ONLINE COMMUNICATION SATISFACTION IN USING AN INTERNET-BASED INFORMATION MANAGEMENT SYSTEM AMONG EMPLOYEES AT FOUR RESEARCH UNIVERSITIES IN MALAYSIA

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List of Abbreviations

ATU	Attitude Towards Use
CGPA	Cumulative Grade Point Average
Colla	IS Quality to Facilitate Collaboration
CRIM	Centre for Research and Innovation Management
CSQ	Communication Satisfaction Questionnaire
CV	Curriculum Vitaes
DD	Deputy Dean
DVP	Deputy Vice President
e-business	Electronic Business
e-commerce	Electronic Commerce
e-cuti	Electronic Leave System
e-governance	Electronic Governance
e-government	Electronic Government
e-learning	Electronic Learning
ELX	Electronic Labour Exchange
EOU	Ease of Use
eP	Electronic Procurement
e-Rep	Electronic-Repository (e-Penerbitan)
eservices	Electronic Services
e-SPEL	Electronic-Training Management System (Sistem Pengurusan Latihan)
GOE	Generic Office Environment
GRA	Graduate Research Assistant
GSS	Group Support System
HE	Higher Education

HRMIS	Human Resource Management Information System
IBIMS	Internet-Based Information Management System
ICT	Information and Communication Technology
IF	Interactivity Features
IIUM	International Islamic University Malaysia
IMS	Information Management System
IS	Information System
ISQ	Information System Quality
IT	Information Technology
ITU	Intention to Use
KM	Knowledge Management
KMO	Kaiser-Meyer-Olkin
KPI	Key Performance Index
LMS	Learning Management System
MA	Master
MIS	Management Information System
MOHE	Ministry of Higher Education
MRU	Malaysian Research University
MSC	Multimedia Super Corridor
NITA	National Information Technology Agenda
NITC	National Information Technology Council
OCS	Online Communication Satisfaction
PEOU	Perceived Ease of Use
PhD	Doctor of Philosophy
PMS	Project Monitoring System
PU	Perceived Usefulness

R & D	Research and Development
R & I	Research and Innovation
RU	Research University
SKU	University Financial System (Sistem Kewangan Universiti)
SMPU	Research University Information System (Sistem Maklumat Penyelidikan Universiti)
SMS	Short Messages System
SOP	Standard Operating Procedures
SPIN	Interactive Teaching and Learning Management System
SPM	Malaysian Certificate of Education (Sijil Pelajaran Malaysia)
SPPB	Continuing Professional Development System (Sistem Pembangunan Profesional Berterusan)
SPSS	Statistical Package for the Social Sciences
STPM	Malaysian Higher School Certificate (Sijil Tinggi Persekolahan Malaysia)
TAM	Technology Acceptance Model
TRA	Theory of Reasoned Action
U	Usefulness
U.S.	United State
U3P	Research Management Centre Information System (Sistem Maklumat Pusat Pengurusan Penyelidikan)
UiTM	Universiti Teknologi Mara
UKM	Universiti Kebangsaan Malaysia
UM	Universiti Malaya
UMK	Universiti Malaysia Kelantan
UMP	Universiti Malaysia Pahang

UMS	Universiti Malaysia Sabah
UMT	Universiti Malaysia Terangganu
UniMAP	Universiti Malaysia Perlis
Unimas	Universiti Malaysia Sarawak
UniSZA	Universiti Sultan Zainal Abidin
UPM	Universiti Putra Malaysia
UPNM	Universiti Pertahanan Nasional Malaysia
UPSI	Universiti Pendidikan Sultan Idris
USA	Usability
USIM	Universiti Sains Islam Malaysia
USM	Universiti Sains Malaysia
UTeM	Universiti Teknikal Malaysia Melaka
UTHM	Universiti Tun Hussein Onn Malaysia
UTM	Universiti Teknologi Malaysia
UUM	Universiti Utara Malaysia
VC	Virtual Community
VIF	Variable Inflation Factor
WCM	Web-based Communication Mode
WKCs	Web-based Knowledge Communities
WWW	World Wide Web

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Abstract

The acceptance and adoption of Internet applications or online systems such as Internet-based Information Management Systems (IBIMS) relies not only on just technological judgement, but includes significant social and organisational factors. The purpose of this study is to investigate, explore and understand the use of IBIMS by employees in Malaysian research universities. This study examined the effects of the perceived usefulness, ease of use, interactivity features, usability and information system (IS) quality on employees' online communication satisfaction (OCS) toward use of IBIMS. It meant measuring their satisfaction with online communication in using systems. This study makes significant contributions and adds new knowledge to the subject of technology acceptance, adoption and its usage, especially the empirical and practical implications for employing IBIMS in Malaysia's higher education and research-based university.

A mixed method research approach was used (combining quantitative and qualitative method) to provide a wider perspective on the topic being studied. This method comprised a survey, an in-depth interview and open-ended questionnaire to collect data from two employee groups (academics and administrative staff) in four pioneer Malaysian research universities (MRUs). The aim is to validate the theoretical framework and hypotheses empirically using a survey and in-depth interview analysis. These methods were important for a triangulation strategy concerning IBIMS. Furthermore the open-ended questionnaire added rich data that enhances an understanding of the adoption of IBIMS in the research context, especially by academic staff.

This study revealed the importance of using the mixed method approach to understand the employment of IBIMS in Malaysian research universities. Usefulness, ease of use, interactivity features, usability and IS quality significantly influence employees' perceptions of OCS and just how successful IBIMS is. The results showed that OCS does

contribute to enhanced employees' attitudes and intention to use IBIMS. However, the qualitative findings described not only the technological importance of enhancing users' OCS, but also highlighted several human and social factors and organisational initiatives. Then, in the research university, IBIMS are important to academics or researchers for managing their research work such as research input (e.g., people, financial matters), research processes (e.g., collaboration) and research output/outcome (e.g., publications, patents, inventions). Therefore indentifying factors involved in successful uptake are important, not just for individual universities but for the national agenda.

The findings in this thesis provide significant and valuable information on technology acceptance, especially to scholars, information system consultants, information technology managers, senior management of MRUs, and ultimately the Ministry of Higher Education in Malaysia. This study has sought to explain the use of Internet-based systems and online systems in the higher education sector with the objective of making recommendations on technology being implemented in administration, teaching, learning, and research.

Finally, this study is the first empirical analyses to examine and understand the success factors that shape OCS concerning IBIMS in MRUs. The significance, implications and future research directions are also discussed in this thesis.

Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

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Date :

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List of Publications

Journal and Chapter in Book

1. Mohd Azul Mohamad Salleh (2013), 'User's experiences of Internet-based systems in Malaysian research universities: Success factors and barriers as starting points to best practices in a developing country', in JR Gil-Garcia (ed), *E-Government Success around the World: Cases, Empirical Studies, and Practical Recommendations* . IGI-Global.
2. Mohd Azul Mohamad Salleh (2012), 'The Impact of interactivity features in enhancing online communication satisfaction', *Malaysian Journal of Communication*, vol. 28, no. 2, pp. 21-36.

Conference Papers

1. Mohd Azul Mohamad Salleh, 2011, '*Online communication satisfaction towards the use of Internet-based information management systems (IBIMS): A case at research universities in Malaysia*', Inaugural Malaysia Postgraduate Conference 2011, 26 – 27 November 2011, University of South Australia, South Australia.
2. Mohd Azul Mohamad Salleh, 2010, '*The effect of interactivity to communication satisfaction in using Internet-based information management systems (IBIMS) in organisations*', Postgraduate Conference on Media and Communication, 22 July 2010, The University of Adelaide, South Australia.
3. Mohd Azul Mohamad Salleh, 2009, 'Online collaboration as a determinant for communication satisfaction in using Internet-based information management systems in organisations', *Proceeding of International Conference on Media and Communication (MENTION2009)*, The National University of Malaysia, Malaysia.

Seminar Paper

1. Mohd Azul Mohamad Salleh, 2011, '*Online communication satisfaction in using Internet-based information management systems (IBIMS)*', Media Research Seminar, 27 October 2011, The University of Adelaide.

Chapter 1

Introduction

1.0 Introduction

The research study into online communication satisfaction (OCS) in four Malaysian research universities (MRUs) takes place against a background of broader electronic government (e-government) implementation. The importance of information and communication technology (ICT) and e-government development globally has been notable in recent years and Malaysia has been no different. With regard to e-government, the use of ICTs means that public administration and policy can be conducted more efficiently in order to achieve better service delivery (Bannister 2007), and good governance (Bannister and Connolly 2011). These authors give their viewpoints of e-government in developed countries, especially in Europe. They argue, with other scholars and practitioners, that e-government is a beneficial development, providing better public services, especially in public administration. Gichoya (2005) also claims that e-government will improve internal administration within government agencies, and bring government closer to citizens.

In line with developments elsewhere, the Malaysian government also wants to improve public administration in public sectors or agencies in order to provide better service quality to citizens through online platforms. Since establishment of the Multimedia Super Corridor (MSC) in 1996, ICTs have been opening new possibilities for the government to transform and reorient traditional business practices through electronic business (e-business) and to develop aspects of national governance through e-government (Hashim 2008). In many areas of Malaysian life, the changes have been fundamental.

One significant change that this thesis examines specifically is the impact of technology adoption in higher education (HE), which will be explained more fully in Section 1.2.

The Malaysian government views ICT and e-government applications as the panacea for improving system delivery, as a bridge between the government and the public, and as creating a knowledge-based economy and society, as stipulated in the high-level policy, Vision 2020. The perceived impact and importance are summed up by a contemporary observer, Abdul Karim (1999, p. 26):

> E-government will ensure that aspects such as network, interconnectivity, standards, security, training and infrastructure are addressed comprehensively in the context of multimedia and the IR revolution. The convergence of broadcasting and multimedia provides an added perspective to how government can be reinvented for service delivery. This is going to mean: more effective access to service delivery, higher quality services, greater impact through better processes and systems, better and more efficient communication, more transparent and faster decision making, and more empowered people.

The government has since implemented several initiatives to facilitate development of ICT, and provide digital tools such as computer programs and Internet applications to government agencies (Abdul Karim & Mohd Khalid 2003). The government developed the over-arching national e-government project to accelerate the development of a digital environment facilitating government-to-government and government-to-public services. This project also became the catalyst for transforming a paper-based environment into an electronic one, integrated through electronic communications across all agencies. E-government is important in public administration because it is more participative, efficient, trusted, open, and transparent (Bannister and Connolly 2011).

