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Exploring the Determinants that Control Information Overload and Postgraduate Research Performance: Conceptual Model and Implications for Future Research

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Abstract--- *This study was performed in one of the top five research universities in Malaysia to explore the impact of information overload (IO) on academic research performance among postgraduate students. It aims to get a deep understanding of the (IO) phenomenon effect on postgraduate research performance, and what are the possible determinants could control this effect. In-depth semi-structured individual interviews and one focus group interview were employed. Purposive and snowballing sampling has been implemented for data collection and verification. Numerous studies in many fields of sciences have been conducted about the aggravated effect of IO phenomenon and its impacts on the social, personal and organizational level. However, inadequate studies found to address the problem of information overload among postgraduate academic researchers. Most of the participants in this study exposed that IO represents a real miserable problem that severely affects their research performance in different stages of their research. Two main contributions introduced in this phenomenological research. First, this study proposed an original conceptual model, which includes four possible moderators identified as (a) information literacy, (b) self-efficacy, (c) expert's consultation, (d) supervisor support. These factors could play a role to control information overload and its effect on postgraduate students' research performance. The research's conceptual model was shaped based on synthesized perceptions extracted from data was collected and supported by relevant literature. Five of highly academician experts in the field assessed the conceptual model. Second, several practical insights and recommendations were provided to the decision makers and specialists in higher education institutions and academic filed on how to manage information overload and reduce its negative effects among postgraduate students.*

Keywords--- *Information Overload, Conceptual Model, Research Performance.*

I. INTRODUCTION

The vast amounts of academic information, especially relevant to research publications represent fear and challenge that could overwhelm academic researchers and scientists who are actually losing control of them (1). For example, as reported a few years ago, Elsevier alone as a single popular online publishing database has 1.8 million

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active authors around the world who submitted 1.3 million manuscripts to Elsevier journals. Elsevier publishes nearly 3,000 journals, which together issue more than 400,000 papers each year (2). As a result of this information explosion, many scholars agree that university researchers are experiencing a state of information overload (3, 4). Where many individuals found difficulty to digest abundant information and they found themselves unable to locate and make use of them.

Postgraduate students in general and Ph.D. researchers in specific are assumed to be a source of research innovation and productivity in today's worldwide knowledge and economy. As they are extensively engaged in research activities, such as thesis writing and publications with great anticipation from their institutions to produce high-quality research findings and articles. Their involvement in these research activities forcing them by default to search for information from many online database sources where they are absolutely encountered with the phenomenon of information overload. Information overload is seen as a troublesome phenomenon that must deal with (5).

Information overload has negative effects on the individual, therefore, previous studies had linked stress to information overload and the following problems resulted from information overload were identified: health damage, bad judgment and information anxiety (3, 5). Too abundant information could be turned to a disturbance tool therefore, some students face problems in choosing the particular information due to tension which influences students' performance, and even causes some of them to stop or withdraw from university (6). The phenomenon of information overload is receiving more consideration, while there are few studies and empirical researches to address this problem, particularly among university students (7).

This study contributes to the growth of knowledge in the field of information overload management and higher education development by addressing three issues. First, this study proposes an original work of a conceptual model that explains the impact of IO phenomenon on postgraduate research performance from a novel angle by introducing four-controller elements that could play a major role as a moderation effect. Second, this study suggested useful practical and theoretical implications as a guideline for academic supervisors and researchers in the same field. As well for research institutions' executives and planning teams about dealing with IO. Finally, by introducing the "implications and directions for further research", this study expected to open the doors for other researchers for more empirical research opportunities in the same filed in different context using different methods and research approaches.

II. Background of the Study

Previous studies in a different field of knowledge have been defined the notion of information overload using variety expressions as communication overload (8), cognitive overload(9, 10), knowledge overload (11), or information fatigue syndrome (12). Interestingly, different authors in different field of sciences have introduced the concept of information overload in a different way. The existence of various definitions for one phenomenon is not faulted logically and assumed be possible scientifically, this is because it is relying on whether these definitions were biased on objectively or subjectively view of point (13). Therefore, the term 'information overload' has no single conventional definition to be agreed upon in the literature.

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Despite the fact, some authors define information overload as a mental state faced by individuals and caused by the inability to process the information (14, 15). On the other hand, others define it as encountering too much information (16, 17). In regard to that, four dimensions of information overload were identified in the previous studies as processing capacity of information, quality of the information, the quantity of the information, and available time. While the processing capacity was reported as the most significant dimension, available time was detected to be relatively less significant than the other three dimensions (18). Regardless the variety expressions and results of IO in the past studies due to some methodological different approaches, especially studies within the field of marketing (19-21), still however, there is a wide agreement among academic scholars that information overload influence the performance of the individuals negatively (22).

Information overload phenomenon is not new rather it is a continual fact that becomes more aggravated with the internet technology advancement. Another important observation is the evidence that information overload has been receiving great attention in many disciplines in the previous studies, while there is a scarcity of researches for this phenomenon and its causes, and effects in the context of universities and postgraduate students' performance. For example, information overload was identified as a problem issue among male and female students while searching the internet and was described as a source of frustrations and common complaint (23, 24). Similarly, other studies conducted among several university's researchers confirmed that information overload identified as an obstacle in locating materials, making suitable use of information (25-27).

In fact, there is a massive growth in the number of academic online databases accelerated by internet technology advancement; it has been reflected in the growth of information overload problems. In consequences, universities started to realize overload problems among their students, and large scales studies start to be performed to investigate the prevalence of information overload among higher education researchers (6, 25). However, it appears that these studies are insufficient to comprehensively address the negative impact of IO on academic researcher's performance and what determinants could help to manage and control IO phenomenon among postgraduates' students. Therefore, this study aims to find answers for core relevant research questions and to introduce a conceptual model as one of the possible remedies to manage and reduce the negative effect of information overload among postgraduate students.

III. Research Questions

RQ1: What are the negative impacts of information overload on postgraduate students?

RQ2: How information overload influence postgraduate is research performance?

RQ3: What determinants could play a critical role to control information overload?

IV. Methodology

A. Study Design

This study implemented a phenomenology research design known as an educational qualitative research design (7, 28). The phenomenology research design was used because information overload requires a considerate understanding of postgraduate students' experiences on this phenomenon. This study explores the influence of

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information overload on the students' research performance and construct the IO phenomenon according to its own manifestations and components. A triangulation methods of the individual in-depth interview, focus group, observation, literature review content analysis and experts' interview was implemented to reduces the risk of biases adopting only specific method and to allow researcher to obtain a well understanding of the phenomenon and help to judge generality of the explanations that can be developed (29).

