 50; M=4.17, S.D=1.217),* and *(Female=85; M=3.88, S.D=1.081)* on cognitive readiness of Open Access among Malaysian academic researchers; *t (133)= 1.697, p=0.092* . Therefore, H1a is rejected

H1b: There is a significant difference between gender of Malaysian academic researchers and conative readiness for Open Access

There was no significant difference in scores for gender *(Male= 50; M=3.00, S.D=1.050),* and *(Female=85; M=3.04, S.D=1.004)* on conative readiness of Open Access among Malaysian academic researchers; *t (133)= -.540, p=0.590* Therefore, the H1b is rejected.

H1c: There is a significant difference between gender of Malaysian academic researchers and affective readiness for Open Access.

The findings showed that there was no a significant difference in scores for gender *(Male= 50; M=3.57, S.D=1.069),* and *(Female=85; M=3.57, S.D=0.941),* on affective readiness of Open Access among Malaysian academic researchers; *t (133)= .261, p=0.794.* Therefore, the H1c is rejected.

ii)   Cognitive, Conative, and Affective Readiness of Open Data

In Table 7-3, an independent -samples t-test was conducted to determine cognitive, conative, and affective readiness for Open Data in relation to gender and Malaysia academic researchers. Based on Table 7-1, the results suggest the following:

Table 7-3: The *difference between Gender and* **Cognitive, Conative and Affective Readiness for Open Data among** *Malaysian academic researchers*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
COGNITIVE READINESS OF OPEN DATA	Equal variances assumed	.047	.828	1.289	133	.199	1.151	.892	-.614	2.916
	Equal variances not assumed			1.280	100.463	.204	1.151	.899	-.633	2.934
CONATIVE READINESS	Equal variances assumed	.380	.539	-1.317	133	.190	-.766	.582	-1.916	.385

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OF OPEN DATA	Equal variances not assumed			-1.326	105.192	.188	-.766	.577	-1.911	.379
AFFECTIVE READINESS OF OPEN DATA	Equal variances assumed	2.537	.114	.181	133	.856	.248	1.368	-2.457	2.954
	Equal variances not assumed			.171	85.121	.865	.248	1.452	-2.639	3.135

H1d: There is a significant difference between gender of Malaysian academic researchers and cognitive readiness for Open Data.

There was no significant difference in scores for gender *(Male= 50; M=3.58, S.D=1.020),* and *(Female=85; M=3.35, S.D=0.991)* on cognitive readiness of open data among Malaysian academic researchers; *t (133)= 1.289, p=0.199.* Therefore, H1d is rejected

H1e: There is a significant difference between gender of Malaysian academic researchers and conative readiness for Open Data

There was no significant difference in scores for gender *(Male= 50; M=4.25, S.D=0.458),* and *(Female=85; M=4.36, S.D=0.471)* on conative readiness of open data among Malaysian academic researchers; *t (133)= -1.317, p=0.190* Therefore, the H1e is rejected.

H1f: There is a significant difference between gender of Malaysian academic researchers and affective readiness for Open Data

The findings showed that there was no a significant difference in scores for gender *(Male= 50; M=3.50, S.D=0.675),* and *(Female=85; M=3.48, S.D=0.539),* on affective

readiness of Open Data among Malaysian academic researchers; *t (133)= .181, p=0.856.* Therefore, the H1f is rejected.

iii) Cognitive, Conative, and Affective Readiness of Open Peer Review

In Table 7-4, an independent -samples t-test was conducted to determine cognitive, conative, and affective readiness for Open Peer Review in relation to gender and Malaysia academic researchers. Based on Table 7-1, the results suggest the following:

Table 7-4: The *difference between Gender and* **Cognitive, Conative and Affective Readiness for Open Peer Review among** *Malaysian academic researchers*

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
COGNITIVE READINESS OF OPEN PEER REVIEW	Equal variances assumed	.664	.417	-.216	133	.829	-.136	.632	-1.387	1.114
	Equal variances not assumed			-.207	89.840	.837	-.136	.660	-1.448	1.175
CONATIVE READINESS OF OPEN PEER REVIEW	Equal variances assumed	.113	.737	.348	133	.729	.340	.978	-1.595	2.275
	Equal variances not assumed			.351	105.573	.727	.340	.970	-1.583	2.263
AFFECTIVE READINESS OF OPEN PEER REVIEW	Equal variances assumed	.987	.322	-.745	133	.458	-.296	.398	-1.084	.491
	Equal variances not assumed			-.749	104.699	.456	-.296	.396	-1.081	.488

H1g: There is a significant difference between gender of Malaysian academic researchers and cognitive readiness for Open Peer Review

There was no significant difference in scores for gender *(Male= 50; M=3.01, S.D=0.782),* and *(Female=85; M=3.04, S.D=0.664)* on cognitive readiness of open peer review among Malaysian academic researchers; *t (133)= -.216, p=0.829.* Therefore, H1g is rejected

H1h: There is a significant difference between gender of Malaysian academic researchers and conative readiness for Open Peer Review

There was no significant difference in scores for gender *(Male= 50; M=2.89, S.D=0.489),* and *(Female=85; M=2.85, S.D=0.505)* on conative readiness of open peer review among Malaysian academic researchers; *t (133)= .348, p=0.729* Therefore, the H1h is rejected.

H1i: There is a significant difference between gender of Malaysian academic researchers and affective readiness for Open Peer Review

There was no significant difference in scores for gender *(Male= 50; M=4.68, S.D=0.367),* and *(Female=85; M=4.73, S.D=0.375)* on conative readiness of open peer review among Malaysian academic researchers; *t (133)= -.745, p=0.458* Therefore, the H1i is rejected.

Therefore, based on independent -samples t-test conducted, H1 that states there is a significant difference between gender of Malaysian academic researchers and their readiness for open scholarly communication (i.e. Open Access, Open Data and Open Peer Review) is hereby rejected indicating there is no difference between the cognitive, conative, and affective readiness of male and female respondents as regards to open scholarly communication therefore, the researcher rejects H1 in entirety. The result suggests that the cognitive readiness, conative readiness, and affective readiness of male or female

respondents does not necessarily have effect on the gender of the respondents in relation to

open scholarly communication i.e. Open Access, Open Data, and Open Peer Review.

7.3.2 H2: There is a significant difference between discipline of Malaysian academic researchers and their readiness for open scholarly communication (i.e. Open Access, Open Data and Open Peer Review)

Table 7-5: Overall mean cognitive, conative, and affective readiness of the researchers' Discipline toward Open Access, Open Data, and Open Peer Review

Open Access	Discipline	N	Mean	Std. Deviation	Std. Error Mean
Cognitive Readiness	Science	94	4.03	1.009	0.104
	Non-Science	41	3.89	0.807	0.126
Conative Readiness	Science	94	3.07	0.424	0.044
	Non-Science	41	3.10	0.331	0.052
Affective Readiness	Science	94	2.99	0.555	0.057
	Non-Science	41	3.02	0.451	0.070
Open Data					
Cognitive Readiness	Science	94	3.39	1.050	0.108
	Non-Science	41	3.53	0.894	0.1396
Conative Readiness	Science	94	4.31	0.488	0.050
	Non-Science	41	4.34	0.423	0.066
Affective Readiness	Science	94	3.76	0.680	0.070
	Non-Science	41	3.81	0.533	0.083
Open Peer Review					
Cognitive Readiness	Science	94	3.06	0.704	0.073
	Non-Science	41	2.95	0.718	0.112
Conative Readiness	Science	94	2.85	0.505	0.052
	Non-Science	41	2.90	0.482	0.022
Affective Readiness	Science	94	4.69	0.394	0.041
	Non-Science	41	4.77	0.312	0.049

Note:1= Science; 2= Non-Science
Note: Not at all ready= 1.0-1-8; Not ready= 1.9-2.7. Somewhat ready= 2.8-3.6;
Moderately ready= 3.7-4.5; Extremely ready= 4.6-5.0

Table 7-5 shows the overall mean, standard deviation and standard error for cognitive,

conative, and affective readiness of researchers' discipline toward Open Access (*cognitive*

readiness Science M= 4.03, S.D= 1.009; conative readiness Non-Science M= 3.10, S.D=

0.331, and affective readiness Non-Science M= 3.02, S.D= 0.451. On Open Data (*cognitive*

readiness Non-Science M= 3.53, S.D= 0.894; conative readiness Non-Science M= 4.34,

S.D= 0.423, while affective readiness shows Non-Science M= 3.81, S.D= 0.533; and on

Open Peer Review (*cognitive readiness Science M= 3.06, S.D= 0.704; conative readiness*

Non-Science M= 2.90, S.D= 0.482, while affective readiness reveals Non-Science M= 4.77,

S.D= 0.312. This result implies that Malaysia researchers (*Science* or *Non-Science*) are

somewhat ready in terms of cognitive, conative, and affective readiness of open scholarly

communication as gauged through their readiness toward open scholarly communication

i.e. Open Access, Open Data, and Open Peer Review.

i.   Cognitive, Conative, and Affective Readiness of Open Access

In Table 7-6, an independent -samples t-test was conducted to determine cognitive,

conative, and affective readiness for Open Access in relation to discipline and Malaysia

academic researchers. Based on Table 7-5, the results suggest the following:

Table 7-6: The *difference between Discipline and* **Cognitive, Conative and Affective Readiness for Open Access among** *Malaysian academic researchers*

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
COGNITIVE READINESS OF OPEN ACCESS	Equal variances assumed	.593	.442	.814	133	.417	.580	.713	-.830	1.991
	Equal variances not assumed			.888	94.32	.377	.580	.653	-.717	1.878
CONATIVE READINESS OF OPEN ACCESS	Equal variances assumed	3.342	.070	-.404	133	.687	-.451	1.118	-2.664	1.761
	Equal variances not assumed			-.445	96.62	.658	-.451	1.015	-2.467	1.564
AFFECTIVE READINESS OF OPEN ACCESS	Equal variances assumed	.191	.662	-.279	133	.781	-.165	.591	-1.333	1.004
	Equal variances not assumed			-.302	92.97	.763	-.165	.544	-1.245	.916

H2a: There is a significant difference between discipline of Malaysian academic researchers and cognitive readiness for Open Access

There was no significant difference in scores for discipline *(Science = 94; M=4.03, S.D=1.009),* and *(Non-Science =41; M=3.89, S.D=0.807)* on cognitive readiness of open access among Malaysian academic researchers; *t (133)= .814, p=0.417.* Therefore, H2a is rejected

H2b: There is a significant difference between discipline of Malaysian academic researchers and conative readiness for Open Access

There was no significant difference in scores for discipline *(Science = 94; M=3.07, S.D=0.424),* and *(Non-Science =41; M=3.10, S.D=0.331)* on conative readiness of open access among Malaysian academic researchers; *t (133)= -.404, p=0.687* Therefore, the H2b is rejected.

H2c: There is a significant difference between discipline of Malaysian academic researchers and affective readiness for Open Access

The findings showed that there was no a significant difference in scores for discipline *(Science = 94; M=2.99, S.D=0.555),* and *(Non-Science =41; M=3.02, S.D=0.451),* on affective readiness of open access among Malaysian academic researchers; *t (133)= -.279, p=0.781.* Therefore, the H2c is rejected.

iv)   Cognitive, Conative, and Affective Readiness of Open Data

In Table 7-7, an independent -samples t-test was conducted to determine cognitive, conative, and affective readiness for Open Data in relation to discipline and Malaysia academic researchers. Based on Table 7-5, the results suggest the following:

Table 7-7: The *difference between Discipline and* **Cognitive, Conative and Affective Readiness for Open Data among** *Malaysian academic researchers*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
COGNITIVE READINESS OF OPEN DATA	Equal variances assume	.839	.361	-.730	133	.466	-.687	.941	-2.549	1.174
	Equal variances do not assume			-.778	88.765	.439	-.687	.884	-2.443	1.068
CONATIVE READINESS OF OPEN DATA	Equal variances assume	.482	.489	-.450	133	.654	-.276	.614	-1.492	.939
	Equal variances do not assume			-.476	87.283	.635	-.276	.581	-1.431	.878
AFFECTIVE READINESS OF OPEN DATA	Equal variances assume	.648	.422	-.428	133	.669	-.615	1.436	-3.454	2.225
	Equal variances do not assume			-.471	96.178	.639	-.615	1.306	-3.206	1.977

H2d: There is a significant difference between discipline of Malaysian academic researchers and cognitive readiness for Open Data

There was no significant difference in scores for discipline *(Science = 94; M=3.39, S.D=1.050),* and *(Non-Science =41; M=3.53, S.D=0.894)* on cognitive readiness of Open Data among Malaysian academic researchers; *t (133)= -.730, p=0.466.* Therefore, H2d is rejected

H2e: There is a significant difference between discipline of Malaysian academic researchers and conative readiness for Open Data.

There was no significant difference in scores for discipline *(Science = 94; M=4.31, S.D=0.488),* and *(Non-Science =41; M=4.34, S.D=0.423)* on conative readiness of Open

Data among Malaysian academic researchers; *t (133)= -.450, p=0.654* Therefore, the H2e is rejected.

H2f: There is a significant difference between gender of Malaysian academic researchers and affective readiness for Open Data

The findings showed that there was no a significant difference in scores for discipline *(Science = 94; M=3.76, S.D=0.680),* and *(Non-Science =41; M=3.81, S.D=0.533),* on affective readiness of Open Data among Malaysian academic researchers; *t (133)= -.428, p=0.669.* Therefore, the H2f is rejected.

v)   Cognitive, Conative, and Affective Readiness of Open Peer Review

In Table 7-8, an independent -samples t-test was conducted to determine cognitive, conative, and affective readiness for Open Peer Review in relation to discipline and Malaysia academic researchers. Based on Table 7-5, the results suggest the following:

Table 7-8: The *difference between Discipline and* **Cognitive, Conative and Affective Readiness for Open Peer Review among** *Malaysian academic researchers*

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| | | | | | | | | | 95% Confidence Interval of the Difference | |
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
COGNITIVE READINESS OF OPR	Equal variances assumed	.003	.957	.802	133	.424	.531	.663	-.779	1.84
	Equal variances not assumed			.795	74.88	.429	.531	.668	-.799	1.86
CONATIVE READINESS OF OPR	Equal variances assumed	.075	.785	-.53	133	.599	-.541	1.027	-2.57	1.49
	Equal variances not assumed			-.54	79.66	.593	-.541	1.008	-2.55	1.47
AFFECTIVE READINESS OF OPR	Equal variances assumed	1.14	.29	-1.18	133	.239	-.493	.417	-1.32	.332
	Equal variances not assumed			-1.30	95.32	.198	-.493	.380	-1.25	.262

H2g: There is a significant difference between discipline of Malaysian academic researchers and cognitive readiness for Open Peer Review

There was no significant difference in scores for discipline *(Science = 94; M=3.06, S.D=0.704),* and *(Non-Science =41; M=2.95, S.D=0.718)* on cognitive readiness of Open Peer Review among Malaysian academic researchers; *t (133)= .802, p=0.424.* Therefore, H2g is rejected

H2h: There is a significant difference between discipline of Malaysian academic researchers and conative readiness for Open Peer Review

There was no significant difference in scores for discipline *(Science = 94; M=2.85, S.D=0.505),* and *(Non-Science =41; M=2.90, S.D=0.482)* on conative readiness of Open Peer Review among Malaysian academic researchers; *t (133)= -.530, p=0.599* Therefore, the H2h is rejected.

H2i: There is a significant difference between discipline of Malaysian academic researchers and affective readiness for Open Peer Review

The findings showed that there was no a significant difference in scores for discipline *(Science = 94; M=4.69, S.D=0.394),* and *(Non-Science =41; M=4.77, S.D=0.312),* on affective readiness of Open Peer Review among Malaysian academic researchers; *t (133)= -1.180, p=0.239.* Therefore, the H2i is rejected.

Therefore based on independent -samples t-test conducted, H2 that states there is a significant difference between discipline of Malaysian academic researchers and their readiness for open scholarly communication (i.e. Open Access, Open Data and Open Peer Review) is hereby rejected indicating there is no difference between the cognitive, conative, and affective readiness of science and non-science respondents as regards to open scholarly communication therefore, the researcher rejects H2 in entirety. The result suggests that the

cognitive readiness, conative readiness, and affective readiness of science and non-science respondents does not necessarily have effect on the discipline of the respondents in relation to open scholarly communication i.e. Open Access, Open Data, and Open Peer Review.

7.3.3 H3: There is a significant difference between types of Malaysian academic researchers and their readiness for open scholarly communication (Open Access, Open Data and Open Peer Review)

Table 7-9: Overall mean cognitive, conative, and affective readiness type of the researchers toward Open Access, Open Data, and Open Peer Review

Open Access	Type of Researchers	N	Mean	Std. Deviation	Std. Error Mean
Cognitive Readiness	Early Career Researchers (<=10 years)	62	3.97	0.998	0.127
	Established Researchers (11 > years)	73	4.00	0.917	0.117
Conative Readiness	Early Career Researchers (<=10 years)	62	3.06	0.418	0.053
	Established Researchers (11 > years)	73	3.10	0.381	0.045
Affective Readiness	Early Career Researchers (<=10 years)	62	3.04	0.602	0.077
	Established Researchers (11 > years)	73	2.97	0.449	0.053
Open Data					
Cognitive Readiness	Early Career Researchers (<=10 years)	62	3.32	1.015	0.129
	Established Researchers (11 > years)	73	3.52	0.992	0.116
Conative Readiness	Early Career Researchers (<=10 years)	62	4.32	0.480	0.061
	Established Researchers (11 > years)	73	4.32	0.460	0.054
Affective Readiness	Early Career Researchers (<=10 years)	62	3.84	0.713	0.091
	Established Researchers (11 > years)	73	3.72	0.563	0.066
Open Peer Review					
Cognitive Readiness	Early Career Researchers (<=10 years)	62	2.57	0.615	0.078
	Established Researchers (11 > years)	73	2.48	0.567	0.066
Conative Readiness	Early Career Researchers (<=10 years)	62	2.65	0.500	0.063
	Established Researchers (11 > years)	73	2.61	0.418	0.049
Affective Readiness	Early Career Researchers (<=10 years)	62	4.75	0.391	0.050
	Established Researchers (11 > years)	73	4.68	0.355	0.042