E-government was conceived of by scholars in an emerging field of academic study as important in providing effective interoperability, empowering people when dealing with government, improving productivity and workflow in service delivery and transforming the government into an information provider. Bannister (2004, p.10) states:

> Staying within the bounds of administration, one way the nature of governance can be changed is by the government becoming broker rather than service provider. In one variation of this type of e-government, the government moves from the role of agent to the role of information provider and lets the citizenry or the market solve the problem for itself.

In order to be an information provider to society, the government integrates their services with ICT applications. The development of various ICT applications and projects in government agencies will act as a strong foundation for e-government initiatives in Malaysia, to enhance working styles in public service; to seek new knowledge through online systems; to share documents and information equally across the country; and to utilise data in the form of useful information in order to provide better decision making. In addition, departments and organizations are connecting online to operate their services in a global system. Thus, advances in ICT, especially the Internet and Web 2.0, have increased the broad development of e-government applications, online systems and Internet-based information management systems (IBIMS) in Malaysia.

Public agencies such as HE institutions are encouraged to be platforms to develop and implement ICT and Internet-based applications. This study explores the use of IBIMS in MRUs, to understand the acceptance and usage of this system for professional practices such as administration, teaching, learning and research. The study seeks to understand the effect of IBIMS on personal and organizational (university) development, and their significance in research university employees' working life.

In this study, IBIMS refer to specific areas of electronic governance (e-governance): online database and information management systems that distribute, deliver and share information over the Internet between users in organizations, and thus help to create new kinds of relationships and work cultures. For example, in universities, use of ICT has improved the digital infrastructure. This has been implemented in order to reposition Malaysia competitively on the global map of the HE industry. While government agencies use other types of technologies, such as short messages systems (SMS) and social networking applications, to empower users and the public (Bannister and Connolly 2011), in the case of research universities seeking to improve their profiles, outputs and research reputations, the need for effective online systems is critical to the success of these goals.

As is common with other innovation projects, large scale changes to business practices, such as those affected by the uses of online systems, and IBIMS in organizations in particular, create potential acceptance and adoption problems. Some users and employees are uncomfortable with new and different work practices, and find it difficult to adapt to the systems because of rapid technological changes in their organizations (Hashim 2008). It has been shown that several potential issues arise from such broad technology adoptions and changes in the workplace, as discussed in Section 3.2 (Chapter 3).

To explore the state of technology acceptance and adoption, it is important to explore and understand factors that influence employees' attitudes when using electronic technology. Thus, this study attempts such a task in relation to communication technology uptake in MRUs.

In Chapter 3 (Section 3.3), the existing academic literature on technology acceptance and adoption focusses on several factors such as users' satisfaction, benefits of systems, system design and interface, and users' needs.

This study argues that gaining a deeper understanding of employees' OCS with IBIMS is beneficial to understanding the influence of communication satisfaction on employees' attitudes to their core activities (teaching, research and administrative tasks). In the case of research universities, which have particular organizational needs, the research aims to identify the connections between employee OCS and the achievement of the government's vision. Therein lies the significance of the research, and it contribution to a critical national policy objective.

This study incorporates a widely tested model – the Technology Acceptance Model (TAM) – to understand and explain how employees' behaviour and attitudes contribute significantly to IBIMS implementation in MRUs. The popularity and usefulness of this model influenced the writer to revise, extend and modify the model in order to investigate and predict employees' acceptance of technology, especially IBIMS, through specific determinants as discussed in Chapter 3. This choice is also in line with Chen, Li and Li's (2011, p. 126) recommendations to conduct research by extending TAM within the contexts provided by other technologies.

> The future research direction is defined as follows. First, keep going with the extension of Technology Acceptance Model. Second, use the extension model of technology acceptance to assess the state-of-the-art technologies contexts including mobile services, cloud computing applications, ubiquitous computing application and so on.

They discuss the importance of studying adoption of different technologies in organizations and workplaces to explore the extension of TAM. In this study, the research

object is MRU employees' (academics and administrative officers) perspectives and behaviour in relation to adoption and use of IBIMS. Accordingly, this study also aims to understand the influence of determinants on usage behaviour, and the extension of TAM as discussed in Chapter 3 in a specific context.

This research extends TAM but, instead of focusing on technologies, as stated in Chen, Li and Li (2011, p. 126), it also focuses on augmenting the research methodology deployed, and adding findings from interview data to a larger-scale quantitative survey of responses on online satisfaction. Deeper analysis of employee satisfaction with IBIMS reveals research university staff members' perceptions of organizational change, and organizational goals. It is important to answer the question whether the TAM model already developed can be modified and extended, and applied in developing countries, especially in developments in the HE system in Malaysia.

In addition, an argument is put that deeper understanding of the use of IBIMS, and its potential impact on achieving institutional research objectives, as discussed in Chapter 2, might motivate employees to make fuller use of the system in teaching, learning, research, and administration. As well, the study highlights that use of IBIMS improves the personal development and reputation of individual staff and universities. This includes enhancing their quality of working life (such as saving time in communicating with others). For example, academic staff can improve their teaching in class through learning management systems (LMS) and sharing teaching materials with students, and manage research and publication via research management systems and the repository system in order to increase academic and personal knowledge.

Through understanding technology acceptance within the main research objectives stated in Section 1.3, the study may help to explain the importance of IBIMS and their acceptance and usage in order to analyse the pull and push factors toward user acceptance/usage of the technology in universities, especially Malaysia's developing HE research institutions. The research findings make clear how important it is to universities and developers to incorporate OCS as outlined in the extended TAM model in order to understand employees' satisfaction with communication processes and major changes to patterns of conducting work.

The study thus makes a contribution to knowledge needed by the Malaysian government, top management of universities and information technology (IT) practitioners in understanding actual behaviour patterns of initial IBIMS usage.

To do this it is necessary not only to examine whether IBIMS use produces communication satisfaction, but also to identify and generate awareness of how other factors influence employees' attitudes towards technological changes in MRUs. The research findings show how IBIMS is perceived by employees as a key factor in significant areas of work: administration, research management and related professional activities.

Extensions to the TAM model are significant in order to understand end users' behaviour. These include social and human factors, and organizational initiatives. A study of these two missing features may help universities to more successfully encourage use of IBIMS, as discussed in Chapter 8. There are benefits to administrative staff, researchers and academics in MRUs in using IBIMS in managing individual research tasks and activities, creating better individual and organizational profiles, and opening opportunities to

compare and evaluate themselves in a global ranking system of international HE status (as discussed in Chapter 7).

1.1 Background of the study

With the aim of creating a world class education hub in Asia, the Ministry of Higher Education (MOHE) Malaysia began to establish research universities in 2006 (www.mohe.gov.my). MOHE designated four public universities to be pioneer research universities (Mohd Majzub 2008): Universiti Malaya (UM), Universiti Sains Malaysia (USM), Universiti Kebangsaan Malaysia (UKM), and Universiti Putra Malaysia (UPM). In 2010, a fifth university, Universiti Teknologi Malaysia (UTM), was designated a research university. Detailed explanations about MRUs are given in Chapter 2.

Each research university must incorporate ICTs into its administration management to create new strategies for acquiring and disseminating data and information, in order to gain a competitive advantage (Othman, Ismail & Md Raus 2009). As noted above, with ICT development, the government encourages public agencies to use ICT-based applications to offer more efficient services and modernise system delivery (Salman 2009), to transform the way people work, and to develop a knowledge-based economy and society (Abdul Karim 1999). This decision contextualizes IBIMS implementation in the country's research universities. For example, universities in Malaysia have implemented, or are in the process of developing, ICT to bridge the gaps between departments and faculties, eliminate distances, and provide quicker information services than has formerly been possible. Furthermore, use of ICT-based applications in Malaysia has grown exponentially and, it has been argued, this is because of the advantages, awareness and adoption of new policies for developing ICT by government (Abdul Karim & Mohd Khalid 2003). ICT development is thus articulated and interconnected at national and site level.

Organizations have realised the importance of ICT implementation to help employees do their jobs through online systems. In turn, these create new forms of governance. There is a belief that the efficiency and quality of services of individual employees and whole organizations may depend on how new technologies support their work. Snijkers (2004, p. 206) claims that digital administration helps organizations to provide communication platforms that are effective in service delivery and information exchange, and further states that:

> ICT is an important enabler of new forms of governance. As stated earlier, in the past, ICT was often used to automate existing processes or tasks. Yet, this did not bring large improvements on the level of customer-orientation. However, when we look at ICT as an enabler, new models of service delivery become possible. ICT offers possibilities like electronic information exchange and integration of services between different administrations that were not possible before. This can increase the efficiency of public service delivery through a decrease of administrative costs as well as an increase of the effectiveness of public service delivery through an increase of the quality of services (e.g. pro-active services).

ICTs are described here as enablers. Previous studies show that ICT applications such as online systems and e-business have increased productivity and efficiency (Li 2005). Li further states, "Cisco gained and increased productivity and cost saving in 2003 by $2.1 billion when they implemented this technology" (Li 2005, p. 116). According to Seo and Lee (2006), ICT investment also provides internal and external benefits by helping organizations improve overall productivity. It is shown that investment in ICT contributes a strategically advantageous form of performance and productivity, economic growth and cost benefit for all stakeholders, including employees, investors and government. Seo and Lee (2006, p. 160) state that the integration of ICT applications and services significantly creates direct impact and adds value to economic development.

> First, the production of ICT goods and services contributes directly to the total value added generated in an economy. Second, the use of ICT capital as an input in the production of other goods and services can also make a significant contribution to economic growth. Finally, ICT investment produces externalities effects that go beyond those benefits accrued by investors and owners. For example, every new investment in a network is advantageous not only for the investor but also for all other participants and improves overall productivity.

In contrast, San-Jose, Iturralde and Maseda (2009) point out that some researcher has pointed to the fact that ICT has not impacted on productivity. In an attempt to understand the relationship between ICT implementation and productivity, they conducted a study to test these understandings of the relationship. They found that an ICT application helps organizations improve individual and institutional productivity. Mendonca, Frietas and Souza (2008) also report that previous studies have failed to demonstrate a significant, positive correlation between ICT usage and productivity. However, they completed a study to locate the relationship between ICT adoption and labour productivity in Brazil, and found that acceptance of ICT applications significantly correlates with employees' productivity (Mendonca, Frietas & Souza 2008). These earlier explorations of understandings of the relationship between ICT use and increased productivity have been useful in this writer's design of research into user communication satisfaction.