B. Participants Recruitment

To understand the essence of participant's experience, multiple interviews have been conducted with several recruited individuals in two stages as illustrated in research design flowchart in Figure.1 in the Appendix A. In the first stage, an official email invitation has been sent to all active postgraduate researchers to participate in this study. Surprisingly, only a very few postgraduate students have replied the email. Therefore, a decision has been made by the researcher to visit postgraduate students' rooms and managed to get eleven participants who agreed and hired to be individually interviewed. In the first stage, data collection was initially evaluated. Although the number of recruited participants was reasonably acceptable, the need to recruit more participants and collect more data was required. This is due to the following justifications: (a) the complete view about IO phenomena was not obtained, (b) the participants were recruited from a single school which could be titled for limiting the experience about the phenomenon within only one environment, (c) to meet the aim of this study to introduce as much generalizable understanding of IO impact among postgraduate students, multiple triangulated methods should be implemented. Therefore, it has been decided to conduct the second stage of the participant's recruitment for data collection. In the second stage, the focus group interview method was conducted, and a number of seven participants was recruited from four different schools through snowballing sampling. The third stage represents recruiting some experts based on some specific purposive criteria to assess research proposed conceptual model.

C. Sampling Strategy

In this study, both purposive and snowballing sampling was implemented through three stages. In the first stage of the data collection, the purposive sampling was used, where some criteria must be matched and participant preferred to be: (1) an active researcher in his/her school (2) not yet submitted his/her final thesis (3) speaks English in a correct manner. From the first stage of data collection through purposive sampling, eleven participants have been confirmed, and their profile information is shown in Table 1 in Appendix A. As usually suggested in the earlier studies about the phenomenon to be explored, in terms of a concept or an educational issue, it can be carried out with a diverse group that may vary in size from 3 to 4 individuals to 10 to 15 (30-32). However, in purposive sampling, explored findings are usually limited to the population under study. Thus, to produce a further wide range of useful data collection and to form the solid theoretical basis for a conceptual model, the researcher decided to move to second round data collection for confirmation in a different population, using a non-probability method (28, 33). The second stage in the data collection snowballing sampling technique was employed whereby requesting from informant to use their social network and recommend other potential people who could contribute to this study. In this second stage, seven participants have been confirmed and their profile information is shown in Table 2 in Appendix A. In the third stage experts have been recruited based on purposive and snowballing sampling as well.

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D. Data Collection and Management

The data in this study was collected using two methods, in the first method, semi-structured in-depth interviews with eleven participants from one school were conducted (27). In this stage, researcher arranged for reserved interviews and met with participants individually for a 40-45 minute for each interviewee, where the researcher wrote notes for any observations or remarkable thoughts, and interviews were electronically recorded using the mobile phone and laptop recorders for accuracy and transcription. In the second method, the data was collected through a focus group interview, which involves seven participants from the other four different schools. In this stage, the same selective semi-structured open-end questions used in the first method were used to find answers for the main research questions. The focus group interview took exactly seventy minutes and it was moderated by the researcher. All the collected data and audio records were transcribed as textual transcript using Microsoft Word then imported to NVivo.12 software as a raw database to be analyzed. The instruments and materials were used to facilitate data collection include interview questions and an interview protocol for recording participants' responses and any other comments the researcher may consider noteworthy (27). During the interview, the researcher introduced the primary terms and definitions of this study, and they can be found in Appendix A.

E. Data Analysis

The general concept of qualitative content analysis was used in this study which defined by some of the scholars as " a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (34). Inspired by (Creswell, 2017) who reintroduced Moustakas (1994) phenomenological analysis, the researcher have implemented both phenomenology analysis enhanced by thematic analysis as following: (a) organizing the data, (b) re-reading through of the database, (c) developing a list of significant statements from the interviews and relevant data sources (d) facilitated by NVIVO.12 software we reduced the data into themes through a process of coding which encompasses merging the transcript data into small categories of information, then looking for evidence for the code from various databases being used in a study, and then assigning a label to the code (e) and abridging the codes, and finally representing the analysed data in figures, tables, or a discussion and forming an interpretation of them. Irrespective the size of the database in this study we have followed the recommended typical way of thematic data analysis by Creswell to not exceed the development of 25–30 categories of information about the IO phenomena then we reduce and combine them into the five themes and some sub-themes that used to write research narrative and synthesized results and findings.

F. Ethical Issues

The researchers made sure to address all possible ethical issues in all stages, before and during and after data collection (35). First, during participant's recruitment, when the participants agree to share their experience, a letter of consent was provided to them to be reviewed, as shown in Appendix C. Once the researcher has the participant's acceptance, then data collection could begin. Second, an ethical consideration while conducting the interview, the participants were reminded and re-informed about the interview common protocol procedures such applying an audio record, requesting some personal demographic information and things to avoid such mentioning academic names or popular figures in their institution. Third an ethical consideration during data analysis, there were two

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participants did not attend the interview after agreement however, they replied the open-end question in a written form. After appreciating their written feedback, the researcher replied to them and emphasized on the importance of their presence for having face to face interview to collect more comprehensive data. Only one of them attended and her participation was considered, the other one was not turning up, then his written form and participation was appreciated but not being considered among analyzed data. Another ethical issue in data analysis is to confirm the mutual trust and credibility between the researcher and participants by sending them back their own interview transcript file to be read and even add any comments to confirm there was no any deviation or misunderstanding of interpretation committed by the researcher. Fourth, ethical consideration used for validation phase, to assure the accurate findings and researcher's unbiased involvement in the study, the researchers employed a special section in this research designed with highly academic experts in the same context of study for findings verification and assessment.

V. The Development of Research Conceptual Model

The influence of IO on the researcher's performance and the determinants that could control information overload are among the most substantial issues were investigated in this study. In relevant to the development of study conceptual model, we attempted to collect every single pace of evidence from three resources: participant's narration, observations on participants and related studies. Unsurprisingly, majority of the participants have reported that they faced information overload in every stage of their research process. Many phrases and terms were expressed by participants to convey the feeling of losing control, being lost, dishearten, stressed, distracted, exhausted, sleepless, confused, disappointed, pressured and having an isolation from common social life activities. Such negative consequences of IO on postgraduate researchers lead to four undesirable effects on their research performance as illustrated in Figure 1 below and explained in detail in the following paragraphs. Therefore, it can be concluded that IO among postgraduate researchers represents a common undeniable and inescapable phenomenon that should be dealt with to avoid its negative impacts on postgraduate's research performance and affect their life wellbeing. The following sections introduce the components of the research conceptual model through exposing themes and results of the drawbacks that affect postgraduates' performance and proposed elements to manage information overload.