Note:1= Early Career Researchers (<=10 years)*; 2*= Established Researchers (11 > years)

Note: Not at all ready= 1.0-1-8; Not ready= 1.9-2.7. Somewhat ready= 2.8-3.6; Moderately ready= 3.7-4.5; Extremely ready= 4.6-5.0

Table 7-9 shows the overall mean, standard deviation and standard error for cognitive, conative, and affective readiness of type of researchers toward Open Access (*cognitive readiness* Established Researchers *M= 4.00, S.D= 0.917; conative readiness* Established Researchers *M= 3.10, S.D= 0.381, and affective readiness* Early Career Researchers *M= 3.04, S.D= 0.602).* On Open Data (*cognitive readiness* Established Researchers *M= 3.52, S.D= 0.992; conative readiness* Early Career Researchers *M= 4.32, S.D= 0.480; and affective readiness* Early Career Researchers *M= 3.84, S.D= 0.713);* and Open Peer Review (*cognitive readiness* Early Career Researchers *M= 2.57, S.D= 0.615; conative readiness* Early Career Researchers *M= 2.65, S.D= 0.500; while affective readiness* Early Career Researchers *M= 4.75, S.D= 0.391).* This result implies that Malaysia researchers (Early Career Researchers or Established Researchers) are somewhat ready in terms of cognitive readiness, conative readiness, and affective readiness of open scholarly communication as gauged through their readiness toward open scholarly communication i.e. Open Access, Open data, and Open Peer Review.

In Table 7-10, an independent -samples t-test was conducted to determine cognitive, conative, and affective readiness for Open Access in relation to Type of Malaysia academic researchers. Based on Table 7-9, the results suggest the following:

H3a: There is a significant difference between Type of Malaysian academic researchers and cognitive readiness for Open Access

There was no significant difference in scores for type of researchers *(Early Career Researchers= 62; M=3.97, S.D=0.998),* and *(Established Researchers =73; M=4.00, S.D=0.917)* on cognitive readiness of open access among Malaysian academic researchers; *t (133)= -.196, p=0.845.* Therefore, H3a is rejected

Table 7-10: The *difference between Type of Researchers and* **Cognitive, Conative and Affective Readiness for Open Access among** *Malaysian academic researchers*

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
COGNITIVE READINESS OF OPEN ACCESS	Equal variances assumed	.245	.622	-.196	133	.845	-.129	.659	-1.433	1.175
	Equal variances not assumed			-.194	125.286	.846	-.129	.664	-1.443	1.185
CONATIVE READINESS OF OPEN ACCESS	Equal variances assumed	.014	.906	-.485	133	.628	-.500	1.032	-2.541	1.540
	Equal variances not assumed			-.481	124.706	.631	-.500	1.040	-2.558	1.557
AFFECTIVE READINESS OF OPEN ACCESS	Equal variances assumed	2.421	.122	.742	133	.459	.404	.544	-.672	1.480
	Equal variances not assumed			.725	111.187	.470	.404	.557	-.700	1.507

H3b: There is a significant difference between Type of Malaysian academic researchers and conative readiness for Open Access

There was no significant difference in scores for type of researchers *(Early Career Researchers = 62; M=3.06, S.D=0.418),* and *(Established Researchers =73; M=3.10, S.D=0.381)* on conative readiness of open access among Malaysian academic researchers; *t (133)= -.485, p=0.628* Therefore, the H3b is rejected.

H3c: There is a significant difference between Type of Malaysian academic researchers and affective readiness for Open Access

The findings showed that there was no a significant difference in scores for type of researchers *(Early Career Researchers = 62; M=3.04, S.D=0.602),* and *(Established*

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Researchers =73; M=2.97, S.D=0.449), on affective readiness of Open Access among

Malaysian academic researchers; *t (133)= .743, p=0.459.* Therefore, the H3c is rejected.

vi) Cognitive, Conative, and Affective Readiness of Open Data

In Table 7-11, an independent -samples t-test was conducted to determine cognitive,

conative, and affective readiness for Open Data in relation to Type of Malaysia academic

researchers. Based on Table 7-9, the results suggest the following:

Table 7-11: The *difference between Type of Researchers and* **Cognitive, Conative and Affective Readiness for Open Data among** *Malaysian academic researchers*

		Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
COGNITIVE READINESS OF OPEN DATA	Equal variances assumed	.394	.531	-1.159	133	.248	-1.004	.866	-2.716	.709
	Equal variances not assumed			-1.157	128.485	.249	-1.004	.867	-2.720	.713
CONATIVE READINESS OF OPEN DATA	Equal variances assumed	.017	.898	.064	133	.949	.036	.567	-1.086	1.159
	Equal variances not assumed			.064	127.489	.949	.036	.569	-1.090	1.163
AFFECTIVE READINESS OF OPEN DATA	Equal variances assumed	1.144	.287	1.157	133	.249	1.526	1.319	-1.083	4.135
	Equal variances not assumed			1.135	115.321	.259	1.526	1.344	-1.137	4.189

H2d: There is a significant difference between Type of Malaysian academic researchers and cognitive readiness for Open Data

There was no significant difference in scores for type of researchers *(Early Career Researchers = 62; M=3.32, S.D=1.015),* and *(Established Researchers =73; M=3.52,*

S.D=0.992) on cognitive readiness of Open Data among Malaysian academic researchers; *t (133)= -1.159, p=0.248.* Therefore, H3d is rejected.

H3e: There is a significant difference between Type of Malaysian academic researchers and conative readiness for Open Data

There was no significant difference in scores for type of researchers *(Early Career Researchers = 62; M=4.32, S.D=0.480),* and *(Established Researchers =73; M=4.32, S.D=0.460)* on conative readiness of Open Data among Malaysian academic researchers; *t (133)= 0.640, p=0.949* Therefore, the H3e is rejected.

H3f: There is a significant difference between Type of Malaysian academic researchers and affective readiness for Open Data.

The findings showed that there was no a significant difference in scores for type of researchers *(Early Career Researchers = 62; M=3.84, S.D=0.713),* and *(Established Researchers =73; M=3.72, S.D=0.563),* on affective readiness of Open Data among Malaysian academic researchers; *t (133)= 1.157, p=0.249.* Therefore, the H3f is rejected.

vii)   Cognitive, Conative, and Affective Readiness of Open Peer Review

In Table 7-12, an independent -samples t-test was conducted to determine cognitive, conative, and affective readiness for Open Peer Review in relation to Type of Malaysia academic researchers. Based on Table 7-9, the results suggest the following:

H3g: There is a significant difference between Type of Malaysian academic researchers and cognitive readiness for Open Peer Review

Table 7-12: The *difference between Type of Researchers and* **Cognitive, Conative and Affective Readiness for Open Peer Review among** *Malaysian academic researchers*

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
COGNITIVE READINESS OF OPR	Equal variances assumed	.013	.910	.888	133	.376	.543	.611	-.666	1.751
	Equal variances not assumed			.882	125.47	.379	.543	.615	-.675	1.760
CONATIVE READINESS OF OPR	Equal variances assumed	.732	.394	.579	133	.563	.549	.947	-1.325	2.422
	Equal variances not assumed			.571	119.39	.569	.549	.961	-1.354	2.451
AFFECTIVE READINESS OF OPR	Equal variances assumed	.479	.490	.965	133	.336	.372	.385	-.390	1.134
	Equal variances not assumed			.958	124.575	.340	.372	.388	-.397	1.140

There was no significant difference in scores for type of researchers *(Early Career Researchers = 62; M=2.57, S.D=0.615),* and *(Established Researchers =73; M=2.48,*

S.D=0.567) on cognitive readiness of Open Peer Review among Malaysian academic researchers; *t (133)= .888, p=0.376.* Therefore, H3g is rejected

H3h: There is a significant difference between Type of Malaysian academic researchers and conative readiness for Open Peer Review

There was no significant difference in scores for type of researchers *(Early Career Researchers = 62; M=2.65, S.D=0.500),* and *(Established Researchers =73; M=2.61, S.D=0.418)* on conative readiness of Open Peer Review among Malaysian academic researchers; *t (133)= .579, p=0.563* Therefore, the H3h is rejected.

H3i: There is a significant difference between Type of Malaysian academic researchers and affective readiness for Open Peer Review

There was no significant difference in scores for type of researchers *(Early Career Researchers = 62; M=4.75, S.D=0.391),* and *(Established Researchers =73; M=4.68, S.D=0.355)* on conative readiness of Open Peer Review among Malaysian academic researchers; *t (133)= .965, p=0.336* Therefore, the H3i is rejected.

Therefore based on independent -samples t-test conducted, H3 that states there is a significant difference between discipline of Malaysian academic researchers and their readiness for open scholarly communication (i.e. Open Access, Open Data and Open Peer Review) is hereby rejected indicating there is no difference between the cognitive, conative, and affective readiness of science and non-science respondents as regards to open scholarly communication therefore, the researcher rejects H3 in entirety. The result suggests that the cognitive, conative, and affective readiness of science and non-science respondents does

not necessarily have effect on the discipline of the respondents in relation to open scholarly communication i.e. Open Access, Open Data, and Open Peer Review.