It is important to understand how deeply ICT development is entrenched in the national agenda. The earliest steps taken towards using ICT in Malaysia came with the launch of the National IT Council (NITC) and National IT Agenda (NITA) (Siang 2001). These were established to reinforce government initiatives and support the master plan for national IT development so that Malaysia could benefit from ICT-based businesses and industries (Hashim 2008). A main pillar of the plan is the MSC, with establishment of seven flagship applications to develop innovation in public and private sectors, such as e-government

transactions, multipurpose smart card, smart school, tele-health, research and development group, e-business and technopreneur developments (Abdul Karim 1999). Abdul Karim (1999, p. 168) states that:

> The flagship applications are aimed at creating a global test bed for innovation by allowing responding organisations to pioneer new applications of multimedia in the public and private sectors. The flagships will also build platforms for ongoing innovation and create standards that allow reverse investment from MSC responding organisations. They will create the opportunity for the MSC to develop a strong reputation for commercial R&D and will strengthen Malaysia's skills base in multimedia R&D.

Among the seven flagship applications under MSC, e-government is the most important project undertaken towards online systems in government agencies. The growing awareness and development of e-government applications helps the nation transform the way government operates and delivers services to the people of Malaysia (Abdul Karim 1999). On the other hand, as noted briefly in the earlier section, people also look for information and resources from the government through web sites and portals to complete their tasks with greater transparency and accountability. Bannister (2007, p. 185) indicates the normative view of e-government as enhancer and enabler:

> There is a consensus among scholars and practitioners that e-government is a good thing with many benefits including greater efficiency, better public services, more transparency, more accountability and so on.

This type of system is seen to foster more efficient platforms of audience participation and interaction within organizations (Bekkers 2003), better public services delivery, enhanced accountability and more transparency in government agencies. According to Wan Mohd Isa et al. (2011) the importance of online systems is that they open greater access to online services through computer networks and Internet technologies. From an educational point

of view, it is important to support universities in managing records and resources about staff and students (O'Brien 2002). These systems also enhance the overall collaborative learning environment, research data management, knowledge sharing, online distance learning and electronic learning (e-learning) through provision of computer network technologies in universities. As stated by Sanyal (2001, p. 12):

> If a nation wide network of community learning centres equipped with computer laboratories with broadband access and trained staff to access online distance learning and to provide tutoring support could be set up in developing countries until a computer is available at home, there are possibilities for these countries to take advantage of the benefits of e-learning mentioned above.

In order to support research universities to meet their needs to develop online systems and physical infrastructure of ICT, the government has allocated extra money from its budget to implement ICT in the education sector. According to Kaliannan, Raman and Dorasamy (2009), a total of RM 12.889 billion (AUD 4.192 billion) under the recent Ninth Malaysia Plan (2006-2010) has been set aside for ICT development. These authors also indicate that the government is investing money to develop IT infrastructure in order to better service citizens and stakeholders. Others agree with the general consensus that growth of ICT development contributes to the significant relationship between the economy and people's quality of life in a knowledge-based society in Malaysia (Kaliannan, Raman & Dorasamy 2009). As noted by Kaliannan, Raman and Dorasamy (2009, p. 544):

> In last decade (2000-2010), concerted efforts were undertaken to provide a stronger platform for Malaysia's transition towards a knowledge-based society. Increasingly central of this effort was the promotion of ICT as a strategic driver to support and contribute directly to the growth of the economy as well as enhance the quality of life of the population. Investment by both the public and private sectors was directed at building the essential ICT infrastructure.

Aside from the accepted advantages of ICT implementation and financial allocation expected in other organizations, universities should be able to evaluate and determine what specific factors influence employees to use systems successfully, and thus help achieve organizational goals.

However, successful implementation is not simply a question of technology. This study shows that the degree of success in online systems implementation can be influenced by several factors, not just technology and infrastructure but, equally importantly, social and human factors and the nature and purpose of the organizational environment.

Scholars such as Davis (1989), DeLone & McLean (2003), Gleason and Lane (2009) claim that the acceptance, adoption, use and success of these new communication systems can be examined by assessing user satisfaction. In line with that, several factors encourage end users' satisfaction, such as usefulness, ease of use and usability. For example, Stone, Good and Baker-Eveleth (2007, p. 480) claim that ease of use and usefulness of systems influence individual users.

> It has been previously reported that no relationships are found from information quality and system/service quality to system use. However, these results indicated that for marketing executives, these relationships exist through perceived useful and system satisfaction. Furthermore, it also has been previously demonstrated that ease of use and perceived usefulness positively impact system use.

Satisfaction with communication processes is important when people use online systems to access, deliver and share information in universities. Universities or other organizations need to determine whether communication satisfaction gained through online systems is a significant factor that influences employees' use of IBIMS. In addition, Stone, Good and

Baker-Eveleth (2007) suggest that future research should focus on studying the impact of using IT on individual users and their particular workplaces.

The rapid development of online systems in Malaysia encouraged this writer to identify those factors that influence employees' attitudes towards acceptance and adoption of IBIMS. While the topic of technology acceptance and adoption has been explored in many organizations (Mohd & Syed Mohamad 2005; Kim, Lee and Law 2007; Selamat, Jaffar & Boon 2009), in relation to several key factors, it is important to investigate and validate new factors in order to contribute new knowledge on technology in the workplace, especially in MRUs. It is necessary to understand key factors that may influence OCS with IBIMS in research universities, as they are a significant element in the overall success of the national information economy agenda.

The purpose of this study is therefore to explore and examine MRU employees' OCS when employing IBIMS.

The study investigates specific factors that drive employees' OCS and attitudes. Combining quantitative and qualitative approaches, this study explores the factors of perceived usefulness, ease of use, interactivity features, usability of the system and information system quality (IS quality) to measure employees' OCS. To do this, the study adapts several specific concepts such as usability, interactivity theory, IS quality, and includes a TAM, to examine employees' OCS and attitudes towards IBIMS.

1.2 Rationale of the study

The reasons why ICT implementation took place in Malaysia, the establishment of research universities, and the TAM research agenda alluded to above are together a

powerful rationale for a close study of a specific group of IBIMS users in research universities. According to Stone, Good and Baker-Eveleth (2007), IS not only provide effective communication platforms, but, affect the individual performance of the user. In research universities, the outputs are measured individually as well as collectively. It is important to understand the factors impacting on employees' acceptance of communication technology, as they can affect the overall success of a local or national enterprise.

However, the question still remains among researchers about which significant factors contribute to accepting Internet-based systems. Users' OCS gained when using any type of new technology in organizations therefore becomes more important for exploration. As stated by Chang (2010, p. 100):

> With the nativity of the World Wide Web, the process of message delivery to organizational clients has changed from traditional communication channels to Web-based communication Mode (WCM). Achieving satisfaction in communication to increase business effectiveness and efficiency is a growing concern of organizations in the Internet age. There is no satisfaction in communication efforts until it is transferred and confirmed by organizational clients. As a result, the widely used communication satisfaction measurement instrument Communication Satisfaction Questionnaire (CSQ), developed for traditional communication efforts, may require adaptation for use in the Internet age.

The increase and diversity in online systems or Web 2.0 applications for daily tasks change the choice of research tools. Most previous studies in communication satisfaction (Andrews & Herschel 1996; Mount & Back 1999; Pincus 1986; Spark 1994; Varona 1996) focused on different contexts and areas, especially employees' satisfaction with their job through traditional media of communication (see, for example, Downs and Hazen 1977; Sparks 1994). Relatively few studies have focused specifically on how OCS is important to end users through computer-mediated communication and web-based communication mode (Chang 2010), particularly in IBIMS use. A question that has never been highlighted

is whether individuals' OCS tends to affect individual end-users' acceptance of technology, with specific reference to IBIMS. The gap in knowledge presented the opportunity for this research.

These areas are discussed in more detail in Chapter 3. A few studies have been published on technology acceptance, adoption and usage in Malaysia (Sulaiman, Lim & Wee 2005; Amin 2008; Loo et al. 2009), but most researchers have not focused on OCS as a variable that influences end users. It is thus important to investigate individual employees' satisfaction with online forms of communication. Few studies have explored the effect of users' satisfaction on technology acceptance, adoption and use, especially in the context of Malaysia's HE institutions (Ramayah & Mohd Suki 2006; Masrom 2007; Wong & Teo 2009). In fact, no significant, suitable frameworks and hypotheses have been described to predict employees' OCS with new communication technologies in MRUs. Most studies in IT/IS acceptance and adoption concern Western countries, especially the United States (US). Wong and Teo (2009, p. 785) suggest that few studies have looked at the Eastern context, specifically in South East Asia:

> It is important to note that all these studies have been carried out in Western cultural context. There are hardly any studies conducted from the Eastern cultural context. Culture is an important element in influencing the ways people react to new technology.

The statement that "culture is an important element in influencing the ways people react to new technology" has been a springboard for this Malaysia-specific research. Previous scholars in the field of technology acceptance have developed several models, theories and contexts from Western points of view to explore different application areas (Wong & Teo 2009). However, it is questioned whether models from a Western cultural context are suitable to integrate with other determinants in a specific environment or in other regions.

Technology acceptance research has been conducted in developed countries, but few studies and scholars have examined the issues in the context of developing countries (as discussed in Chapter 3). Such studies and findings in other countries and environments may be inconsistent and/or not applicable to organizations in Malaysia, especially its research universities. It is therefore important to extend previous studies in technology acceptance, and conduct new research in countries such as Malaysia to confirm existing studies of success factors and resistance to using IBIMS by including a study of contexts of use.

This study not only generates new literature on this topic but validates and extends previous findings emerging from the Malaysian cultural context. Furthermore, although it began in 2009, it addresses the future research suggestion made in Chen, Li and Li (2011) that a focus on technology acceptance requires an extension of TAM in various technological contexts. Context and culture are seen to play important roles in technology acceptance among MRUs' employees, as the later chapters in the thesis illustrate.