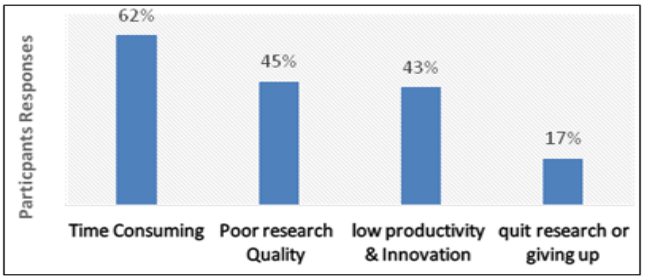

Fig. 1: The Negative Impacts of IO on Researcher's Performance

A. Theme I: Information Overload and Time-Consuming

Majority of the participants (62%) revealed that one of the main negative effect of information overload on their performance is the time wastage and consuming. As it is well known that postgraduate researchers are constrained

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by limited time and financial support and adhered to other academic obligations to achieve what supposed to be completed on time. However, IO could result to prolong research process which causes postgraduate researchers to spend more time and money as well to proceed and finalize their work. As it was reported by one of the participants (P15): "I find it taken a lot of my time. So, when I'm overwhelmed with too much information, if I have a task to be finished in one year then I have information overload there is a high tendency not to reach that target, that is a very serious influence ". Another participant (P16) stated that: "you feel you are wasting too much time on literature, then searching on method or experiment then you discovered this is not valid then ok go for something else, because lack of guidance you just spend 2,3 months on doing something then it became useless and you have to start again. It creates a lot of stress" Another two females' participants (P1) & (P5) have added (P1): "It is for me, time-consuming and pressure, I feel like I'm swimming in the sea I don't know where the direction is" (P5): "It will waste a lot of time and also money because I see some people they spent like three or four semesters just reading on literature just to prepare for that then, at the same time to pay additional tuition fees that will cost as well". Therefore, the results from the analysis revealed that when postgraduate researchers face information overload, they found too much difficult to synthesize information and to make a good meaning of them, it takes a lot of time a lot of thinking which prolong the research process. These results are consistent with previous studies which indicated that, IO is intensified with the advancement of internet and individuals spend massive time on information gathering, filtering, and evaluation and that might cause time waste, delay of decision making, tiredness, loss of energy, stress, distraction, frustration, reduce in personal productivity and efficiency (19, 28, 36-38).

B. Theme II: Information Overload and Poor Research Quality

An interesting result was explored from (45%) of the participants' narrations indicated that information overload could lead to poor research quality. According to the researcher's observation and data that were analyzed in this study, the diminishing of research quality could take three forms: First, the difficulty that postgraduate students face to collect the most relevant information and come up with good synthesized and rigor research work that should be flowed to end with a desirable academic product. Second, Due to academic research limited time and other life obligations, postgraduate researchers who encounter IO attempt to just accelerate their research work with whatever information and results they thought it is serving their research. In fact, they end up with just a shallow research work that didn't meet an academic required level. Third, some postgraduate students who face IO during their research are enforced to hand over their research task to others to be completed, this is due to different kinds of pressure they face. As a result, when the research work is done by others even, they are professionals it might be subjected to many shortcomings and sometimes manipulating. These findings were testified by the participants in a different ways, as participant (P18) declared that: "information overload really effects because it makes it very difficult to synthesize the information into one because if you writing the report there should be in a flow and it should be correlated and give meaning, but when there is information overload too much you find it difficult to synthesize it and to make in a good meaning". Another participant (P6) narrated that: "I feel also not satisfied with my work I just do the research work with low quality and just want to finish whatever is the work. I don't have the way to improve it more sometimes I feel I don't want to complete but I know this is a challenge for me because when I come to this university was not easy to come so it is not easy also to lose hope in doing my research."

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Another participant (P2) stated that: "when we talk about research performance when there is too much information it is really not good because you will mix up the ideas incorrectly, other than that the other factors if you can't meet the supervisor expectations and what you perform in your thesis, of course, you will jeopardize your research performance". Another participant (P16) added: "IO influence research quality because all of us has a limited time, you don't have like infinite amount of time, so whenever you take the wrong approach because of information overload, so you will start again and in a very quick way in hurry, not giving your work a sufficient amount of time, like you are in the half-way."… [] "honestly sometimes - because research limited time I have a friend wants to manipulate in the statistical analysis he wants to manipulate". These results are in accord with previous studies that found, university academics and individuals who encountered with too much information, used to seek fast information and they just search within unsophisticated strategies such Google searches or any convince sources (6, 39). However, from the perspective of research quality assessment, this behavior yields poor procedural of acquiring knowledge that causes the low quality of research (40, 41). This is because Postgraduate researchers will miss an important part of information due to the huge information need to be gathered filtered and processed (42, 43), therefore, when individuals experience too much information and do not have enough time to assess them, they miss some or most of the important and relevant parts. This situation could lead researchers to evaluate the inferior and alternatives with insufficient information(19), and that could affect the quality of the research performance and researcher's decision of selection as well (44). Another study in the field of medical education confirmed that due to IO and students' lack of sufficient research skills and students feeling not being efficient to use valuable time, the final strategy that is feasible to them is to get somebody else to do the work for them (19).

C. Theme III: IO and Low Productivity and Innovation

In this part of the research, the results that have been discovered from some of the participants' narrations, (43%) of the participants disclosed some unique and essential findings on how IO could function as an obstructive tool that negatively affects personal productivity and the innovativeness of postgraduate researchers. A combination of facts has been uncovered through researcher observation and from analyzed data, indicated that there are three main deterrents which prevent postgraduate students from personal productivity, innovativeness and creative thinking: First, in a climate where the feeling of stress, frustration, confusion, and distraction is predominant because of IO phenomenon, it is impossible to have that type of innovative and productive academic searchers. Second, Information overload sometimes creates an isolated individual who suffers a very low interaction with others, including experts and professionals. However, the interaction with other peers and experts in the academic filed is essential for productivity and innovation. Third, the full engagement of postgraduate students with their thesis as main work and the extensive time they spent to overcome IO during the postgraduate study journey, do not allow them to find enough time to produce good quality publications. These are some pieces of evidence from the data collected that confirmed such findings. Participant (P4) stated that: "If I'm overloaded I cannot produce or be productive so I cannot publish" another participant (P8) has commented on the same issue of being not innovative and produce high-quality novel work he stated: "Sometimes what happen I have a limited window of time to complete my Ph.D. in 3 years. One year my framework still not yet done, what happens, I rush and I differed myself with that framework which I think it is easy to do, so that time my interest has not come but because of the

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emergency I select such framework, and most students have made this, they are not doing those research which actually they want to do they are doing the researches that they should do because of the constraints this happens when you are overloaded" and he further added "It will be just a research process no enjoyment, no novelty". Participant (p2) added: "this information overload could influence directly to my personal productivity, you know I can feel the stress and stressful situation like every day because I keep thinking on how I want to manage my ideas in my brain to put in the right things and all that". The results and findings in this part of the study are in line with previous research that information overload not only affect individual's wellbeing but hampered their innovation, and productivity as well (45), by reducing personal efficiency and mental energy (46).