7.4 Discussion

The study has hypothesized the cognitive/conative/affective readiness of Malaysian academic researchers and open scholarly communication (i.e., Open Access, Open Data, and Open Peer Review). The results of this study suggest that open scholarly communication has not yet taking root with moderate understanding and practices among Malaysian academic researchers. The independent – samples t-test showed that cognitive/conative/affective readiness does not significant influenced by *gender (male = 50; female=85)* in this study. Although, the males mean value indicated *(M=4.42)* rated higher than *females (M=4.12)* in the *understanding about Open Access to provides unrestricted online access to full text of scientific articles.* On contrary, *more females' scholars involved in reading Open Access articles when compared to males' scholars*. According to (Abrizah et al., 2015; Abrizah, 2016), the author's impact on readers is not much felt in terms of traditional citation counts and that reading behavior among scholars showed little revelation or sign of new form of scholarly behavior of them taking full effect. Their mean value suggests that conative readiness of *female (mean=4.40)* scholars does not necessarily have effect on the gender of the researchers in relation to the awareness of Open Access. Malaysia universities have recently stepped up the Open Access to their research output, however in many, open research is still restricted, and a concern to speed up the availability of open research through institutional and regulations are in progress. However, with all the benefits associated with opening of science, Malaysian researchers have not yet truly embraced open research. This notion applies to their *feelings toward receiving higher*

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citations in Open Access for *female (M=3.88) rated higher than male (M=3.74)*. Abrizah et al., (2015); Abrizah (2016), point out that scholars were much involved in good old-fashioned scholarly detective works when it comes to what to read, cite or publish. They argued that scholars craft a "footprint" via profiles in social networks, homepages or publication lists to make themselves and their work more visible which is against the citation impacts or counts. This result shows a moderate level of understanding, practices, and believes of Open Access (Walker and Rocha da Silva, 2015).

Furthermore, the males mean value indicated *(M=3.94)* rated higher than *females (M=3.62)* in the *understanding that open data are online data, free of cost accessible data*. Findings seem to show that there is clearly a lack of understanding among the respondents around what makes Open Data sharing essential. The motivation was partly compliance with journals publisher and research funders. This may be due to the clear steps most publishers take today to increase motivation to share data, that make it worth a researcher's time and effort to open up their research (Baynes, 2019). Interestingly, while the emphasis on Open Data is to support reusability of research, this practice does not often view as being important. Research data are perceived as personally owned and decisions on sharing are driven by researchers, not by their institutions or funders. Findings seem to indicate that Open Data is a reality for publishers and research funders but has not yet become a reality for researchers. *While more females' scholars involved in sharing of data as mandated by journal policy when compared to males' scholars*. Their mean value suggests that conative readiness of *female (M=3.20) rated higher than male scholars (M=3.06)* which does not necessarily have effect on the gender of the researchers in relation to the awareness of Open Data. Existing literature reveals the length the challenges of data publication in Open Data initiative. Some journals have mandated that authors should submit their data together with

their results for verification. This notion applies to their *feelings toward the believe that open data improves publishing transparency in academia for female (M=3.75) rated higher than male (M=3.74).* The availability of data and its reusability has been a challenge as many scholars are not willing to share data due to negativity that may result from sharing research data. A refusal to share data has been established to be related to the number of errors in the resulting manuscript (Wicherts, Bakker and Molenaar 2011); that is to say, the data that need to be reviewed the rigorous out of exactness concerns are the data not being made public.

   Furthermore, the males mean value indicated *(M=3.68) rated higher than female (M=3.52) in the understanding that open peer review enables discussions between reviewers themselves.* Studies showed that there is low awareness on open identities, open interactions, and open reports, open participation, open pre-peer review traits of Open Peer Review (OpenAire 2016; Ross-Hellauer et al., 2017; Hodonu-Wusu, 2018 p.8). On contrary, *more females' scholars are likely to submit to journals that make their review participation open when compared to males' scholars.* Their mean value suggests that *conative readiness of female (M=3.47) rated higher than male scholars (M=3.46)* which does not necessarily have effect on the gender of the researchers in relation to the awareness of Open Peer Review. This notion applies to their *feelings toward the believe that Open Peer Review upholds the integrity of science in academia for female (M=3.52) rated higher than male (M=3.48).* From all indications, this means there is no difference between male and female respondents as regards to the cognitive, conative, and affective readiness of Open Access, Open Data and Open Peer Review, hence, the researcher rejects Hypothesis 1 in entirety.

For Hypothesis 2, the results of the independent – samples t-test showed that cognitive/conative/affective readiness does not significant influenced by discipline (Science= 94; Non-Science =41) of *Malaysian* academic researchers and their readiness for open scholarly communication (Open Access, Open Data and Open Peer Review). *Open Access cognitive readiness and discipline of the scholars revealed the mean value of Science (M=4.29) rated higher than Non-Science (M=4.20) in the understanding about Open Access to provides unrestricted online access to full text of scientific articles does not necessarily have effect on the discipline of the researchers in relation to the awareness of Open Access.* Malaysian researchers acknowledge that they do not share their research data in particular due to unclear information on data privacy policy, trust in what others may do with researchers' data if it is made openly available, and the probability of losing publication opportunity. The biggest barrier to research data sharing and reuse seems to be a matter of trust, which was also found in the Digital Science study (Hrynaszkiewicz, 2019). However, in the study of Ostaszewski (2014), majority of the respondents claim that sharing research data in research practice may positively contribute to a progress in their discipline. Such a high level of support complies with the main arguments addressed by advocates of Open Science, that giving and sharing research data would give extra boost to the process of scientific progress.

More Non-Science scholars involved in reading open access articles because they are made available for free to read, use and reuse when compared to Science scholars. Their mean value suggests that conative readiness of Non-Science (M=4.39) rated higher than Science scholars (M=4.31) which does not necessarily have effect on the disciplines of the researchers in relation to the awareness of Open Access. This notion applies to their feelings toward publishing in a place where their colleagues published in Open Access.

Science scholars (M=3.64) rated higher than Non-Science (M=3.49) which does not necessarily have effect on the disciplines of the researchers in relation to the awareness of Open Access.

Furthermore, the mean value indicated Non-Sciences value *(M=3.76) rated higher than the Sciences (M=3.73) in the understanding that open data are online data, free of cost accessible data. It was found out that more Non-Science researchers believe Open Data improves publishing transparency in academia when compared to Science scholars. Their mean value suggests that conative readiness of Non-Sciences (M=3.80) rated higher than Science scholars (M=3.72) which does not necessarily have effect on the discipline of the researchers in relation to the awareness of open data.* This position is in line with Tenopir et al. (2011) who investigated 1,329 scientists' data needs, sharing practices and intentions, found out that that social science researchers are less likely to make their data electronically available to others when compared with their science counterparts. *This notion applies to their feelings toward the believe that Open Data allows re-analysis of data for different purposes from the ones originally conceived (Non-Sciences (M=3.88) rated higher than Sciences (M=3.63)).*

Additionally, the mean value indicated *Sciences* value *(M=3.64) rated higher than Non-Sciences (M=3.44)* in the understanding that O*pen Peer Review enables discussions between reviewers themselves.* Literature show low awareness on open identities, open interactions, and open reports, open participation, open pre-peer review traits of Open Peer Review (OpenAire 2016; Ross-Hellauer et al., 2017; Hodonu-Wusu, 2018 p.8). Similarly, more *Science scholars are likely to submit to journals that make their review participation open when compared to Non-Science scholars*. Their mean value suggests that *conative readiness of Sciences (M=3.76) rated higher than Non-Science scholars (M=3.34)* which

does not necessarily have effect on the discipline of the researchers in relation to the awareness of Open Peer Review. This was in line with the submission of (Ross-Hellauer et al., 2017) which shows a stronger level of exposure among the Scientists. This same notion applies to their perception that open peer review is unsustainable and due to few reviewers. The *Sciences (M=2.77) rated higher than Non-Sciences (M=2.59))*. Further, there is evidence that suggests the satisfaction with OPR seems to strongly vary across disciplines (Ross-Hellauer et al., 2017). From all indications, this means there is no difference between Science and Non-Science respondents as regards to the cognitive, conative, and affective readiness of Open Access, Open Data and Open Peer Review, hence, the researcher rejects Hypothesis 2 in entirety.