Several studies have examined ICT applications in different contexts, as discussed in Chapter 3: for example, digital and online libraries (Teow & Zainab 2003); collaborative learning (Measin et al. 2009; Sulaiman et al. 2004); and e-learning (Ali & Bahroom 2008; Abdul Karim & Hashim 2004). In other environments, apart from universities, studies in Malaysia have focused on acceptance of banking systems (Sohail & Shanmugham 2003), ICT usage (Wong & Teo 2009), multipurpose smartcard (Loo et al. 2009), electronic ticketing (Sulaiman, Ng & Mohezar 2008), mobile personal computers (Ramayah & Mohd Suki 2006), wireless Internet using mobile devices (Parveen & Sulaiman 2008), and electronic medical records (Mohd & Syed Mohamad 2005). Most of these studies use a quantitative methodology with samples from ICT users, mobile phone and Internet users,

internet banking customers, student teachers, smartcard or Malaysia identity card (MyKad) holders, doctors, and students in HE institutions.

However, studies in Malaysia focusing specifically on online applications such as IBIMS are rare, and there are none involving research universities' employees. Therefore, this study is important in creating new knowledge and information about online communication and IBIMS usage among employees in MRUs.

1.3 Aims of the study

As noted, several studies (described further in Chapter 3) in technology acceptance and adoption in Malaysia have focused on teaching and learning applications, banking systems, mobile applications, ICT usage and electronic medical systems, and as yet no study has examined employees' OCS through IBIMS in Malaysian HE institutions. The main objective of this study is to do precisely this, while integrating and investigating several concepts in developing suitable frameworks, and extending TAM: usefulness and ease of use of systems; interactivity features; usability of systems and IS quality; and how they impact on employees' OCS in achieving user loyalty to IBMS, and successfully achieve the objective of MRUs. This will enable a deeper understanding of employees' attitudes towards IBIMS in their particular employment context, the research university.

Therefore, specific objectives of this study are:

1. To integrate and investigate the influences of two important determinants from TAM, usefulness and ease of use on employees' OCS with the use of IBIMS.
2. To examine the influence of interactivity features on employees' OCS with the use of IBIMS in producing suitable frameworks and extending TAM.

3. To investigate the influence of usability and IS quality on employees' OCS with the use of IBIMS in producing suitable frameworks and extending TAM.
4. To evaluate the influence of OCS on employee attitudes towards using IBIMS among employees, specifically administrative staff and academics in MRUs.
5. To explore and investigate other factors that influence employees' perceptions of online management systems at MRUs in order to generate new framework in enhancing the integration of IBIMS with research management.

1.4 Research questions

Previous researchers state that usefulness and ease of use of systems influence attitudes to these systems (Amin 2007; Davis 1989; Hashim 2008; Ramayah et al. 2009; Wong & Teo 2009). They also claim that usefulness and ease of use are important influences on users' satisfaction. However, none of them integrate and investigate the influences of two important determinants from TAM: usefulness and ease of use on users' OCS in using IBIMS. Chen, Li and Li (2011) argue that TAM is a widely applied, useful and reliable model that helps us understand usage behavior in IS/IT implementation. Moreover, this study wants to investigate whether usefulness and ease of use of systems will significantly affect users' OCS when they utilize systems, specifically IBIMS. Therefore, the first research question is:

RQ1: To what extent do usefulness and ease of use affect employees' OCS when using IBIMS?

Gleason (2007), and Gleason and Lane (2009) claim that interactivity features such as user experiences, technological features and content have a positive impact on users' satisfaction. Fiore (2008) states that interactivity can improve users' satisfaction in

participation and interaction through digital technology. However, they do not focus specifically on understanding whether interactivity features have a significant impact on OCS in using IBIMS. Thus, the next research question is:

RQ2: To what extent do interactivity features affect employees' OCS with the use of IBIMS?

The study employs the usability and IS success model (DeLone & McLean 2003) to create elements for online collaboration. The studies show that IS quality is important for enhancing users' satisfaction (DeLone & McLean 2003; Petter, DeLone & McLean 2008). Koohang and Ondracek (2005), Preece (2001) and, Wichansky (2000) state that usability of the system is important in indicating user satisfaction with the online system's navigation and accessibility. DeLone and McLean (2003) and, Petter, DeLone and McLean (2008) stress the importance of IS quality in influencing end users to use IT and systems. In relation to that, they reveal that information quality, system quality and service quality contribute significantly to users' satisfaction with systems. On the other hand, some researchers (Koohang & Ondracek 2005; Preece 2001; Wichansky 2000) indicate the different factors in technology usage, in which usability of the system is necessary to ensure use by end users. In order to explore that, the writer argues that usability and IS quality may influence the OCS of employees in research universities through technology usage. However, none of these studies investigate specifically the impact of usability and IS quality of the systems on employees' OCS. Therefore, this study questions whether there are relationships between usability and IS quality with OCS in using IBIMS. Consequently, the third research question in this study is:

RQ3: To what extent do usability and IS quality affect employees' OCS when using IBIMS?

Sparks (1994) states the importance of understanding communication in terms of providing communication satisfaction. Downs and Hazen (1977) highlighted the importance of communication satisfaction to creating job satisfaction. More recent studies evaluate the effectiveness of communication media for users in the workplace (Pi et al. 2008; Pornsakulvanich, Haridakis & Rubin 2008). However, none of these studies use communication satisfaction specifically to examine OCS through online systems. This study questions whether there is important relationship between communication satisfaction and IBIMS use. Thus the next important research question is:

RQ4: To what extent does OCS affect employee attitudes when using IBIMS?

Finally, from this writer's point of view, it is important to identify what other factors influence employees to use online management systems; and define how they perceive OCS with IBIMS at MRUs. Previous studies (outlined more fully in Chapter 3) indicate that several key factors influence acceptance and adoption of new technology, such as skills and training, budget and cost, senior management involvement and support, and other factors. This gives rise to the last research question:

RQ5: What other factors influence employees to use online management systems at MRUs?

1.5 Research design

Mixed method approaches have been chosen in order to answer the research questions. These approaches provide the best possible perspective (Tashakkori & Creswell 2007) on the relationships between variables for OCS with IBIMS by employees at MRUs. Wall, Devine-Wright and Mill (2008, p. 83) state that the mixed method approach increases confidence in the findings because different approaches support the consistency of findings:

> This underlines the value of a mixed method approach to the study, with increased confidence in consistent findings obtained by two quite different methods of data collection and analysis.

Consequently, the first set of primary data was collected using a quantitative data collection method utilising a survey technique, specifically a questionnaire delivered to two sets of employees across all four universities. As the scope of this study encompasses the effects of usefulness, ease of use, interactivity features, usability and IS quality on OCS gained through using IBIMS at four MRUs, this approach provides an important opportunity for measuring the hypotheses. It enables the examination of the relationships between usefulness, ease of use, interactivity features, usability and IS quality of the systems, and individuals' OCS. This feature of the research design tested the strengths of the survey approach in evaluating the research framework in Chapter 3.

The second set of primary data was collected using a qualitative approach incorporating in-depth interviews and an open-ended questionnaire with a smaller group from the original sample. This approach documented a range of individual feelings, opinions, experiences and insights of employees about OCS and attitudes regarding IBIMS. This study claims the importance of qualitative data for investigating end users' understanding of IBIMS, and

their professional roles in a research university. Detailed information about research design and methodology of the study is discussed in Chapter 4.

The quantitative data was collected via a paper-based survey administered by the writer to employees in all four pioneer MRUs. The data for the survey was gathered from 223 respondents (administrative officers and academics) through face-to-face interviews. The instrument was adapted from many studies on technology acceptance, usability, IS quality, communication satisfaction and interactivity. The items were modified to suit the context of IBIMS use among employees in these universities, following a pilot test of the instrument to confirm its validity and reliability. The data was analysed using statistical software (SPSS) with multiple analyses such as descriptive analysis, factor analysis and regression test. The findings are reported in Chapter 5.

The qualitative data was collected through semi-structured interviews with twenty-one informants. The questions were developed with reference to the conceptual framework of this study already described. All interviews took place in the participants' offices. Interviews were recorded, transcribed into Microsoft Word documents and analysed using qualitative data analysis software (Nvivo). The data was analysed and then categorised according to specific topics or themes in order to meet the aims of the study and produce findings of use to research universities and their communities. The findings are stated in Chapter 6.

In a third stage of data collection an open-ended questionnaire was sent to ten academic staff from the second sample described above, to further refine understandings of how IBIMS adoption impacts on employees' research work in universities. The focus of the questionnaire was to identify academics' perceptions of the use of technology-based

communication in the everyday practice and management of research. It aimed to test users' understanding of more sophisticated communication uses such as collaboration and the enabling of individual capacities and university research profiles.

In this case, all questionnaires were emailed to participants in the form of Microsoft Word documents with the request to return them within a two-week period. Analysis of the returned forms provided fresh insights into more particular research-based aspects of IBIMS adoption in the research university context. The findings are presented in more detail Chapter 7.

Furthermore, OCS, acceptance and use patterns of IBIMS may differ significantly between groups of employees, and university contexts, and this reflects on other success factors such as cultural, human behaviour and organizational initiatives. In order to understand those, the mixed method approach produced consistent findings, and the results can be drawn upon to form conclusions about the above-stated research objectives.

It was necessary to obtain human ethics approval from the University of Adelaide's Human Research Ethics Committee to ensure the integrity of the research, and the anonymity and confidentiality of the respondents/informants, information and organizations in this study. The initial ethical approval was granted on 25th November, 2009 for one year, between 1st December, 2009 and 30th November, 2010 (see Appendix 1). The second ethical approval for interviewing participants was given on 2nd November, 2010 for the period between 1st December, 2010 and 30th November, 2011 (see Appendix 2). The third stage of the research, the final open-ended questionnaire of supplementary questions, was allowed under the second stage of ethical approval. More information about ethical considerations are described in Chapter 4.

1.6 Significance of the study

Above, the argument has been made that the development of competitive research universities is part of the national information society agenda enabled by technology which began to be implemented following Vision 2020. The argument, supported by the findings of prior research studies, will also be made that productivity improves with OCS. This study contributes significant empirical findings, canvasses practical and theoretical implications, and produces a suitable framework for comprehending research university employees's OCS and attitudes to IBIMS. Its significance lies not only in its assessment of adoption of a developing component of e-governance vital to the success of a national ICT project but it also tests a current approach to measuring technology adoption success by extending the TAM approach, in studying the key determinants of successful online systems utilization (Chen, Li & Li 2011).