D. Theme IV: Information Overload: Thinking of Giving up, Quit or Turning Over University

A surprising result was revealed by (17%) of the participants' narrations indicated that information overload and due to its negative effects could lead some postgraduate researchers to decide to give up research work or to quite current educational arena, and in some other situation to turn over looking for another university or new research topics. These findings were revealed by Participants (P6), (P7) and (P8). For instance, participant (P6) when she was asked to describe the worse scenario could be when she overloaded with too much information she stated that: " sometimes I feel I don't want to complete but I know this is a challenge for me" and she further added: " For example my friend from another college she decided to change the country - [not the course] –because she was facing some problems like rarely support and if meeting with supervisor they are always busy so my friend then changed to the USA because she studied before in the USA and she told me [..] the American or Europe usually they know what you want and you know what they want from you." Other participants when he has been asked the same previous question about IO she said: "Sometimes I feel I will give up or maybe I will quit and maybe sometimes I ask myself I'm I suitable for this area." As a conclusion for this part of findings some type of postgraduate students when they are under IO pressure and stress and no way to guide them or they have lack of initiative interaction and communication, they might take long term withdrawal strategy behavior. This is only can happen at any critical point and situation, and the fact match with this result was when one of the participants(P15) declared that : "I think university should employee a Psychologist, that's why you need to talk to someone, when you get depressed you know" surprisingly Participant (P16) have agreed with the same view of point and stated: "I'm totally supporting this suggestion this is the right thing to do, in my opinion also guidance lack of guidance is the main issue." It was expected that it is very hard to find studies that are consistent with the same findings. Surprisingly, one recent study has confirmed that researchers observed certain facets that are creating issues of students' dropped number of enrollment and admissions and sometimes withdrawal in some of higher education institutions, the main reason of this problem was claimed to be information overload (47).

VI. The Possible Controllers of Information Overload

Interestingly, there were four possible factors have been identified in this study which could act as a controller between IO and postgraduate academic research performance. According to participant's narration aided by the researcher's thoroughly observations and supported by relevant IO literature, four possible moderating factors for IO were identified as follow: (a) Information Literacy, (b) Self-Efficacy, (c) Experts Consultation, (d) Supervisor

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Support. The proposed conceptual model is shown in Figure 2. First, information literacy was detected through two ways, one way is from the recorded written answer of a question was embedded among the participants' demographic information that was measuring how experienced participants are, using IT tools or any research skills. Another way to detect participant's information literacy was through their narrations for replying the question relevant to how they cope with IO. Second, participants' self-efficacy was perceived through the researcher's observations on the way participants reply the questions, how confident they are when facing and coping IO, who among participants was less complain of IO and who was proud of his/her knowledge, skills ability to cope IO. Third, expert's consultation, this factor was noticed through the researcher's observations and analysis of the participants' narration while replying a question on how participant overcome IO, the researcher was highly focused whether the participant is an autonomy person, or he/she has the spirit of asking help from others. Finally, the supervisor support factor was observed, through participant's narration to reply a very straight forward question regarding the role of supervisor to reduce or manage IO.

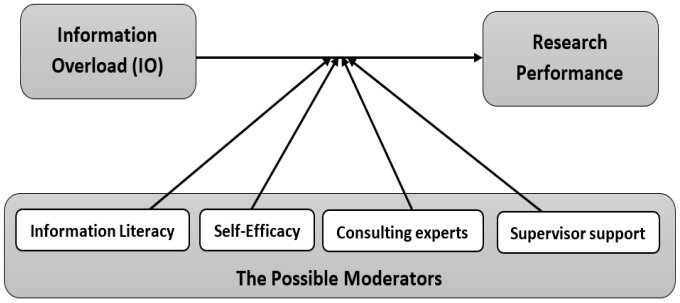

Fig. 2: Research Conceptual Model

A. Theme I: Information Literacy

Information literacy was defined by the American Library Association (ALA) as, the ability of a person to recognize when information is required, to locate, evaluate, and use effectively the necessary information. (6). Information literacy is one of the essential components for handling information overload, it represents lifelong learning that was recommended to be a survival skill to cope electronic information overload(48), and overcoming stress resulted from IO in the Higher Education Institutions (HEI) (49). According to participants' profile records, and their narrations while answering interview questions, it was found that (73%) of the participants were using the traditional method of information searching on the online database. Whereby, they didn't use any common search skills like AND, OR, NOT Boolean operators with strings ["…. "]. In addition, only (30%) of the participants have mentioned that they use some advanced information research methods and how they managed them by some supported software like NVivo, Mendline, and Endnote. The most exciting finding was noticed, that the participants who complain and suffer from IO are those who haven't used the common advanced research methods and skills and they just relied on typing keywords in publicly well-known research engines and convenience online database. In contrary, those postgraduate researchers who used to employ some common advanced information research skills like AND, OR, NOT Boolean operators, and they have well-established knowledge where to search information and how to sort, filter, manage and make use of them, they were the less complaint about IO. Some narrative evidences

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by participants were harmonized with these result as stated by participant (P9): " it is the matter of understanding the appropriate research keywords, and also we need to know databases, we need to know which database is more appropriate to my study for example if you want to get a very rich content and reliable information, you can go to web of science for example" and he further added: " this is how I minimize my overload you see how I minimize information overload if I know the process! So sometimes It depends on academician how he handles the information". Another participant (P8) stated that: "I think there is a lack of orientation in searching information, we just do a blind searching, unfortunately, if you do a blind searching or wide searching just like that, many things come but I think if you limit your search using some key terms maybe it reduces the amount of information you will get". The findings in this part of study are consistent with the facts in the previous studies that, the general promotion for information literacy among individuals in higher education institutions become as a necessary strategy in coping with information overload (50-52). Nevertheless, there is an agreement on how powerful is the information literacy to be recommended among postgraduate researchers (37, 50), yet it requires proper training to be introduced to postgraduate students in order to efficiently minimize the effects of information overload.

B. Theme II: Self-Efficacy

Self-efficacy was the most challenging factors to be detected and observed through loads of participants' narrations and different personalities. Moreover, this is also due to this factor's multidimensional categories and definitions. Several studies have adopted the general defintion of self-efficacy and refined it to be fitted with specific context and settings. For instance, in a study conducted by Yan (2016) and his colleagues, the self-efficacy appear to be situated and categorized based on sensitive domain. Several types of self-efficacy were mentioned in their study like internet self-efficacy, social self-efficacy, academic self-efficacy, creative self-efficacy, mobile self-efficacy and even information literacy self-efficacy (39). However, we managed to set one specific thematic node for self-efficacy using NVivo software to detect and reanalysis any narrations that reflect the definition of self-efficacy through observing partisans' mastery of experiences, ability to learn the capability to solve problems and perform tasks with high competence and confidence. The results were found that (50%) of the participants had revealed some specific terms and statements that reflect some levels of self-efficacy that help them in coping with IO. For instance, participant (P2) described some level of self-efficacy saying that : " within my environment I preferred to do things by myself …, I manage and organize my folders, what I'm doing I try to divide them according to their filed so it is easier for me to reach the paper maybe it is not directed to cope with information overload but at least before you want to start you feel more comfortable, it is a self-dependent you have to do it you have to know you have to update by yourself ". More additional evidence that indicated some level of self-efficacy stated by (P8): "I don't think I was overloaded because I was clear about my research problem, actually when I come for Ph.D. I already drafted the proposal, I discussed it with my supervisor and my supervisor say ok you can go and do this research in this particular area" and then he added, "I was not overloaded because my mind was with those variables to identify". Other participant has added (P9): "So this is how I minimize my overload you see how I minimize information overload if I know the process! So sometimes it depends on academician how he handles the information". These results agree with a wealth of research which indicated that self-efficacy has a vital connection with educational performance and stimulate academic motivation, inspire learning, and achievement (37, 53). On the

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other hand, low self-efficacy was considered to be one of the main obstacles that hinder effectively information searching (54). From what we have found in the results and literature review it is confirmed that postgraduate student's self-efficacy represents a very crucial construct to control the relation between information searching, information overload and students research performance. However, the development of self-efficacy among postgraduate students in the academic arena still one of the challenges that top institutions' management faced and yet have not used enough and effective strategies to develop this feature in postgraduate students' personality.