For Hypothesis 3, the results of the independent – samples t-test showed that cognitive/conative/affective readiness does not significant influenced by type of researchers (Established Researchers/ Researchers >=11 years)= 73; Early Career Researchers/ Researchers <=10 years) =62) of Malaysian academic researchers and their readiness for open scholarly communication (i.e. Open Access, Open Data, and Open Peer Review). The age of the respondents was used to identify whether they are early career researchers (ECRs) or established researchers. According to the working definition of Malaysian ECRs, they are "researchers between 30-39 years old, who are not more than ten years from receiving their doctorates operating without tenure" (Abrizah, Shah and Nicholas 2016, p.76). Established researchers in this study are researchers in their prime who have developed a level of independence or those that are leading in their research areas. These are researchers aged between 41 years and above and have experience more than 10 years on the academic job – as defined by the Vitae European Researchers Framework (2016, p.5). *Open Access cognitive readiness and* type of researchers *revealed the mean value of* Established

Researchers (*M=4.26) rated higher than* Early Career Researchers *(M=4.19) in the understanding about Open Access to provides unrestricted online access to full text of scientific articles does not necessarily have effect on the type of the researchers in relation to the awareness of Open Access.* Malaysia universities have recently stepped up their research output, however in many, open research is still restricted, and a concern to speed up the availability of open research. However, with all the benefits associated with opening of science, Malaysian researchers have not yet truly embraced Open Peer Review.

Also, more Established Researchers *involved in reading open access articles because they are made available for free to read, use and reuse when compared to* Early Career Researchers. *Their mean value suggests that conative readiness of* Established Researchers *(M=4.34) rated higher than* Early Career Researchers (*M=4.32) which does not necessarily have effect on the type of the researchers in relation to the awareness of Open Access. However, this notion changes in their feelings toward publishing in a place where their colleagues published in open access.* Established Researchers (*M=3.73) rated lower compared to the* Early Career Researchers *(M=3.95).* This may be due to their involvement and being the harbingers of change in the new millennial study which does not necessarily have effect on the disciplines of the researchers in relation to the awareness of Open Access (Nicholas et al., 2019a; 2019b; Nicholas et al., 2020).

More so, the mean value indicated no difference between Established Researchers (*M=3.58) and the Early Career Researchers (M=3.58) in the understanding that Open Data are online data, free of cost accessible data.* Further, few more Established Researchers share data to reduce duplication of effort from different research attempting to collect same data set *when compared to Early Career Researchers. Their mean value suggests that conative readiness of* Established Researchers *(M=3.15) rated higher than Early Career*

Researchers (M=2.98) which does not necessarily have effect on the type of the researchers in relation to the awareness of Open Data. However, this notion changes in their feelings toward the believe that open data allows re-analysis of data for different purposes from the ones originally conceived (Early Career Researchers (M=3.76) rated higher than Established Researchers *(M=3.66)).*

Furthermore, the mean value indicated no difference between Established Researchers values and *(Early Career Researchers (M=3.58)* in the understanding that O*pen Peer Review enables discussions between reviewers themselves*. Studies show that evidence suggest the satisfaction with OPR seems strong among the STM researchers (Ross-Hellauer et al., 2017) with a lot of familiarities amongst younger researchers (Bravo et al., 2019). There are also, more *Early Career Researchers are likely to submit to journals that make their review participation open when compared to* Established Researchers. Their mean value suggests that *conative readiness of Early Career Researchers (M=3.65) rated higher than* Established Researchers *(M=3.62)* which does not necessarily have effect on the type of the researchers in relation to the awareness of Open Peer Review. This is in line with the number of submissions to journal publications to support OPR that is constantly increasing, which suggests authors do not have problems with practicing OPR (Reekers, 2020). This notion applies to their feelings toward the believe that open peer review is unsustainable and due to few reviewers (*Early Career Researchers (M=3.60) rated higher than* Established Researchers *(M=3.42))*. Reviewers, even if they believe the value of openness, tend to decline invitations to OPR journals mainly because the OPR process involves a considerable amount of time and intellectual efforts (Bolam, 2017). To conclude it means there is no difference between Established Researchers and *Early Career Researchers*

respondents as regards to the cognitive, conative, and affective readiness of Open Access, Open Data, and Open Peer Review, hence, the researcher rejects Hypothesis 3 in entirety.

7.5 Summary

To summarize the testing of hypothesis in this chapter, the researcher carried out independent samples t-test to analyze the data. It was found out that there was no statistically significant difference between gender, discipline and type of researcher and the cognitive/conative/affective readiness of Malaysian academic researchers' Open Scholarly Communication (i.e., Open Access, Open Data, and Open Peer Review) on the hypotheses tested. The next chapter presents the discussion, and the limitation, implications of the study, suggestion for future studies.

CHAPTER 8: DISCUSSION AND CONCLUSION

8.1 Overview of the study

The final chapter of this thesis provides a summary and overview of the study, including the statement problem, research questions, research framework and theory involved. The main part of the study is devoted to a summary, discussion and recommendations for future studies.

Section 8.2.1 presents the demographic findings of the respondents, Section 8.2.2 discusses the readiness index of the scholars and Section 8.2.3 presents their classifications Section 8.2.4 presents the theory of readiness, cognitive, conative and affective as well as the hypothesis used. Section 8.2.5 presents the discussion of major findings of the study. In this subsection, the researcher was able to discuss the summary of the whole thesis ranging from literature review, methodology used, to answering the research questions on Malaysian academic researchers and open scholarly communication in terms of cognitive, conative and affective relations.

Research Question 1 answered "To what extent are Malaysian academic researchers aware of open scholarly communication as regards to open access, open data and open peer review?". Research Question 2 answered "What are the practices exhibited by Malaysian academic researchers towards Open Access, Open Data and Open Peer Review?" The Research Question 3 answered "To what extent do Malaysian academic researchers perceive the capability and ability of Open Access, Open Data and Open Peer Review for open scholarly communication?" while The Research Question 4 is in form of hypothesis and answered the following question. "Is there a significant difference between gender, types of researchers, and discipline among Malaysian academic researchers and readiness of open scholarly communication?"

Section 8.3 presents the limitations and recommendations for open scholarly communications future studies. Section 8.4 presents the contribution of the study and explore how this research advances study of library and information science (LIS), while Section 8.5 presents the closing remarks.

8.2 Discussions

8.2.1 Demographics and Background of Subjects

The background information of the respondents was collected on age, gender, years in academia, academic position, discipline and number of publications in 5 years. The 135 respondents were mainly female 85(63.0%), largely within the ages of 41 and above 73(54.1%), with more established researchers (ERs) 73(54.1%) participated. Senior lecturers and other cadres had 106(78.5%), as compared to the professors and associate professors of 29(21.5%). More sciences 94(69.6%) participated compared to Non-sciences of 41(30.4%). Majority of the respondents 74(54.8%) have published more than 7 publications within 5 years.

8.2.2 Categorization of Scholarly-Based Readiness Index on the level of Cognitive, Conative and Affective in Open Science

Table 8-1: **Categorization of Scholarly-Based Readiness Index on the level of Cognitive, Conative and Affective in Open Science**
[Adapted and Modified from Wagayan-Alicmas, and Ramos (2015), Shaizimah (2011), Ramachandran (2010) and Dalenius and Hodges (1959)]

INDEX SCORE RANGE	GROUP OF CLASSI-FICATION	DESCRIPTIONS			
		COGNITIVE	CONATIVE	AFFECTIVE	READINESS
5 –(4.2-5.0)	Sentience	Great knowledge of open scholarly communication and ready to take up the opportunities involves in it	Frequently practicing of open scholarly communication and ready to take up the opportunities involves in it	Very Transformative on what s/he thinks about open scholarly communication and ready to take up the opportunities involves in it	Extremely Ready
4 –(>3.4-4.2)	Sprinters	Moderate understanding about open scholarly communication and gaining momentum for it	Almost Every time intended to read, share and publish in open scholarly communication	Transformative on his/her feelings about open scholarly communication	Moderately Ready
3 –(>2.6-3.4)	Strollers	Moving ahead with open scholarly communication but not very consistent in it	Sometimes practice open scholarly communication	Neutral/unpredictive about open scholarly communication	Somewhat Ready
2 –(>1.8-2.6)	Starters	Slightly Aware of open scholarly communication but lacking consistency in the momentum	Almost Never practice open scholarly communication due to lack of motivation to continue the momentum	Shows pessimistic on the issues of open scholarly communication	Rarely Ready
1 –(1.0-1.8)	Stragglers	Not at all Aware of open scholarly communication	Never practice open scholarly communication	Very pessimistic on open scholarly communication	Not at all Ready

Table 8-1 shows the characterization of scholars in open scholarly communication. The finding of the Cognitive readiness index of the scholars towards open access revealed that scholars are moderate in understanding about open access and gaining momentum for it. More so, in terms of conative, they are almost every time intended to read, share and publish in open access, while affective readiness of the scholars shows that they are neutral/unpredictive about open access and are grouped as Sprinters. For Open Data, Cognitive readiness index of the scholars towards Open Data revealed that scholars are Somewhat ready and are moving ahead with Open Data but not very consistent in it. More so, in terms of conative, they are Sometimes practice open scholarly communication, while affective readiness shows that they are neutral/unpredictive about Open Data and are grouped as Strollers. Finally, For Open Peer Review, Cognitive readiness index of the scholars towards OPR revealed that scholars are Somewhat ready and are moving ahead with open peer review but not very consistent in it. More so, in terms of conative, they are Sometimes practice Open Peer Review, while affective readiness shows that they are neutral/unpredictive about Open Peer Review and are grouped as Strollers too.