It is significant that the study's findings may help promote better IBIMS use in universities, particularly in relation to managing internal perceptions of what is required in individual and organizational research processes and output. Chang and Wang (2008, p. 2337) have stated that it is necessary to explore additional external factors that impact on online communication in order to improve interface design for different web users:

> Examination of the important technological features affecting web users' beliefs, attitude and intention towards online communication tools can help the corporation or website administrator to improve their interface design and the approach of online communication with consumers or web users.

IBIMS offers new online platforms to support communication processes and produce different levels of satisfaction in organizations. It is important to know how perceptions of technology change may also affect work practices and culture. According to Fiore (2008),

higher satisfaction levels among end users will affect their loyalty and acceptance of the product and their organization. Lin (2008, p. 139) makes an even larger claim for the study of user satisfaction as a factor to investigate community and business loyalty, in referring to the virtual community (VC):

> Satisfaction is a common measure of IS success because it affects users' motivation to continue to use the IS. VCs are currently perceived as a new form of mainstream personal communication, which are sufficiently potent to make Internet users change their information exchange methods and firms adjust their marketing strategies. Hence, research on VC acceptance can enhance understanding of user beliefs or motives to use VCs and show the effect of these factors on user satisfaction and loyalty in VCs.

It can be argued that the promise of creating a VC in place of a traditional one is the overall benefit gained by IBIMS adoption, and that this is one reason why measuring communication satisfaction has particular relevance to the four MRUs studied. If IBIMS is used in research universities in an optimum way, it will create a VC to influence the way people work, communicate and compete in research and innovation. Some findings point to the fact that few employees interviewed are fully aware of the potential of IBIMS in their universities. This study generates a reconsideration of theoretical frameworks in the relationships it explores between communication satisfaction, user loyalty to IBIMS, and achievement of the objectives of research universities. Further, the findings also indicate that OCS is shaped by end users' perceptions of the institutional goals of research universities.

This study generates new knowledge about technology acceptance and adoption by supporting new hypotheses that explain the link between usefulness, ease of use, interactivity features, usability and IS quality of the systems with users' OCS. From a theoretical point of view, this study reveals new evidence for a significant and positive relationship between OCS and attitudes of MRUs employees when using IBIMS. The

study demonstrates that a high score for OCS results in a positive score for attitude towards use of, and intention to use, IBIMS. Hence, this study creates new data of key determinants of success in use of online systems or Internet-based applications that previous researchers have not covered.

In order to understand all the research questions in Section 1.4 it is important to discuss the choice of methods in more detail, as it pertains to the significance of this project. Most previous studies use quantitative methods to explore the acceptance of IS and new technologies. For example, there are surveys (Davis 1989; Morris & Dillon 1997; Premkumar & Bhattachherjee 2008) and experiments (Bagozzi, Davis & Warshaw 1992; Davis, Bagozzi & Warshaw 1989; Lee, Ahn & Han 2007). On the other hand, as claimed by Venkatesh, Brown and Bala (forthcoming 2012-2013, p. 2), there are limited studies on IS using mixed methods approaches.

> Despite such calls for methodological pluralism and the benefits of combining multiple methods, there has not been much research in IS that has employed a mixed methods approach. Our review of the IS literature suggests that less than 5 percent of the empirical studies published between 2001 and 2007 in the six major IS journals identified in the Senior Scholars' Basket of Journals (AIS 2007) 5 have employed mixed methods.

In order to understand the wide scope of technology acceptance and usage, Vreede, Mgaya and Qureshi (2003) used a mixed method approach with four methodologies: observation, open and semi-structured interviews, satisfaction questionnaires and electronic meeting logs to measure the use of Group Support Systems (GSS). The study completed by Vreede, Mgaya and Qureshi (2003) shows that several kinds of qualitative approaches can be used to analyse and investigate the success or failure of implementing new technologies in organizations. Later in 2009, Lin et al. also used a qualitative approach to measure success factors of Web-based Knowledge Communities (WKCs) among online community

members. Therefore, Lin and Lee (2006) argue that future research should use different methodology, such as focus groups and interviews, to examine the acceptance and successful use of technologies.

In addition, Hodgkinson (2006) claims that there is a lack of in-depth and deeper information about end users' points of view in this area of study. For example, Bucy (2004) uses a qualitative study to explore users' perceptions of interactivity when using computer-mediated-communication. Bucy also notes that Heeter (1989) focuses on qualitative assessments to investigate interactivity and design experiences when using technology. Yet, different though they are, these studies show the importance of qualitative research approaches to investigate users' perceptions.

The examples discussed above highlight the point that a limited number of studies have combined quantitative and qualitative methodology approaches in investigating OCS in relation to technology acceptance and use. Even though a quantitative approach contributes significant measurable and quantifiable results, few studies use qualitative research designs like those of Markus and Lee (2000) to study IT in order to gain more insights.

Qualitative approaches remain important to clarify and validate results (Johnson et. al 2007) when significant interpretations are made of employees' OCS and experiences using IBIMS. The qualitative data can play an important role in triangulating, exploring and creating new determinants that may be used to predict OCS and technology acceptance in Malaysia.

Therefore, this study is significant not only in its focus, but in its integration of mixed methods approaches, in order to gain more in-depth information about the phenomena of

the study. This technique, as suggested by Venkatesh, Brown and Bala, can be valuable (forthcoming 2012-2013, p. 29).

> Considering the value of mixed methods research in developing novel theoretical perspectives and advancing the field, we urge IS researchers to go beyond the rhetorical debate related to the use of multiple methods and paradigmatic incommensurability and consider undertaking mixed methods research if they feel that such an approach will help them find plausible theoretical answers to their research questions.

In order to answer the research questions, this study enhances the empirical and practical methodological perspectives to understand the topic studied from the perspectives of different groups of users.

These groups of users are academics (lecturers) and officers (from the management and professional group) and are used to understand and explain the importance of OCS in the use of IBIMS in managing staff or student records as well as research-related data and information. Individual academics and administrative officers participating in this study help in understanding and explaining the importance of individual factors in determining usage behaviour and acceptance of IBIMS. This approach yields rich data and provides a significant measurement tool to obtain reliable, valid and accurate evaluations of employees' OCS with, and attitudes towards, use of IBIMS.

This study focuses on MRUs to explore more deeply how important organizational factors are and how they play significant roles in influencing IBIMS use in administration, academic work and research. In relation to the establishment of premier research universities in Malaysia, this study contributes useful information to high impact strategic plans, such as the guidelines or Standard Operating Procedures (SOP) for implementing online systems. The findings promote a greater understanding of new technologies of use

to planners in research universities and other HE institutions, reinforcing the aim of creating a networked society and knowledge-based nation. This study could therefore have significant implications for academics, administrators and senior management regarding the use of ICT, such as online systems in their organizations, especially such systems' ability to empower employees in day-to-day management, to enhance information exchange and, research collaborations, and to facilitate teaching and learning. Numprasertchai and Igel (2005, p. 1180) comment on ICTs as empowerment, which indicates the importance of knowledge management and the new relationships which emerge from online environments:

> A number of organizations have already realized that ICTs can empower their employees. Therefore, most organizations are now trying to use ICTs to capture the knowledge residing in the minds of their employees, so it can be easily shared within the organization. The growth of technology has also enabled members of global organizations to collaborate and exchange information and knowledge efficiently. Therefore, ICTs are assuming significant roles in KM and one of the most important knowledge enabling tools. ICTs facilitate the maintenance of relationship network with research collaborations, partners, and customers.

For example, academic staff can utilise IBIMS to improve their research tasks, especially in managing research input (e.g., financial records, human resources), research process (e.g., communication and collaboration) and research output (e.g., publication and invention). In research universities positive acceptance of IBIMS is important in helping research management and capability improve. Bevan and Harrington (2011) indicate the need of research IS to enhance more efficient management of information, particularly of individual academics' and researchers' publications, by becoming institutional repositories of research. Bevan and Harrington (2011, p. 26) state:

> One of the conclusions of the study was that a more efficient publication workflow aimed at reducing workload and integrating the IR with other internal and external information systems needed to be developed. The overall goal of the strategy is to move the IR more into the mainstream of research management within the institution, a process which in recent years has been referred to as 'routinization'[3], that is, making sure the repository forms part of the daily working environment of academic, researchers and other relevant stakeholder communities.

Through use of IS, online systems, Internet-based systems, collaboration tools and communication means, researchers and research groups could reduce unnecessary costs, enhance information workflow, increase research potential and improve the quality of research outcomes between research communities locally and globally. Thus, the balance of technology acceptance and the IBIMS usage among employees is needed to create intelligent collaboration between government agencies, private organizations, research institutes/centres, universities and industries. For example, Bertazzoni et al. (2012, p. 158), assert the importance of research ISs such as U-GOV in managing the research process and the knowledge/technology transfer processes.

> With regard to knowledge/technology transfer process, for example, the outcomes spreading is absolutely essential: universities need to build a bridge between research and the world of industry and public administration. For this reason, in addition to interoperability tools and open standard compliance, U-GOV Research provides a set of functions that help university to collect, manage and public (sic) data about research resources such as groups, infrastructures, equipments, etc.

Researchers and universities routinely collect and manage public data to improve day-to-day research management, research work, individual researchers' competitiveness, and university profile and reputation. Therefore, this study highlights a significant research topic, knowledge gaps, findings and implications. It aims to understand OCS from communication studies and technology acceptance perspectives. It also offers valid results

regarding the extent of employees' perceived communication satisfaction in the use of IBIMS for daily administrative, teaching, learning, and research tasks.

1.7 Outline of the thesis

This thesis comprises nine chapters. Chapter 1 introduces and discusses the background, research aims, specific focus and methodological approaches of the study. It indicates the significance of the study from various perspectives such as theory and practice, media and communication studies, methodology approaches, and technology acceptance and usage.

In order to explore the use of ICT, IBIMS, the vision for HE institutions and MRUs, Chapter 2 describes the HE system in Malaysia, especially in terms of the national HE strategic plan, and use of IBIMS in research universities. This chapter describes HE reform in Malaysia to meet the needs of national agendas in producing human capital and a knowledge-based society in 2020. It also establishes significant knowledge on employees' perceptions of the advantages that a research university can gain from increased use of ICT applications, specifically IBIMS.

Chapter 3 looks at the literature on technology acceptance, its usage, and the development of a conceptual framework for the study – based on specific concepts, models and theories best suited to understand employees' OCS when using IBIMS. It discusses important issues concerning the study of technology acceptance, and the significance of the study in examining the effects of ease of use, usefulness, interactivity features, usability, and IS quality on OCS among employees at MRUs. It also describes the conceptual framework and hypotheses to be examined and evaluated.