C. Theme III: Supervisor Support

According to the participants' narrations and textual data analysis, supervisor support construct was reported as the highest rated construct to have an important moderation effect between IO and research performance. Almost (84%) of the participants have emphasized on the supervisor's significant role to help in reducing IO, and help to improve postgraduate students' research performance. Supervisor support is defined in this research context as: the extent to which an academic supervisor able to transfer his/her experience to their postgraduate students and provide full guidance and assistance in their research process and care about their well-being. Here are some of participants' narration evidences that described their perceptions about their supervisor role toward the IO and research performance, for instance: Participant (P1) has testified about her supervisor: "Yes of course without her guide I think I don't know what I should do, actually she can give me a way to go big correct way. "Another participant (P10) has stated that: "when we come to the supervisor he plays a very important role and help a lot in term of to find the reliable source to develop my measurement, to make sure people will not ask me later on, the storyline must be correct and how I figure out my problem these things made me work very fast and easier". The results found from the analyzed textual data highlighted the importance of supervisor support in reducing IO and helping students to improve their research performance. In fact, this part of research findings is consistence in somehow with same findings were found in the previous section about causes of IO, in which it was found that the communication gap between postgraduate researchers and supervisor could increase the IO and effect research performance. In addition, these findings are in line with what has been found in the previous literature that an appropriate matching between supervisors and students could play a crucial role on the student's performance and achievements (39, 55). Moreover, the existing literature showed that the absence of supervisor support, experience transfer, and frequent planned communication might cause students to be academically isolated, un-updated having anxiety that could generate interaction avoidance behavior (56, 57).

D. Theme IV: Experts Consultation

There were (39%) of participants used to refer to their senior postgraduate friend, peers and other experts to help in coping IO while doing research activities. Experts consultation in this study context refers to the students' act and activities of communication and interaction with other experienced people in the research filed for an assistance in managing IO. On the other hand, there were a few numbers of participants (11%) who are cautious to consult or share IO problem with others. The justification of those who consult experts or seniors was to reach faster to the required information and save a lot of time that was consumed before in searching load of information. However, the minority participants who reserved to consult others sometimes encountered with some demotivated consultant

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experience. In overall, one way was found to be practiced among postgraduate students to reduce IO and cope with it is to share their IO and other research problems with the more experienced people. As it was described by the participant (P10): "I was facing some problem in my research I sent email to Professor Ringle, then he replied me I email to another scientist he replied this is how I manage my IO". He further added the importance of sharing with other experienced people: "when there is a sharing session with other researchers in the same area it can improve". Another participant (P16) when he was asked how you do when you couldn't cope IO with your own ways he stated: "I try to take another approach or ask for someone suggestion someone help, not necessarily professional sometimes I speak my problem to a friend or brother and he will suggest something was little bet far from my mind, so what If I do this! Will it work? Sometimes it works". Such findings are in accord with previous research, as was stated in some previous studies that some experience of searching information could be gained by consulting and observing the mastery experiences of others (58), therefore postgraduate researchers are likely to ask whom they may think they can support them in this stage, such peers, colleagues and academic experts which is important in order to avoid isolation (37).

VII. CONCEPTUAL MODEL ASSESSMENT

To assess the feasibility and usability of the proposed conceptual model for further and future researches, one further step to evaluate the proposed conceptual model has been conducted with five highly experts in the field. A combination of purposive and snowballing sampling was adopted to hire the five experts, the profile of the experts is provided in Table 3 in the Appendix B. Expert who has been requested to assess the conceptual model must meet the following criteria: (a) having minimum of 10 years of work experience in HEI (b) Having at least 7 years of experience in supervising postgraduate students (c) His/her designation must be professor or associated professor. Face to face interviews have been implemented with the experts, they were given a draft of the illustrated conceptual model with all its factors' terms and definitions and assessment questions as shown in the Appendix B. Semi-structure open end questions were asked through face to face interview with experts to assess and comment on the research conceptual model. Every interview took from 15 – 20 minutes.

VIII. EXPERTS' ASSESSMENT

According to the observations and investigations have been conducted with postgraduate students, the results proposed four possible factors that could play a role in controlling the effect between information overload and postgraduate students' research performance. These four factors include students' self-efficacy, information literacy, supervisor support, and expert's consultation. Interestingly, the five experts have revealed their consensus that all these four factors have a moderating role between information overload and students' research performance. However, each expert's evaluation for each factor's level of importance varied from one expert to another, but there was a tendency of agreement has been concluded. As shown in the Table 1, in each factor's first sub-column, all factor has been assessed and marked as having an effective role between IO and students' research performance. In the second gray sub-column, each factor has been ranked from 1 to 4 according to the level of importance decided by expert's evaluation, in which 1 denotes the very high level of importance and 4 is the lowest level of importance. As illustrated in Figure 3, the experts' assessment and factor ranking clearly revealed that information literacy has the most crucial role to manage information overload then followed by student's self-efficacy in second place then

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followed by supervisor's support and experts' consultation respectively.

Table 1: Experts' Assessment

Expert	***Factors' Assessment & Ranking Level of Importance***							
	Self- Efficacy		***Information Literacy***		***Supervisor Support***		***Experts Consultation***	
E1	√	3	√	**1**	√	2	√	**4**
E2	√	**2**	√	**1**	√	3	√	**4**
E3	√	**2**	√	**1**	√	3	√	**4**
E4	√	4	√	3	√	1	√	2
E5	√	**2**	√	**1**	√	3	√	**4**

As justified by an expert (E1): "I'm sure if you are having the information filtering ability and filtering strategy, it will reverse the negative effect of IO. Ph.D. students assumed to be independent so if they have that ability to filter all information without the intervention of so many people, that will be helpful, in the context of the Ph.D. as well you have a person to rely on which Is the supervisor. For me, supervisor and information literacy are the most important then self-efficacy". Expeert1 (E1) she added that the fourth factor "expert consultation" is important, but it could be sometimes like a double edge sword expert' consultation could be the reason why we have information overload, maybe you have IO because you consult so many experts". Expert2 (E2) has confirmed a the same assessment and high level of importance mentioned by (E1) regarding information literacy by stating that:" I was thinking about the two most important factors as the self-efficacy and information literacy, but I believe more than information literacy comes first then the self-efficacy and confident as second, because if the researcher is too confident that's where the problems come." (E2) has justified her evaluation and stated that: "Too self-confident may cloud your good judgment and I prefer this self-efficacy to be in the late stage of research not an early stage of the research." An interesting comments and assessment was given by third experts when he was asked to rank these four possible moderating factors, (E3) reported that: " Ok will take this question from two perspectives what should be and what is happening ,What should be literacy, efficacy, supervisor support and lastly Experts Consultation if necessary, but what is happening that students come with lack of literacy and efficacy so I have to put my responsibility at top then I try to help them in building their literacy and efficacy sometimes they go for experts in the statically issues but that one is very rare normally I can solve that issue". On the other hand, fourth expert the only expert who stated that supervisor support has the most important among four factors to moderate information overload (E4) reported:" by looking to this model yes, I do agree that yes these are some possible factors that can moderate information overload and the performance of the Ph.D. students especially I think the supervisor support". Then (E4) when he was asked to rank the four possible moderation factors, he added: "I think the supervisor support is the very important among them then expert's consultation then information literacy follow by self-efficacy". Lastly, fifth expert (E5) she indicated that information literacy is most important then the other factors come after, (E5) reported that:" if -postgraduate students- have the skills to filter information this will help them to digest the information".