8.2.3 Classification and Levels of Readiness of Researchers toward Open Scholarly Communication

Readiness of researchers toward open scholarly communication can be classify into the following based on the outcome of our findings.

Table 8-2: Classification and levels of readiness of researchers towards OSC

	Cognitive	Classification	Conative	Classification	Affective	Classification
Open Access	Moderately Ready	Sprinters	Somewhat Ready	Strollers	Moderately Ready	Sprinters
Open Data	Somewhat ready	Strollers	Somewhat ready	Strollers	Moderately Ready	Sprinters
Open Peer Review	Somewhat ready	Strollers	Somewhat ready	Strollers	Somewhat ready	Strollers

a. On Cognitive: findings showed that researchers are moderately ready for open access and are classify as Sprinters which means that researchers were moderate in terms of understanding the concept of open access and are gaining momentum for it. In terms of Open Data, researchers are somewhat ready and are classify as Strollers which means researchers sometimes practice Open Data while on Open Peer Review, they are somewhat ready too and are classify as Strollers which means they are neutral or unpredictive about Open Peer Review.

b. On Conative: findings revealed that researchers are somewhat ready for Open Access and are classify as Strollers which means that researchers were moving ahead with Open Access but not consistent in it. In terms of Open Data, researchers are somewhat ready and are classify as Strollers which means researchers sometimes practice Open Data while on Open Peer Review, they are somewhat ready respectively and are classify as Strollers which means they are neutral or unpredictive about Open Peer Review.

c. On Affective: findings showed that researchers are moderately ready for Open Access and are classify as Sprinters which means that researchers were moderate in terms of feelings toward the concept of Open Access and are gaining momentum for it. In terms of Open Data, researchers are moderately ready and are classify as Sprinters which means researchers sometimes practice or have mixed feelings toward Open Data while on Open Peer Review, they are somewhat ready too and are classify as Strollers which means they are neutral or unpredictive about Open Peer Review (Table 8-2).

8.2.4 Cognitive, Conative and Affective Readiness of Open Scholarly Communication

Readiness is the preparedness of scholars in terms of mental awareness, practices and feelings towards open scholarly communication. It is expected that scholars reveal a level of readiness to change, in this case perception (affective) and practices (conative) towards open scholarly communication that skewed towards disclosure of open scholarships and this level of readiness to change will vary from their level of awareness (cognitive) to practices (conative). In this study, ultimately, scholars feel that research data needs to be understood before being used and shared. Some researchers in the sampled expressed concern that if their research data is made public, then someone else could use it and takes the credits rather than given it to the rightful owner(s). Additionally, scholars are concerned that if they do not control access to their research data, they will not be able to publish their findings from the data before someone else uses it, affecting their ability to publish research and advance their careers. This finding is in line with the study of Hall, (2014; p97) on faculty attitudes towards institutional repositories. In his study, he found out that "people have different ideas about what openness means and have concerns about their ability to publish and get credits for research that is seen as rigorous". As found in other studies, most researchers value the idea of public access to research data, but they

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are reluctant to share their own research data. This study produces a novel finding about what disincentivize data sharing and open peer review as seen in Chapter 6, subsections 6 to 8.

Also, as demonstrated extensively in Chapter 1.6, a scholar who is ready to change is one who exhibits a proactive and positive behaviour towards change, which can be translated into willingness to support and own the change. An individual readiness depends on whether they perceive the benefits of change as outweighing the anticipated risks. In this case, the scholars perceive the significance of change differently in the scholarly communication and as a result, the readiness level may vary based on what each scholar perceive as the balance between the costs and benefits of the status quo and the costs and benefits of change. Therefore, the state of a researcher's cognitive/awareness or understanding can range from being excited about the benefits and open to change affective (perception), to being fearful of, or anxious about it and opposed to giving up (conative/practices) their current ways of carrying out research or scholarly communications.

Also, as hypothesized in Chapter 7, H1 showed that there was no statistically significant difference between gender of Malaysian academic researchers and readiness of open scholarly communication. Also, H2 revealed that there was no statistically significant difference between discipline of Malaysian academic researchers and readiness of open scholarly communication, more so, the last hypothesis H3, revealed that there was no statistically significant difference between type of researchers of Malaysian academic researchers and readiness of open scholarly communication and hence, the researcher fails to reject all the hypotheses tested.

8.2.5 Discussion of Major Findings

This section presents the summary of the study objective and discussed the findings of the three research questions and the hypotheses. Based on the research objective, the study is to investigate the readiness of Malaysian academic researchers in open science in terms of awareness; practices and perception of open scholarly communication, which answered the research questions in four different chapters. Chapter 4 answered the research question 1. It was found out that Open Access is taking root among Malaysian researchers, with progressive levels of awareness among the scholars. However, few researchers still need full understanding of what Open Access is. There is little awareness of Open Data by the researchers, although, Open Data awareness is still low, a substantial portion of the scholars still have limited awareness of Open Data and its potentials. More so, there are also low levels of awareness of Open Peer Review as those that understand are not keen about it benefits as shown in their mean scores (Abrizah et al., 2015; Abrizah, 2016; OpenAire, 2016; Ross-Hellauer et al., 2017; Hodonu-Wusu, 2018) and presented the outcome of the research by presenting the overall readiness status of scholars towards open access. In terms of understanding of Open Access awareness, currently, Malaysian researchers are reasonably positive towards Open Access awareness (Walker and Rocha da Silva, 2015; Baynes, 2019). Nevertheless, there is a concern for those that are not aware of Open Access among the scholars. The unawareness of these researchers may be as a result of the journals they submit to, that do not exercise Open Access options, and these scholars may have never been involved in Open Access publication (Wicherts, Bakker and Molenaar 2011). Further, researchers also exhibit slight awareness on the open data. Considering the mean responses that reflect researchers' awareness of Open Data sharing, currently there is a reasonably positive level of awareness of Open Data. Although, open data awareness among Malaysian researchers is progressing, a sizeable fraction of Malaysian researchers is still

not aware or have limited awareness of Open Data and the potential benefits, as well as show that concerns over copyright infringement. On OPR, the mixed awareness in Open Peer Review shows that researchers may be grasping the aspects of OPR, which may indicate that the journals they submit to do not exercise OPR, and many of them have never been involved in OPR. The statement that in OPR, "all review reports will be published, but reviewers will be given the option to remain anonymous" received the little understanding probably because the researchers finds it difficult to agree with the statement "to remain anonymous", as in line with the advocates of open review, somebody making an important judgement on the work of others should not do so in secret (OpenAire 2016; Ross-Hellauer et al., 2017; Hodonu-Wusu, 2018 p.8). It is also argued that reviewers will produce better work and avoid offhand, careless or rude comments when their identity is known (Gieneisen and Zhang, 2012). This implies that Malaysia researchers' have little understanding about Open Peer Review. The chapter equally described the step taken to calculate the overall readiness of Malaysian academic researchers towards open access and categorized authors into their respective groups based on the outcome of the findings. It was found out that Malaysian academic researchers are moderately ready toward Open Access scholarly communications.

In chapter 5, the researcher presented the analysis and findings of the analysis on the practices of Open Data among Malaysian scholars. The experiences and participation in Open Data by Malaysian researchers indicate that Malaysia, as a nation with better research competences have employed some elements of open data. This would help in lifting her up from the bottom 40 percent to higher income earner and becoming a high – income country by 2020 thereby increase the nation's digital transformation (World Bank 2017b).

In terms of awareness of Open Data, currently, Malaysian Researchers are reasonably moving positive towards Open Data awareness. However, a substantial portion of

Malaysian researchers are still not aware or have limited awareness of Open Data and the potential benefits, as well as show that concerns over copyright infringement. Also, the tendency to share data openly is a major concern for the researchers, findings indicate that open research data is a more established practice among the sciences and early career researchers (Ross-Hellauer et al., 2017) with a lot of familiarities amongst younger researchers (Bravo et al., 2019). The reason for not making/sharing data openly could be as a result of not having access to their data anymore and will not be able to publish findings from their data especially if another researcher uses it first affecting their own ability to publish research and advance their careers (Nathan, 2014). Early career researchers were more than willing to share data (n=12) as against (n=10). This could be as a result of their attitudes and behavior motivated to go in line with the likelihood of stand-in on any innovative beliefs, they might have about the current system of open scholarly communication, especially to make their footings known in academe and as the harbingers of new wave in their chosen fields (Nicholas et al., 2015; 2016; 2017; Watson, 2007). They do not care whether another person will use their data provided that have published it first and collaborate with others. However, this attitude of making data open by them is not frequent as shown in their responses.

While the benefits of sharing data may be recognized, the barriers are clear as well. This may be as a result of scholars withholding attitudes toward sharing of data (Kim & Stanton, 2016; Tenopir et al., 2011; Wicherts, Borsboom, Kats and Molenaar, 2006). They believed (true of me/ very true of me) that the barriers to the promotion and positioning of Open Data are identified as follows: contains sensitive or copyrighted information, which has disclosure (mean=3.3); lack well-defined technical standards that discourage sharing and reuse of data (mean=3.27); volumes of data might discourage scholars from sharing data (mean=3.46); and open data practices that are very hard to execute (mean=3.39). This is in line with withholding data attributes of the

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researchers in a past studies (Wicherts, Borsboom, Kats and Molenaar, 2006; Wolnis, 1962).