Turning from conceptual issues to the empirical evaluations, Chapter 4 describes the research design and methods used in this study. It gives a detailed explanation of the mixed methods sequential explanatory research approach to examine objectives outlined in Chapter 1. This chapter describes the process of data collection and its analysis, especially the survey research approach, the in-depth interview and open-ended questionnaire.

In order to understand the outcomes of the study, Chapter 5 discusses the quantitative data analysis and results. This chapter presents the quantitative survey findings as the first phase of data collection to answer the research questions and hypotheses stated in Chapters 1 and 3. Chapter 6 then presents the findings for the second phase of data collection to better understand employees' OCS in four MRUs when using IBIMS from a qualitative perspective. It highlights the findings of the in-depth interviews as the second phase of data collection to support and complement the quantitative results in Chapter 5.

Chapter 7 presents the findings from the open-ended questionnaire answers, so that more is known about academics' feelings, opinions and experiences when using IBIMS for research. This chapter describes how individual academics and the university use IBIMS to facilitate research management in improving professional reputations and profiles. It also describes how individual academics use IBIMS to improve their core business objectives, specifically in managing research input, processes and outcomes.

Chapter 8 discusses and interprets the findings of Chapters 5, 6 and 7 in relation to the original research questions. It explains the effects of variables on employees' OCS when using IBIMS. Looking beyond the aims of the study, this chapter discusses other important issues and factors emerging from the qualitative data to explain how the findings are important to technology acceptance knowledge generally. Specifically, this chapter

synthesises important findings and issues from quantitative and qualitative data concerning employees' use of IBIMS in MRUs.

Chapter 9 concludes the study, summarizing the main findings and their implications for theory and practice. It reveals several significant findings and insights in understanding OCS, IBIMS acceptance, and usage in MRUs. This chapter also suggests future avenues of research on this topic from individual, organization and national perspectives.

1.8 Summary

This chapter has presented the foundations and background of the study, the rationale and aims, research questions, and its significance to theory and practice, media and communication studies and to theories of technology acceptance. An overview of research methodology and ethical approval has been included here. Finally, the structure of the thesis is briefly described. The next chapter discusses the HE reforms that the Malaysian government introduced.

Chapter 2

Higher Education Reform in Malaysia

2.0 Introduction

This chapter describes HE reform in Malaysia, which was designed to meet the needs of human capital development and to produce a knowledge-based society. The five main sections in this chapter explain and discuss the background of HE in Malaysia; characteristics of the public HE sector; the national strategic plan which gives significant attention to transforming HE; establishment of MRUs focused on research-based education; and integration of ICTs and IBIMS in research universities to improve employees' administrative tasks, teaching and learning activities and research management. In this way, it establishes the significance of investigating communication satisfaction and employee perceptions of the advantages that a research university can gain from increased use of ICT.

In 1991 the Malaysian government launched Vision 2020, its strategy for developing the country by 2020 (Mohamad 1991). Lee (1999) describes this vision as a paradigm shift for the Malaysian government in transforming an agricultural and industrial country into an advanced economy with the characteristics of national unity, social cohesion, social justice, political stability, a good quality of life, social and spiritual values, national pride and confidence. Former Prime Minister, Tun Dr Mahathir Mohamed described in his speech at the Second Global Knowledge Conference in Kuala Lumpur in March 2000 how Malaysia was set on creating a knowledge-based economy (Kamogawa 2003).

Education has been seen as one of the most important catalysts in meeting the challenges of producing knowledge workers, and skilled human capital in a knowledge-based economy (Sirat 2010). Former Prime Minister, Tun Abdullah Ahmad Badawi, in the

National Higher Education Action Plan 2007-2010 (p.3) stated: "The success of our human capital development agenda rests in large part on the quality of the national education system". For this change to occur, basic primary and secondary education systems would have to play a significant role in promoting the government's vision.

One initiative was to emphasize and enhance IT applications and multimedia/computing equipment in order to improve the quality of teaching and learning processes, and their institutional management. The establishment of MSC in 1996 shows the government providing a new foundation for the process of integration between ICT and education in HE. The use of ICT plays a crucial role in the core business of educational institutions, as discussed in Section 2.5 of this chapter.

HE institutions are a national asset to transform a society to an information or knowledge-based one in which all people can participate to develop knowledge-based economies (Sirat 2010). In order to enable HE to develop, the government articulated several strategies to achieve this goal (Mok 2011): for example, establishment of a Ministry of Higher Education (MOHE) with far-reaching powers. Information about MOHE is presented in detail in Section 2.1.

As part of the process of transformation, public HE institutions in Malaysia have been clustered in three different categories: research universities, comprehensive universities and focused universities. Research universities concentrate on research, high quality lecturers and a student ratio of 50:50 between graduates and postgraduates. Comprehensive universities stress a varied field of studies (such as marine science in Universiti Malaysia Sabah), and focused universities emphasize specific fields of studies such as degrees on defence science and management: for example, at Universiti Pertahanan Nasional

Malaysia. The ratio of student intake for these non-research universities is 70:30 between graduates and postgraduates. These categories aim to ensure the development and excellence of HE, and to produce quality graduates according to specific field of studies based on the relevant capabilities of universities (Ministry of Higher Education 2007). Further information about public HE sectors, which are relevant to this study, are presented in detail in Section 2.2.

The National Higher Education Strategic Plan 2020 and the National Higher Education Plan 2007-2010 were launched in 2007 as part of the Malaysian government's attempt to build the country's international reputation for HE institutions, and specifically to improve research, teaching and learning, system delivery and internationalization. These aims were in line with the "National Mission" objectives of the Ninth Malaysia Plan, in order to produce human capital for the country. To provide more information, Section 2.3 describes the National Higher Education Strategic Plan.

In other initiatives to transform HE, the government designated five public universities for future development as research universities in 2006 and 2010, as discuss in Section 2.4. Research universities were given priority to develop as top universities in the world, and to produce better human resources for nation building and economic development. They were to create international levels of research output and resources. Their mission was to attract international students and scholars to collaborate in research development and commercialization of research outcomes. In this way, Malaysia would become more competitive within its economic region.

The achievement of HE reform can be judged by several indicators, including the success of core activities such as teaching and learning, management and administration, and

research and innovation. This study argues that the maturation of the HE institutions, specifically research universities, should be explored in order to audit the success of their mission, how they conform to a national vision, and how they contribute significant knowledge to the advancement in learning outputs and research outcomes.

To understand more about maturation of the HE institutions in Malaysia, the following section briefly discusses public HE, the national HE strategic plan, and the use of IBIMS in MRUs. Included is a discussion about initiatives to create an excellent HE system and to engage with future challenges in the global education system. This discussion contextualises the study of communication satisfaction in using Internet-based technologies as important to help HE institutions to utilize IBIMS in administrative tasks, to facilitate teaching and learning, and manage research activities as described in this thesis.

2.1 Background of higher education in Malaysia

The education system in Malaysia provides two levels of basic education for children, primary and secondary – as part of the developments needed to achieve the status of a developed nation. This includes providing educational opportunities to promote national unity, social equality and economic development (Lee 1999, p 87). The Ministry of Education is responsible for promoting and managing these two basic education systems in order to create a successful democratisation of education in Malaysia. However, to develop a knowledge-based and highly developed society, the Malaysian government announced its full commitment to development of the HE system. Kamogawa (2003) claims that the government of Malaysia has been concerned about HE since establishment of the Education Act as early as 1961. This study outlines the significance of this education act and its role in improving and enhancing the education system.

The New Economic Policy (NEP) was implemented in the early 1970s, aiming to increase the total number of Bumiputera (Malays, aboriginal natives of Sarawak and natives of Sabah) students in HE institutions (Kamogawa 2003), and to increase the number of other minority ethnic groups such as Chinese and Indian. The NEP helps the Malaysian government to increase the number of Bumiputera in HE, and to balance all ethnic groups, such as Malay, Chinese and Indian in the education system, and at the same time improve national unity among them. This policy helps the government meet the needs of Malaysian society for better education within the whole population. For example, the diversity of HE institutions with multi-ethnic groups shows that the government attempts to build an open education system with student enrolments matching students' qualifications and abilities.

The MOHE is responsible for managing and coordinating all HE institutions, including public and private universities. The rationale for this is to provide centres of excellence to meet national and international needs in undergraduate and postgraduate programs. The ministry is mandated by government to manage all activities of private and public universities, polytechnics and community colleges. It is responsible for development of centres of knowledge in Malaysia. For example, MOHE produce several initiatives in the development of public and private HE institutions, the establishment of research centres and research universities. It also helps to create an innovative HE system by producing skilled workers through integration of ICT and soft skills such as communication, leadership and entrepreneurship.

The MOHE plays a significant role in ensuring that Malaysian universities will be listed among the top universities in the world, and in establishing centres of excellence for teaching, research, and publication. In addition, MOHE is required to increase the numbers

of academic staff in public universities with Doctor of Philosophy (PhD) degrees and to produce high quality and competent graduate and postgraduate students to meet the needs of the national and international workforce. MOHE also provides financial aid and infrastructure, strengthens research collaboration and enhances commercialization activities, in order to improve the key performance indicators of universities and to receive a return on government investment in HE.

MOHE has organized the country's HE institutions into four categories. The first consists of public HE institutions governed, funded and supported by the Malaysian government. The second category covers those that offer more opportunities to people in HE, introduced in 1996 through the Private Higher Education Act 1996, National Accreditation Board Act 1996 and Education Act 1996 (Kamogawa 2003). These pieces of legislation were critical in encouraging private HE universities or colleges to establish several HE programs for such subjects as science and technology. Most private universities and colleges are owned by state governments, private companies and organizations, and/or branches of foreign universities: for example: private universities (such as Open University Malaysia, Petronas University of Malaysia and Sunway University); private colleges (such as Nilai University College, KDU University College and SEGi University College); and foreign university branch campuses (such as Monash University, Curtin University and the University of Nottingham). So, it can be seen that there has already been a level of international contact with overseas research universities.

The third level of HE involves polytechnic institutions owned by the government. These exist to encourage school leavers to study technical skills in various fields or trades, especially engineering, so that well-qualified experts like technical assistants, technicians, and junior and middle executives are produced.