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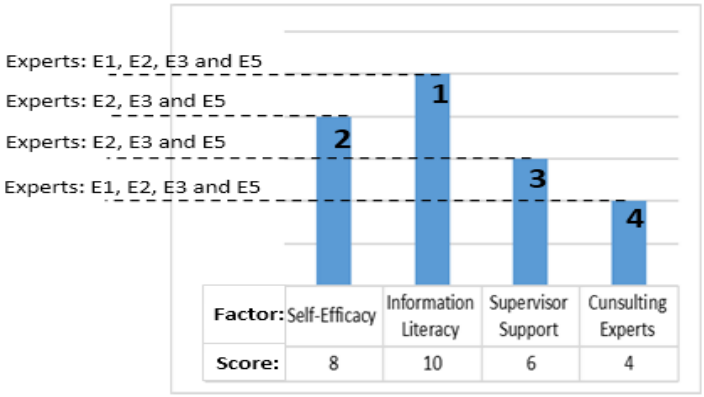

Fig. 3: Ranking the Level of Importance

IX. Discussion of Assessment Findings

Almost (80%) of the experts, four out of five have assessed information literacy as the most important factor that helps postgraduate students to control and reduce information overload. Followed by self-efficacy factor which evaluated by three experts out of five and ranked as the second important factor to manage information overload, then supervisor support and experts' consultation as third and fourth important factors respectively in the ranking. However, the findings have been reported from participants' narration earlier stated that almost (84%) of the participants have emphasized on the supervisor support as a significant role player to help in reducing IO and help to improve postgraduate students' research performance. For the first sight, it seems like contradictory findings and a debatable issue could be raised but it is not. In fact, there are no contradictions between the findings reported from students and experts for three reasons. First, when looking deeply on the four possible factors which could control the phenomenon of information overload, they can be divided into two main categories. Information literacy and self-efficacy which could be classified as self-dependent factors for postgraduate students who have a high level of autonomy and they used these two factors as a self-reliant skill to manage information overload. The other two factors which represented in supervisor support and consultation of experts could be classified as not self-dependent factors for those postgraduate students who have a low level of autonomy and self-reliant skill and they still highly rely on others to help in managing information overload. Therefore, those students who have a high level of information literacy and self-efficacy even they are few, they consider supervisor support as a secondary role player to manage IO. Whereas students who complain about information overload, they consider supervisor support as the main factor to manage IO. Second, even though majority of the experts have assessed information literacy and self-efficacy as the most important factors to manage information overload, but they have commented that this is what should be in the ideal situation but they have declared that they still giving priority and high level of importance for supervisor support where in reality most cases of the students are facing the information overload. Third, the findings were obtained from both expert's evaluation and postgraduate participation have been introduced in a raw conceptual model and represented in four possible moderating factors that could be empirically tested either through singular selective factors or in the group.

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X. CONCLUSION

The main objective of this study was to understand the negative impacts of information overload on postgraduate students and their research performance. Most of the participants in this study exposed that IO represents a real miserable problem that severely disturbs their research performance in different stages of their research. Time-consuming, cost, inferior research work quality, and poor personal health, social activities' isolation, low level of creativity and productivity are some of the major drawbacks resulted from IO. The research conceptual model, which represents the essential part of this study, had depicted four possible moderators were identified as (a)information literacy, (b) self-efficacy, (c) expert's consultation, (d) supervisor support. These factors could play a role to control information overload and its effect on postgraduate students' research performance. This conceptual model has been introduced as a raw developed model to be iambically examined based on a singular factor for each moderator or based on any other context.

XI. IMPLICATIONS

This study has introduced a few important implications that could be utilized as a practical guide for postgraduate students, academic supervisors and decision makers in higher education institutions to reduce and manage information overload. Reducing and managing IO during the research process conducted by postgraduate students enable them to achieve good quality research in a limited time, allow them to be highly productive and innovative with a low level of stress and confusion. This study proposed a conceptual model that comprises some elements which represent solutions to manage IO and reduce its negative effect on postgraduate students. ***First***, postgraduate students themselves should focus more on enhancing their own information literacy and self-efficacy as two important skills to cope IO. Improving information literacy can be achieved through acquiring the necessary skills of research information and information filtering and by developing own abilities on how to manage, categorize and make good use of collected research information. The skill of information literacy could be gained through attending relevant research workshops, training and by involving postgraduate students in knowledge sharing sessions and research group works. The notion of self-efficacy should be improved and gained by postgraduate students to enable them to be enough confident of the knowledge and skills they already have, to enable them to face IO challenge and solve the problems. ***Second***, academic supervisors should play a major role in helping postgraduate students to manage and reduce IO, through providing them adequate guidance about what and where to search information and always link them to their research topics and objectives. Academic supervisors must have their own competency and accumulated experience and it should be transferable to their postgraduate students on how to find the most relevant information and make good use of them. If the academic supervisor shows no competency or has communication gab toward students, no experience could be transferred. In some cases, this will force postgraduate students to search for other's consultation as an alternative solution.

XII. LIMITATIONS AND DIRECTIONS FOR FURTHER RESEARCH

Information overload as described earlier represents a continual, aggravated and panic phenomenon in which no single research in specific context able to cover its all aspects. Although, this study has introduced an essential contribution of findings and proposed a conceptual model to define the IO phenomenon and manage it in the context

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of postgraduate students and HEI, yet it has some limitations that could open several opportunities for further research. First, up to date the research about information overload phenomenon has been enriched in the field of marketing and information science but still need for more empirical studies in the field of higher education and research institutions. Second, this study has been conducted in a limited population, which has been taken from only four academic schools in one Malaysian research university. Further research might explore or investigate the IO phenomenon in a wider range of population using different methods, institution and other countries. Third, the conceptual model that has been introduced in this research proposed four possible factors that could have a moderation role between IO and student's research performance, this model still raw and need to be empirically measured. The four possible moderating factors proposed in this research conceptual model could be examined selectively in singular form depends on the context and type of the research. Fourth, as an extension to this research work, it would be interesting to assess the effect of information overload more specific on the innovative thinking of postgraduate students or on the researcher's publication productivity.