However, in the study of Maciej (2014), majority of the respondents claim that sharing research data in research practice may positively contribute to a progress in their discipline. Such a high level of support complies with the main arguments addressed by advocates of Open Science, that giving and sharing research data would give extra boost to the process of scientific progress. From the mean score obtained in our study, it was evident that the scholars are aware of Open Data, yet they are not actually practicing data sharing as shown in the mean scores (not consistent) as well as their responses towards the statements asked. This is corroborating with a new report from Meijer's Elsevier and Centre for Science and Technology Studies (CWTS) which reveals that although the benefits of open research data are well known, in practice, confusion remains within the researcher community around when and how to share research data (Meijer., Berghmans., Cousijn., Tatum., Deakin., Plume., Rushforth., Mulligan., de Rijcke., Tobin., Van Leeuwen., and Waltman., 2017). Therefore, the researcher concludes that majority of the Malaysian scholars are not actually practicing open research data sharing presently.

From the above, the researcher can convincingly conclude that many factors hindered the data sharing among scholars. Such as losing of next available opportunity to publish, unclear policy of the journal concerning submitting publication data with author's manuscripts and misuse of data publication by other scholars either by no attribution of the sourced or copyright violations. Others according to (NIH, 2003; NSF, 2011) are issues of data repositories, mismanagement or inadequacy of data preservation, data legislation, cultured devaluation of data sharing, and fear of errors of being discovered (Jeffrey, 2013). It is also very clear that majority of the researchers recognize the benefits of sharing research data, yet fewer are willing to share. This might be as a result of lack

of training and incentives for data sharing. The chapter equally described the steps taken to calculate the overall readiness of Malaysian academic researchers towards Open Data and categorized authors into their respective groups based on the outcome of the findings. It was found out that Malaysian academic researchers are somewhat ready toward Open Data sharing.

The chapter 6 discusses the perception of the scholars towards open scholarly communication and answered research question 3. From the analysis, there is evident that many of the researchers in Malaysia believed Open Peer Review will ensure transparent, provide honest feedback, increased motivation and improve science, but the issue of timing in reviewing is a challenge and fear of negative comments is a concern to them. This means that although, the scholars see the benefits of Open Peer Review, but this negates their attitudes towards OPR as they remain undecided about the effects and advocate choice of application. Furthermore, reviewers' practices towards OPR showed that many of them favoured OPR, however, majority of them do not actually published review reports to increase the quality of reviews done, and those doing it may be doing it as a result of another reason and not to increase the quality of review. Finally, on what disincentivize authors and reviewers from participating in OPR was analyzed, the results 40(29.6%) indicating low perception toward practices of OPR by the authors, while the reviewers on the other hand were neutral. Gauging the practices of reviewers toward OPR revealed much is needed by the authors and reviewers to make OPR a priority in Malaysia. Their practices and perception towards OPR are low judging from their responses and mean scores also showed some concerns (Publons, 2018). This chapter described the step taken to calculate the overall readiness of Malaysian academic researchers towards Open Peer Review and categorized authors into their respective groups based on the outcome of the findings. It was found out that Malaysian academic researchers are somewhat ready toward open access scholarly communications. This

indicates that even though, authors see the benefits of OPR, they remain skeptical about its effect and advocate choice in its execution which has a correlation with the study of Ross-Hellauer, (2017). In conclusion, the mean score and the standard deviation of each variable is worthy to pay attention to and included all responses to each statement.

The Chapter 7 summarizes the testing of hypothesis in the study. The researcher carried out independent samples t-test to analyze the data. From the Hypothesis 1 analysis, it shows clearly that there was no difference between the readiness of Malaysian academic researchers' open scholarly communication and gender relations. The analysis suggests no difference between the readiness of female and male respondents and practicing openness of scholarly communication. The Hypothesis 2 revealed that there was no mean difference between discipline and readiness of Malaysian academic researchers open scholarly communication. The result shows that there was no difference between scientists and non-scientists when practicing open scholarly communication. Finally, the results showed that there was no mean difference between readiness of Malaysian academic researchers open scholarly communication and type of researchers' relation. The result reveals that more established researchers make their research open compared to early career researchers. Howbeit, this suggests there was no difference between established researchers and e*arly career researchers.* Regarding the cognitive, conative, and affective readiness of Open Access, Open Data and Open Peer Review and Malaysian academic researchers, the researcher therefore, rejects the three Hypotheses.

8.3 Limitations and Recommendations for Future studies

8.3.1   Limitation of the study

This study was conducted based on certain delimitation that set boundaries to focus the research. The first boundary set in this study is that only research institutions are

selected for investigation. There are five research institutions in Malaysia, which incidentally the oldest and most established in Malaysia. All these institutions are public universities with almost similar operations. Two, since the raison d'être of this study was to gauge the scholarly communication readiness of Malaysian academic researchers towards Open Science. Hence, the scope is limited to only academic scholars with Ph.Ds. in these five (5) research institutions in Malaysia namely Universiti Malaya (UM), Univeriti Sains Malaysia (USM), Universiti Kebangsaan Malaysia (UKM), Universiti Putra Malaysia (UPM) and Universiti Teknologi Malaysia (UTM).

The study is also limited for the generalization of the findings. The data were collected from five research universities in Malaysia. This finding may not be applicable to other researchers' views or perception and practices about open scholarly communication, however, universities in Malaysia who share the same values and scholarly communication culture may benefit from the findings of this study.

Another limitation is the number of respondents towards the data collection and analysis were small, further study can be carried out to include more scholars through constant reminder for online survey, phone calls, personal emails and visiting through paper-based method. It is also limited in the scope of Open Science. Other aspects of open science such open educational resources, open notebooks, open source, scientific social network, and citizen science may be included to have broad knowledge of the topic. Albeit limitations in this research, the present study still manages to share an acceptable amount of contribution to the literature and methodology with a new insight with better understanding towards open scholarly communication among scholars.

8.3.2   Recommendations and Future Studies

a. These results have shown that Malaysian researchers did not totally reject Openness in research, however, how might authors and reviewers be

motivated to engage in open participations processes and what ways are they different from the traditional peer review?

b. Future studies should also investigate the importance or rewards for data sharing among scholars' institutions, also, studies bridging the gap between policy and practices of open data sharing should be examined.

c. Future studies should also look into how amidst growing awareness that the skill sets such as questions and challenges faced by the early career researchers while critique a distinguished professor's work when conducting open peer review; how do we balance and protect the need for research integrity and rigorous review without career-ending challenges?

d. Future works should further investigate what is disincentivize scholars from open peer review research and data and how to encourage it by the researchers. How do we balance effort with effect and how do we discover and validate the standards that are being adopted worldwide on open research?

e. Future study may also combine qualitative method as a preference with the current survey design that this study employed to see whether there can be improvement in the way scholars perceive and practice open scholarly communication in Malaysia.

8.4 Contribution of the study

Open Scholarly Communication is a new trend in academics and so this study will shed more light on the state of awareness, practices, and perception of scholars toward the pillars of Open Science. Knowing factors or variables that determine the cognitive (awareness), affective (perception) and conative (practices) of the scholars towards open communications or innovations would reposition the funding agencies and employers to

focus on those areas for effective participations and involvements in Open Scholarly Communication (Open Access, Open Data and Open Peer Review).

With the dawn of the new millennium, Open Access has offered the field of Scholarly Communication and publishing a new challenge. Increases in the cost of journals and a stable budget over the last two decades have made it difficult for libraries to keep their journal subscriptions at a reasonable level to sustain their research and development activities. In the meantime, the publishing of scholarly articles in the public domain through the Internet has created new outlets for the scholarly community. With supporting models for openness, various means of Open Scholarly Communication traits have been addressed. This study on Open Scholarly Communication readiness of academic scholars will be useful and significant in the following areas:

8.4.1 Academic Contribution/Significance

Academic librarians are promoters of Open Scholarly Communication initiatives, they serve as librarians, researchers, reviewers, editors and provide access to research output and other documents from their individual institutional repositories. In fact, librarians contribute immensely to the scholarly and scientific communication by providing, teaching and marketing the resources instead of keeping them away from the users, this they do by opening doors of scholarly communication. In this study, the researcher was able to report the perception, attitude or practices and awareness of scholars toward Open Scholarly Communication in relation to Open Access, Open Data and Open Peer Review.

Scholars that have a link with Malaysian researchers will benefit immensely from the findings of this study as it will create in them more awareness about open scholarly communication. Also, the understanding to practice open scholarly communication and the belief to advocate for more openness in scholarly

communication is possible. Furthermore, the study highlights major obstacles and way forwards to solving the issues in Open Scholarly Communications especially in terms of data disclosure and involving in Open Peer Review.