Fourthly, there are community colleges, designed to train and improve school leavers in a wide range of skills such as IT, hospitality and business.

Today HE in Malaysia offers equality of enrolment through a merit-based policy and through equal education opportunities in order to produce graduates from all ethnic groups. This is an important part of creating national unity, and the national aspiration towards a knowledge and economy-based society.

In the push to become a knowledge-based economy, driven by innovation, the Malaysian government has played a formative role in establishing the HE sector as a national information economy project, to realize the goal of becoming a regional education hub in South East Asia, as noted by Knight and Sirat (2011, pp. 602-603).

In order to give a more detailed context to trends and thus contexualize the significance of the study, the following section discusses specifics of the public HE sector. A basic understanding of the mission of the sector contextualises the significance of establishing research universities to create research-based education.

2.2 Mission of the public higher education sector

According to Lee (1999), to achieve the government's vision, Malaysia requires graduates who have various levels of qualifications and skills. Similarly, Sirat and Ahmad (2008) claim that HE policy will make the attainment of a national development plan possible and promote economic growth. Bashir, Herath and Gebremedhin (2012) also claim that the education sector affects economic growth directly and indirectly through individuals, organizations and those parts of society involved in it. For this reason, since the early

1970s, the government has been strongly committed to establish a more professional and educated university community. Bashir, Herath and Gebremedhin (2012) suggest that investment in education is one means to increase human capital.

The development of public HE in Malaysia began with the Universities and Universities Colleges Act in 1969 (Kamogawa 2003, p. 548). Table 2.1 documents the 20 public universities in Malaysia that have existed since 1962 (Universiti Malaya was established in Singapore in 1949), up to and including 2006.

Table 2.1: Public universities in Malaysia

Established	Name
1962	Universiti Malaya (UM)
1969	Universiti Sains Malaysia (USM)
1970	Universiti Kebangsaan Malaysia (UKM)
1971	Universiti Putra Malaysia (UPM)
1975	Universiti Teknologi Malaysia (UTM)
1983	International Islamic University Malaysia (IIUM)
1984	Universiti Utara Malaysia (UUM)
1992	Universiti Malaysia Sarawak (Unimas)
1994	Universiti Malaysia Sabah (UMS)
1997	Universiti Pendidikan Sultan Idris (UPSI)
1998	Universiti Sains Islam Malaysia (USIM)
1999	Universiti Teknologi Mara (UiTM)
1999	Universiti Malaysia Terangganu (UMT)
2000	Universiti Tun Hussein Onn Malaysia (UTHM)
2000	Universiti Teknikal Malaysia Melaka (UTeM)
2002	Universiti Malaysia Pahang (UMP)
2002	Universiti Malaysia Perlis (UniMAP)
2006	Universiti Sultan Zainal Abidin (Uniza)
2006	Universiti Malaysia Kelantan (UMK)
2006	Universiti Pertahanan Nasional Malaysia (UPNM)

Source: MOHE's website, 2010.

Since then the government has not established a new university, preferring to develop existing ones with particular strengths. These universities were established at different times and for different reasons but the overall aim is to provide undergraduate and graduate

courses, provide better human resources, enhance economic development and, as noted above, turn Malaysia as a regional and strategic HE hub in Asia.

All public universities share a common style of governance systems and similar characteristics in terms of administrative structure, human resources, financing and academic affairs. Each, however, has an independent local administrative structure, statute, policies and set of regulations. In each university, the Vice-Chancellor, Board of Directors and Senate are responsible for administration, to manage and control general and academic affairs.

Centralization of administrative structures at the national level began in 2004, when the governance system of public universities came under the aegis of the MOHE (Sirat & Kaur 2010). The government now formulates educational policy, budget allocations and other general management issues at the national level. All public universities receive government funding and must ensure that the national, ministry and university rationales and objectives are achieved. Consequently the government and ministry monitor and assist all public universities in order to ensure effective operations and management. This includes the introduction of major initiatives to use ICT in administrative tasks, such as Internet, e-mail and IBIMS, the focus of this thesis.

The next section briefly describes the national HE strategic plans in order to understand in more detail the government's efforts to achieve a national vision, to transform HE, and how this affects the research university sector.

2.3 The national higher education strategic plan for quality outcomes

As seen in previous sections the Malaysian government has given significant attention to transforming and reforming HE through establishing policy goals, legislation and governance structures for public universities. As noted, the aim of the transformation action plan is to empower the HE system to aid the nation's development, produce an efficient workforce, and emphasize the quality of what is taught. The most recent initiative is the creation of a national strategic approach to help implement the overall vision. Both the National Higher Education Strategic Plan 2020 and the National Higher Education Action Plan, 2007-2010 help create the conditions for a competitive HE landscape (Sirat 2010).

The principal goal of the plans is to enhance the quality of the HE system, and encourage human capital development through holistic approaches. As stated in the National Higher Education Action Plan, 2007-2010 (p. 10), the aim is "…to strengthen the foundation of our higher education institutions (HEIs) and take the necessary steps to enhance the overall capacity of our higher education system to produce human capital with first-class mentality." Sirat and Kaur (2010, p. 200) show that the development of the National Higher Education Action Plan 2007-2010 in 2007 incorporates several action plans so that public universities can meet challenges arising in the HE sector.

Acccording to Sirat (2010, p. 469), the seven major thrusts of the National Higher Education Strategic Plan 2020 are as follows: widening access and enhancing quality (human capital development); improving quality of teaching and learning through industrial internships for students; industry attachment for academics and interactive learning pedagogy; enhancing research and innovation by building a critical mass of researchers, research universities and centres of excellence; promoting a research and

innovation culture among academics and students; strengthening institutions of HE to ensure that some of Malaysia's public universities will be classed among the top 100 world class universities; giving autonomy to universities based on key performance indicator audits; producing 75 per cent of academic staff with PhDs; intensifying internationalization through smart collaboration in teaching and research with foreign universities; sending staff and students for post-doctoral programs; introducing student mobility programs with credit transfer with renowned international universities; offering scholarships for international students; encouraging lifelong learning to increase learning and participation by adults with the support of e-learning platforms; reinforcing the ministry's delivery system to facilitate and monitor the governance of universities in order to provide the best delivery system; allocating the government budget; and appointing suitable top management at public universities based on key performance indicators or merit.

The action plan presents a real change in governance as well as teaching and research in universities. Furthermore, this plan is the important key to developing a more systematic and national HE system in accordance with the Ninth Malaysia Plan (2006-2010). For example, this thesis will argue that universities need to utilize all available infrastructures and technologies (such as ICT applications, Internet and online systems) as platforms to generate an efficient income and create new investment in knowledge-based era.

Consequently, one major strategy to achieve the above objectives resulted in the government establishing research and development (R & D) centres of excellence. This objective was made explicit in the National Higher Education Action Plan, 2007-2010 (p. 33): "Under this plan, Research Universities and R & D centres of excellence will become hubs of a well functioning, thriving and collaborative national innovation system." The

research university occupies a special spot on the education reform agenda. The following section discusses in more detail the MRU.

2.4 Research universities in Malaysia

In 2006, the Malaysian government chose four universities that could execute the priority given to research and development (Mok 2011). The National Higher Education Plan envisaged that research universities will become platforms that promote national and international collaboration in research opportunities with reputable international universities, public research organizations and industries.

A research university is a research-intensive institution focusing on several key areas, including research and innovation, recruitment and training of postgraduate students, professional services, and international linkages with industries and international universities. Komoo, Azman, and Abdul Aziz (n.d.) argue that the main goals of MRUs are to be: leaders in innovation; centres of excellence in strategic areas; producers of world-class outputs and publications; and attractors of postgraduate students locally and internationally.

The National Higher Education Action Plan 2007-2010 indicated that the government gave full attention to two important aspects in research and development: to develop researchers, scientists, and engineers; and to provide the right culture to enhance passion, dedication and commitment in research. As will be seen in findings from the research conducted on employee perceptions for this study, the second objective is still some way from being achieved.

To create a successful and innovative research culture, the government designated four public universities as research universities in 2006 (Mohd Majzub 2008): UM, USM, UKM and UPM. Later, in 2010, UTM was added to this list. They were selected because the government wanted these universities to be well established in teaching and learning, in research activities, including production of academic publications. Mok (2011, p.73) indicates that these universities were selected because they had a satisfactory track record in research activities and outcomes. On this subject, Taylor (2006) indicates several characteristics of research universities, such as conducting pure and applied research, delivery of research-led teaching, enhancing academic disciplines, increasing postgraduate research programmes and receiving more external grants that enhance international reputation. Taylor also stresses the importance of interaction between teaching, research, and social and community issues to enhance the universities' core business. Rip (2011) claims that future research universities should be competitive with other universities in order to become postgraduate centres of excellence. The research universities have to move forward quickly in providing more postgraduate programs as sources of competent professionals in research and invention to achieve the national vision. This allows the research universities to become global institutions for research.

Research is a key function of all MRUs, and a university's academic role needs to be integrated with research activities in order to create a positive teaching and research environment, yet the initial emphasis on five universities places pressure on them to succeed as models for others. As such it has been noted that they have greater institutional autonomy through the university autonomy granted in January 2012 (Bernama 2012). This top-down policy gives autonomy and power to MRU in implementing proactive strategies, not only in governance, finance, human resources and student admissions, but also in

campus developments such as the integration of ICT to provide efficient services to facilitate interaction and collaboration between academics and students.

In line with that aim, effective management and governance in MRUs needed to adapt with e-government applications in order to implement e-governance, and to enhance the work of governing bodies (boards of directors and senate members), academics (lecturers and scholars), and administrative staff (registrars and finance officers). E-governance not only provides better governance and more effective management in universities, but is thought to remove procedural and bureaucratic difficulties and thus produce features of good governance such as accountability and transparency.

It is also envisaged that research universities will become strategic actors that plan their individual research systems to ensure that governance systems are productive (Rip 2011). Fang (2012) also argues that research universities can play a significant role in offering very market-oriented programs, especially in advanced undergraduate programs (bachelor degrees) or postgraduate programs (MAs and PhDs) in order to act as pathways to knowledge and innovation. Welker and Cox (2006) claim that research at such universities is important for establishing individual and institutional priorities that: inspire the research culture; stimulate the formulation of university policy; enhance economic development and technology transfer; and increase collaboration between academics/researchers. MRUs thus aim to become centres of HE that offer research facilities, postgraduate programs and post-doctoral opportunities. All stakeholders in research universities understand the importance of these aims. In addition, the top management, academics, administrative officers and other staff need to increase their productivity in order to achieve them.