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APPENDIX A

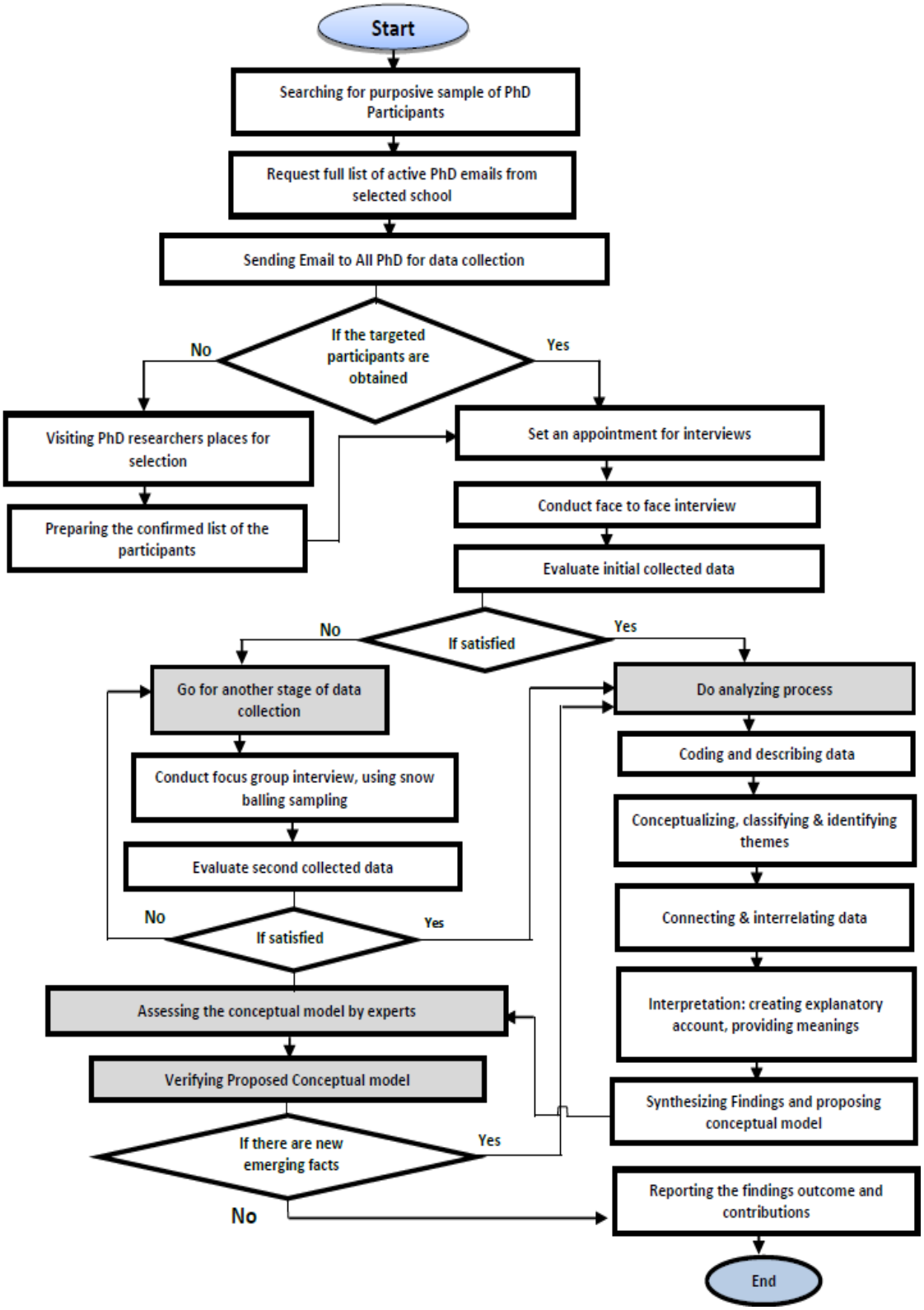

Fig. 1: Research Design Flowchart

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Table 1: Postgraduates Interviewee Profile for the First stage Data Collection

Participants	*Age in Years*	*Field of Study PhD*	*Gender*	*Observed Self-Efficacy*	*Level of Study*	*Nationality*	*Search Skills*
P 1	29	Islamic Finance	Female	Medium	2nd year	China	Traditional
P 2	33	Organizational Behaviour	Female	High	3rd Year	Malaysia	Traditional
P3	31	Human Resource Management	Male	High	1st year	Nigeria	Advanced
P4	31	Islamic Finance	Male	Low	1st year	Pakistan	Traditional
P 5	30	Finance	Female	Medium	2nd year	Malaysia	Traditional
P6	38	Marketing	Female	Low	1st year	Saudi	Traditional
P7	28	Management	Female	Low	1st year	Malaysia	Traditional
P8	33	Business	Male	High	2nd year	Pakistan	Traditional
P9	37	Operation Management	Male	High	3rd Year	Bangladesh	Advanced
P10	43	Management	Male	High	2nd year	Malaysia	Traditional
P 11	40	International Business	Male	Low	2nd year	Pakistan	Traditional

Table 2: Postgraduates Interviewee Profile for the Second Stage of Data Collection

Participants	**Age in Years**	**Field of Study PhD**	**Gender**	**Observed Self-Efficacy**	**Level of Study**	**Nationality**	**Search Skills**
P12	37	Chemical Science	Male	Low	3rd Year	Nigeria	Traditional
P 13	45	Chemical Science	Male	Low	2nd year	Nigeria	Traditional
P14	29	Pharmaceutical clinical	Male	Medium	2nd year	Yemen	Traditional
P15	31	Pharmaceutical clinical	Male	Low	1st year	Nigeria	Traditional
P16	30	Pharmaceutical clinical	Male	High	1st year	Syrian	Advanced
P17	40	Social Sciences	Male	Medium	3rd Year	Nigeria	Advanced
P 18	36	Pharmaceutical clinical	Male	High	4th Year	Nigeria	Advanced

Exploratory Study on Perceived Information Overload among University Post Graduate Students

Postgraduate Participants' Form

Section 1: Participant's Information

Participant's Number: ---------- (Please leave it empty)

Age: ---------- Gender: ----------

Nationality: ---------- Field of study: ----------

Level of study: ----------

Semester No: ---------- Year no: ----------
* Number of Supervisors: 1- Main ---------- 2 – (if any) Co-supervisor----------

*Having Information Research Skills : ----------

Number of papers published: ----------

Number of Average meetings with supervisor per month: ----------

Using any support software or computerize method to help in research process: ----------

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Interview Questions for the Postgraduate Participants

#	Question
1	As an academic researcher could you please describe when and where do you find yourself overloaded with too much information?
2	What forms of Information Overload (IO) you face sometimes?
3	Could you please describe your situation being overloaded with too much information?
4	Explain how usually you try to cope with Information overload?
5	From your own experience and perspective, what do you think are the causes of being overloaded with information?
6	Could you please describe how IO could influence or effect your research performance?
7	Does IO during your PhD research process influence or effect other sides of your life?
8	Could you please suggest any solutions you think your school or institution can do to help PhD researchers to reduce IO?
9	Could you please tell me to which extent do you think supervisor can help to manage or reduce IO for PhD researchers?