8.4.2 Methodological Contribution/Significance

This study is significant as it contributes to the current research in methodological terms by rigorously developed an instrument for Open Scholarly Communication. Since no evidence was found through literature review relating to framework of Open Scholarly Communication - Open Access, Open Data and Open Peer Review, this research will provide useful information for scholars on the gaps that exists between what is currently available and what scholars needs to satisfy their curiosity in academe. The development and the assessment of the validity and reliability of the survey instrument developed in this study adds to the body of knowledge on instrument building. The measurement of the readiness index of the scholars also offers a new approach into scholarly communication and useful insights regarding readiness level of scholars towards open scholarly communication. The instrument can be replicated or serve as addon for further research by researchers in Malaysia or elsewhere.

8.4.3 Societal Contribution/Significance

One of the results of the Open Scholarly Communication is the revolution in the awareness, practices and perception of Open Access, a sustainable model for academic publishing. Unlike subscription access papers, this new model allows any user to read, view, copy, distribute, print, search, or link to the full text of journal articles without paying fees.

The Open Data practices and perceptions of Malaysian researchers indicate that overall, it is apparent that there is a reasonably positive awareness, although the tendency

to share research data openly brings with it many concerns and challenges for researchers. While Open Data is clearly established as a topic that is now in the mainstream for researchers (Fane 2019), a substantial proportion of Malaysian researchers are still not aware or have limited awareness of open data and open peer review and the potential benefits. The reason for not sharing data openly could be as a result of not having access to their data anymore, not being able to publish findings from their data especially if another researcher uses it first affecting their own ability to publish. Findings indicate that academic discipline and research experience affect the affinity of Open Data and its sharing practices, as it is a more established practice among the sciences and ECRs. This could be as a result of their open scholarly communication behaviours such as promoting and fostering scientific research and collaborations, as well as attitudes with regard to the motivation to improve scientific transparency to go in line with the likelihood of stand-in on any innovative beliefs, especially to make their footings known in academe and as the harbingers of new wave in their chosen fields (Nicholas et al. 2017; 2019).

Further, in terms of open peer review benefits to the scholarly society, The findings suggest that the majority still have strong concerns about these two transparency traits, being afraid or vulnerable to criticism or prone to positive bias in their review that OPR is known for (Schmidt et al. 2018). These findings chime with Jamali's et al. (2020) study of ECRs, whose as reviewers, prefer the anonymity and show little support for the types of peer review that have open identities because of "a possible backlash" from the scholarly community or the fact that as ECRs, they might not be able to make strong comments to more senior authors. Similarly, Nicholas' et al. (2019b) three-year longitudinal study of ECRs from seven countries, including Malaysia, found that although the majority were supportive, but they were uncomfortable with the idea of OPR, which contains too many perils for many of them, increased criticism being one.

Nevertheless, like Hamid's et al. (2020) this study has reasons to believe that from the attitudinal responses, Malaysian researchers who support open identities do so because it increases transparency and prevents the use of impolite language in comments. Ware (2008) also argued that reviewers will produce better work and avoid offhand, careless, or rude comments when their identity is known.

Many believe that OPR is more time-intensive leading to few willing reviewers, and this is consistent with findings on attitude that not many respondents thought they would be more likely to review if invited. Others' findings (Van Rooyen et al. 1999; Ware 2008) lend support to this study, that time and voluntary participation are indeed the case, although Ross-Hellauer's et al. (2017) study found that a high majority of their respondents thought that reviewers are more likely to review if invited. However, Nicholson and Alperin's (2016) study reported it would take no extra time/effort or only moderate extra time/effort to make peer reviews suitable for public posting.

This study concludes that; indeed, it is very early days for Malaysian researchers when it comes to OPR; they seem not to be not strong advocates of this Open Science pillar. There is little sign of them relinquishing their beliefs and practices in regard to sharing, openness and transparency, similar to other findings that reported Malaysian researchers' attitudes and behaviours on open data, green open access (Singeh, Abrizah and Karim 2013) open access mega journals (Abrizah, Shah and Nicholas 2019), open metrics (Nicholas et al. 2020) and open science (Nicholas et al 2019a).

In all, this study is significant because it reveals scholars' readiness in terms of cognitive, conative, and affective Open Scholarly Communication (Open Access, Open Data and Open Peer Review) and suggests ways for advocacy openness.

8.4.4 Institutional Contribution/Significance

The university authorities are not left behind as they will be aware of new trends in open scholarship and how to benefits from its existence. The impact of freely available articles can be assessed by citation studies. Citation impact of scholarly output depends upon to discover, read and at the end to cite that scholarly output by authors and for this all, access is not only a factor, but also necessary one (Kumar and Bansal, 2008). Some studies have been reviewed to show the impact of OA on scholarly research. There are increase number of scholarly societies and institutions developing Open Scholarly Communication journals as part of contribution towards Open Science. Academic librarians manage the development of OA institutional repositories that houses theses, dissertations, institutional documents, and data, as well as other files that may likely be accessible by the public (Cullen and Chawner, 2011). Interestingly, Latif, Timo and Tochtermann (2014) note in relation to Open Scholarly Communication movement as that: "repositories as a system for collecting, publishing, disseminating, and archiving digital scientific content have become one of the most prominent types of digital library applications. Especially with respect to Open Access publishing, repositories today serve as a platform for acquiring and disseminating scientific content, which before had been almost exclusively released by commercial publishers (para 1)."

Making resources available through Open Scholarly Communication portend their readiness and practices towards Open Science, this equally helps the researchers as well as other academicians get scholarly information. The availability of preprint and post-print, dissertation, theses, dissertation research reports and other scholarly resources shows their practices towards expanding open scholarly communication as well as sharing scientific and knowledge sharing. To collaborate their readiness and practices of Open Scholarly Communication, Hunter (2012) stated that academic

institution libraries have embraced digital publishing to provide digital resources for both faculty and students or other users.

Besides urging the journal articles to be accessible online and free, the OA movement and Open Science initiatives have brought repositories to academic institutions. The universities authorities, as well the funding agencies have mandated all researchers under their watch to make known their research outputs or results to the public which is the major aspect of Open Scholarly Communication and librarians have led the ways to the movement of Open Science (Suber, 2008). However, this movement does not exist universally, in developing countries for example, the movement has been slow.

Many libraries still consider their repositories as an important asset of the universities and some librarians keep them away from the public and still consider themselves as the custodian of repositories. More so, lack of infrastructure for online access is another challenge faced by them and this has slowed pace Open Scholarly Communication the third world nations. Academic librarians need to be aware of this fact, and key into the vision and mission of open science initiatives which among other others is to provide resources in order to boost the growth of scientific knowledge.

This study provides the awareness for Open Scholarly Communication and suggest should practice it. Librarians and researchers in research institutions at all levels need to key into this vision and be well prepared for the challenge ahead. The perception of scholars needs to change concerning how science is being carry out today and they need to move with time else they would be left behind by technology. Libraries should not be a close access to institutional repositories, rather should be open access to research and data repositories and peer review. Every hand must be on deck to drive in this vision across the breadth and length of our institutions as librarians and researchers need a lot to do to achieve this.

8.5 Closing Remarks

From the foregoing, it is obvious that open science is yet to be given its pride among Malaysian scholars. The findings presented in this study will helps researchers – as well as their institutions, government and funders to better understand where aching drives lie, and the philosophies involves when it comes to Open Access to research, research data sharing and Open Peer Review among the scholars.

Currently, Malaysian researchers are reasonably positive towards Open Access awareness. Nevertheless, there is a concern for those that are not aware of Open Access among the scholars. The unawareness of these researchers may be as a result of the journals they submit to, that do not exercise open access options, and these scholars may have never been involved in Open Access publication. The journal editors are not left behind in the resistance researchers face when submitting their data to journals. There should be an alliance between the publishers and the funders in ensuring compliance for data publishing.

Open Access to research and Open Data consents would promote better connection with researcher motivation and measurement structures (i.e. linking to the institutional reputation of the scholars). This study presents to the world that even though the benefits of open research are enormous through its practices and perceptions, however, more awareness and training on open access to research, Open Data sharing and Open Peer Review are needed among the scholars worldwide. Likewise, the issues of cultural and national concerns pose a major challenge to research data sharing in the public. The fear of losing publication rights for the fear of unknown and lack of incentives should be address urgently by the funders and advocates of Open Data. Policies that incentivize the use and reuse of Open Data sharing practices, as well as tools and guidance to support

data sharing and a strong incentives and rewards to implement Open Data practice among scholars are encouraged. OPR is gaining popularity day by day – the time is now to involve in it.

Malaysian researchers have an opportunity to practice it, even if it has not fully taken in. Nevertheless, Open Peer Review can only perform credibly well if those involved have a clear idea as to its central drive. From Smith's options one can deduced that open peer reviewing has a lot to correct in scholarly communication and encourage quality and innovation in academics which is the way to make peer review open and interesting. The results have shown that Malaysian researchers are not totally reject OPR, however, how might authors and reviewers be motivated to engage in open participations processes and what ways are they different from the traditional peer review?

Also, the issues of open identities, reviewers are differing in allowing their reviews made public alongside the articles – seemingly reflecting common fears that either reviewers will hold back valid criticisms for the fear of offending (especially the senior) peers, or that forthright reviewers will be subject to future reprisals. The question to ask is to what extend are such fears valid? Do researchers act in such ways in OPR systems? If so, how could this be solved? Future studies should look at these and what can motivate researchers for open research.

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