APPENDIX B

Table 3: Experts Profile

Experts	*Academic Experience in years*	*Age in Years*	*Designation*	*Gender*	*Specialist*	*Supervising Experience in years*
E1	12	45	Professor	Female	Entrepreneurship	12
E2	13	45	Associated Professor	Female	Operational Safety	13
E3	12	45	Associated Professor	Male	Economics	10
E4	20	52	Associated Professor	Male	Finance	18
E5	10	42	Associated Professor	Female	leadership and HRM	7

Expert's Assessment Forms for the Proposed Conceptual Model

Section 2: Expert's Information

Expert's Number: ---------- (Please leave it empty)

Age: ----------

Gender: ----------

Nationality: ----------

Filed of Specialist: ----------

Designation: ----------

Total years of academic work experience: ----------

Total years of supervising postgraduate students: ----------

Methodology expertise: ----------

Total number of students under supervision: ----------

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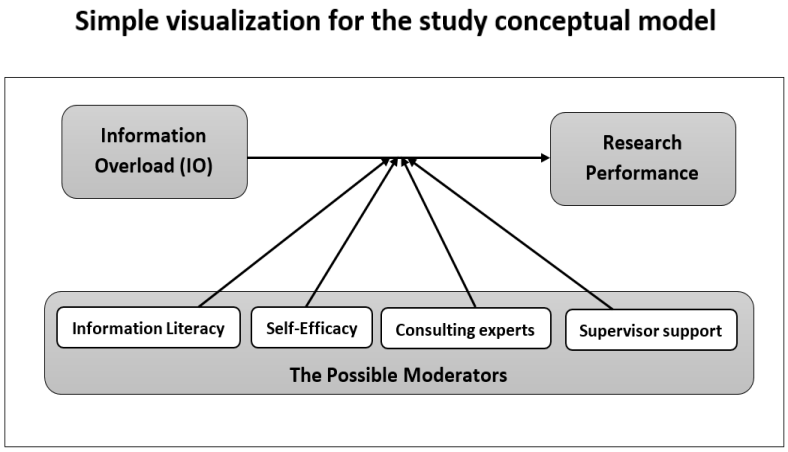
The Assessment of the Proposed Conceptual Model



Research Conceptual Model

Terms and Definitions for this Study Context

Information Overload (IO)

The mental and physical condition experienced by the postgraduate students when they deal with too much information and being not able to locate, evaluate and process the information.

Research Performance

The related research work activities expected to be performed by postgraduate students to accomplish their research task and requirement successfully, and to acquire a desirable research goals and achievements.

Information Literacy:

The ability of postgraduate students to recognize when information is needed, and to locate, evaluate, and use effectively the necessary information.

Self-Efficacy:

Postgraduate students' judgments of their capabilities to execute courses of action required to deal with prospective situations and attain designated types of performances.

Consulting Experts:

Postgraduate student's acts and activities of communication and interaction with seniors, peers and experts in their research filed for assistance in managing IO.

Supervisor Support:

the extent to which academic supervisor is able to transfer his/her experience to their postgraduate students and provide fully guidance and assistance in their research process **and care about their well-being.**

EVALUATING RESEARCH CONCEPTUAL MODEL

Experts' Interview Questions:

1. Through your experience, could you please describe how far the proposed conceptual in model is effective

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to manage IO phenomenon among postgraduate students?

2. Could you please describe, which two factors among the four moderators are the most important?
3. If you have been asked to rank these factors according to the level of importance how you would arrange them?

First:

Second:

Third:

Fourth:

APPENDIX C

LETTER OF SOLICITATION

Dear potential participant,

We have the pleasure to invite you to participate in a phenomenological research study, titled exploring the inescapable suffering among postgraduate researchers: Information overload conceptual model and implications for future research, conducted by Nabil Hasan Saleh Post doctorate fellow at the University Science Malaysia, under the supervision of Assoc. Prof. Dr. Siti Hasnah Hassan

Your participation will include attending an interview session which will take approximately 40 minutes. This session encompasses an informal discussion regarding your experience dealing with information overload during your research activities, your experiences with information overload, and the perceived influence that these experiences have on your research performance, personal health and on your overall levels of research productivity. Upon completion of the interview you will be asked to provide the names of other possible participants that the researcher could contact. Furthermore, in order to ensure the accuracy of your statement's interviews will be audio-recorded and you will also be asked to review the transcript of your interview, and the corresponding themes, once they have been provided to you electronically by the researcher.

It is important to note that the information you provide will be kept confidential and anonymous. Your participation in this study is entirely voluntary. If you wish to withdraw at any time from the study, you are permitted to do so. At that time any information you have already provided to the researcher will be safely discarded. Only the researcher and supervisor will have access to the information you provide.

If you agree to participate or have any inquiries, please feel free to contact me.

Thank you & sincerely,

Nabil Hasan Saleh

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CONSENT FORM

Exploring the inescapable suffering among postgraduate researchers: Information overload conceptual model and implications for future research

Researcher: Nabil Hasan

School of Management

Postdoctoral Studies

University Science Malaysia

Supervisor: Assoc. Prof. Dr. Siti Hasnah Hassan

School of Management

Postdoctoral Studies

University Science Malaysia

Invitation for Participation

I am invited to participate in the abovementioned research study conducted by Nabil Hasan and supervised by Associated Professor. Siti Hasnah Hassan.

Purpose of the Study

The purpose of this study is to explore the information overload and its impact on research performance among university postgraduate students.

Participation

My participation will consist of attending a face -to -face interview session, scheduled at a time of my own convenience, which might take approximately 40 minutes. During this time, I will be asked to involve in an informal discussion with the researcher regarding my experiences dealing with information overload during my research activities. The researcher will also inquire about the influence of these experiences on my research performance, personal health and on my overall levels of research productivity. When the interview is finished, I will be asked to suggest names and contact information of other possible participants whom I think they could have relevant experience and might contribute to this research phenomenon. Lastly, I am aware that my interview session will be audio-recorded and that I will be asked to review the interview transcript, and corresponding themes, which will be sent to me electronically via email. Once received I will be given one week to review and either to confirm my agreement with or to provide any additional information or clarification. I will be able to report back to the researcher via his University email address.

Confidentiality and Anonymity

I have been assured by the researcher that that the information I will provide will remain completely confidential, and my confidentiality will be guaranteed as only the researcher and supervisor will have access to my information.

Conservation of Data

I understand that the information I will provide will be included in a paper that will be published in researcher's

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future work, and my personal information will be anonymous kept by the researcher and no privacy or personal declaration or conflict of interest with any other party will be exposed.

Voluntary Participation

I participate in this study's interview voluntarily and I have the choice to withdraw from the interview at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all the information gathered from me will be safely vanish immediately afterwards.

Acceptance: I, _____, agree to participate in the above research study conducted by Nabil Hasan and supervised by Associated Professor. Siti Hasnah Hassan.

If I have any questions about the study, I may contact the researcher or his supervisor. University Science Malaysia, School of Management, Room 134, Pinang, Tel.: (0060) 04-657-6520. Email: nabil.h@usm.my

I understand that signing and returning this form implies consent. Participant's name: _____

Participant's signature: _____Date (YYYY/MM/DD) _____

Researcher's signature: _____Date (YYYY/MM/DD) _____

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