MRUs become more important as a critical mass of researchers is produced, as "world class" universities can generate more research grants. Trends towards internationalization, globalization, competitiveness and international ranking have driven the government of Malaysia to establish research universities. Therefore, the development and establishment of MRUs are important for national wealth and competitiveness.

This study argues that one of the keys to achieving this agenda is the integration of ICT applications in universities to improve administration, management and related activities. How employees respond to these developments is critical to this implementation, and sparks this study's focus on communication satisfaction. The following section describes briefly the advantages of ICT application in the education sector.

2.5 The use of ICT applications in education

The use of ICT applications has been significant in ensuring a more flexible and efficient working environment in HE. Lievrouw and Livingstone (2002) refer to ICT as "the artefacts or devices that enable and extend our abilities to communicate; also, the communication activities or practices we engage in to develop and use these devices; and the social arrangements or organisations that form around the devices and practices" (p. 7).

The thesis findings shed light on IBIMS uptake and, more significantly, provide new information on the contexts of use, and the attitudes of employees to technology adoption in MRU.

For now, the thesis considers commentary on ICTs and governance. Bekkers (2003) defines ICT as a set of devices to help government in institutional arrangements, transactions and interactions between government and its stakeholders. ICT provides the

means and communication tools for people and institutions to use computers, IS, online systems, and Internet-based systems as part of their information management.

For several years ICT development has changed and affected people's lives in many ways, especially in relation to process, exchange, and distribution of digital information. Technology-enabled communication has improved reach, efficiency and accuracy, at work and in personal lives. It gives users quick access to data, information, knowledge, ideas and experiences at a very low cost and from a wide range of people, communities and cultures through World Wide Web (WWW) capabilities. It has also created virtual cultures that provide new forms of information sharing such as e-mail, chat rooms and instant messages. In the education environment, as claimed by Omona, van der Weide and Lubega (2010) ICT and Internet applications enhance knowledge management in HE, especially for access to knowledge in learning activities and for the research agenda.

Donnellen (2002) argues that ICT in education contributes a number of teaching and learning benefits to the institutions/students, such as improving subject learning in curriculum, increasing motivation and attitudes to learning, creating independent learning and research skills, enhancing vocational skills and training, development of network society and literacy, and social development. Sanyal (2001) claims that ICT can contribute to education by: supporting educational institutions; developing non-formal education for out-of-school children and adults; increasing distance learning and professional development; and improving the management of educational institutions.

Said (n.d, p. 4) identifies six main foci of the Education Development Plan for Malaysia 2006-2010: to build the nation, develop human capital, empower national schools, bridge the education gap, improve the status of the teaching profession, and upgrade the

excellence of educational institutions. ICT is central to achieve these outcomes. This has been established by the study's findings that most employees, specifically management officers and academics, were using ICT applications such as IBIMS to facilitate administrative and management tasks

This is a critical point for understanding the emphasis on rapid and large scale ICT development. For example, in Malaysia, all sectors are encouraged to use ICT applications such as IS and online systems (Abdul Karim & Mohd Khalid 2003). The emergence and the availability of online systems has helped the growth of computer networks and systems, such as media for communication, teaching and learning, e-governance and online transactions. The introduction of online systems in any given organisation closes cultural gaps between departments, eliminates physical distances, provides easy and quick services delivery, and increases the efficiency of activities for all stakeholders, including academics and students. For example, employees can use online applications to apply for annual leave without using paper-based forms and face-to-face meetings to get approval from their head of department. They get approval in an effective manner through personal e-mail. It is archived and trackable.

Malaysia's government prioritizes ICT, understanding that it plays significant role in national development, especially in global competition. The cost is significant. In order to implement ICT through the Seventh Malaysia Plan (1996-2000), government investment in ICT increased by nearly RM4 billion to RM5.9 billion (Malaysian Communications and Multimedia Commission 2002). In the Ninth Malaysian Plan (2006-2010), Malaysia invested a total of US$6 billion (RM18.42 billion) for ICT-related programmes such as electronic commerce (e-commerce), e-government and bioinformatics. ICT has thus become important in establishing Malaysia as an IT and multimedia hub, through key

strategies such as upgrading communication infrastructures, increasing and developing human resources in ICT, introducing e-commerce, creating local content, implementing MSC's flagship application, and formation of a critical mass for ICT-based industries. HE institutions receive the benefits of ICT development, as shown: Malaysian National Plans such as the Country's Annual Budget; the five year Malaysian Plan; the National Education Plan; and NITA. These plans provide budget allocations for ICT development to promote several strategic activities and programmes in order to increase the use of ICT. In the Ninth Malaysian Plan the government extended the MSC into a second phase to expand the communication network, develop ICT skills and enhance e-learning in education. For example, universities are provided with blueprints with detailed guidelines and standards to boost the employment of future ICT throughout the country (The Ninth Malaysia Plan 2006 – 2010). The Education Development Plan for Malaysia (2001-2010) similarly highlights the development and integration of ICT in management and in programs in each type of education.

The above plans provide HE institutions with increased access to information sources, communication platforms, interactive and collaborative learning environments, information management, and methods of teaching and learning. In Malaysian HE institutions the growth of ICT, Internet and Web-based systems has opened up opportunities for people to seek new information in their campus life. These technologies offer more possibilities to people on campus to use electronic mail for communication, online discussion with other researchers through collaborative software, and web access to retrieve reading materials (electronic journals). Most MRUs use learning management systems for communication with students, and make available online materials (such as notes, books, journals, and assignments) for every course to improve teaching quality. For

example, in UM, academic staff use the UM Conference Management System to manage data and information about national and international conferences.

Thus, MRUs particularly, not only use learning management systems but several applications and systems, including IBIMS, in order to improve employees' professional practice, personal development and quality of working life. To provide more details, the following section briefly discusses the use of IBIMS in MRUs.

2.6 IBIMS in research universities

Management information systems (MIS), information processing systems, information services and computer-based information systems can be used as synonyms for information management systems (IMS), which support the activities, operations, and transactions and decision-making processes in organizations (Davis 1995). Awad (1998) claims that MIS is "an IS which supports any type of transactions processing and management decision making functions" (p.5). He describes five key elements in MIS: to provide integrated systems to end users; to produce computer-based systems to support end users with applications (databases); to develop suitable user-machine interfaces that enhance input and feedback to enquiries from end-users; to provide information to all stakeholders and management in organizations; and to support operations and decision-making processes.

The integration of IMS and Internet-based technologies such as IBIMS encouraged this writer to study the reactions of individual employees (academics and officers) to its use in research universities, to produce knowledge on how individual uses of IBIMS enable research universities to develop more electronically.

The study aims to help universities understand employees' communication satisfaction in order to motivate employees to make full use of IBIMS, specifically in managing administrative tasks, sharing teaching materials, conducting research discussions and so on. Thus, in the context of IBIMS implementation, it is necessary to understand the impact of perceived OCS on employees' attitudes and behaviour in accepting IBIMS as a platform to manage research activities.

Offering an early working definition, Awad (1998) argues that IMS can refer to database and transaction management systems (stand alone and online) that support the delivery of information to stakeholders. Web-based or online IMS provides an important platform as a one-stop centre for information when data in a database is converted to more useful information. The more useful the information retrieved, the better the services and decisions made by employees in order to enhance their tasks. It shows that IMS applications have the potential to enhance efficiency, effectiveness, performance and productivity for competitive advantage. For example, adoption of knowledge management systems increases improvements in the efficiency and effectiveness of HE in accessing information about staff members' research and innovation. According to the above key elements, as an important driver of organizational and management change, IMS has the ability to enhance and transform the workplace environment. Sometimes the significance of the changes is not always obvious to employees, as this thesis' findings illustrate about MRU employees' satisfaction and attitudes to IBIMS.

In Malaysia, initiatives are being implemented to enhance the development of IMS through Internet-based projects in order to enable better transactions and services delivery between public sector agencies and their stakeholders. For example, as shown in *The Civil Service of Malaysia* (2001), the current pilot projects for e-government that utilize the power of

IMS and Internet are electronic services (eservices), electronic Procurement (eP), Generic Office Environment (GOE), Human Resource Management Information System (HRMIS), Project Monitoring System (PMS), and Electronic Labour Exchange (ELX)

In research universities, IBIMS provide opportunities for employees to use them as media to shape and produce communication processes that facilitate teaching and learning, and manage their research processes and activities. Today in Malaysia, as elsewhere, most universities employ IT and related systems in organizational strategies and educational processes (Liong 2005).

The widespread adoption of online systems nationally and internationally is one of the most important key drivers in the widening use of IBIMS. Research universities use Internet-based applications as tools for information access and flexible delivery systems (Oliver 2002). Table 2.2 below shows some of the many IBIMS in four MRUs.

The rapid implementation and adoption of IBIMS in MRUs highlight the importance of ICT systems in providing greater responsiveness and interactivity between students and lecturers, especially through access to online educational management in distance learning or e-learning. For example, Kidwell, Linde and Johnson (2000) emphasize that the Internet-based/Web-based portal enhances the collaborative platform in creating active conversations and participation between students and lecturers, and building online communities to bridge the barriers between people. Whether these systems are accepted and can promote the same possibilities in research is a key question for this study.

Table 2.2: Examples of IBIMS in four MRUs

MRUs	Example of IBIMS
Universiti Malaya	Student Online System • UMISISweb • Online Course Registration Staff Online System • E-Recruitment • UMPortal Academic & Research • UMEXPERT • UM Conference Management System
Universiti Sains Malaysia	Main suites • University Information System – Student (SMU-P) • University Information System – Staff (SMU-S) Local use • Travelling Claims (e-Tuntutan) • Leave System (e-cuti)
Universiti Kebangsaan Malaysia	Academic applications • Sistem Maklumat Pelajar (SMPWeb) • Sistem Penilaian Pengajaran Kursus (SPPK) Corporate applications • Aplikasi web e-warga • Sistem Maklumat Peribadi Kakitangan
Universiti Putra Malaysia	Student Aplications • Sistem Akaun Pelajar • Student Portal Office Automation Applications • Aplikasi Cuti Online • Aplikasi Stok Inventori Human Resource Applications • E-IHRAMS • Staff Protal

Source: MRUs' websites

According to Oliver (2002) the use of applications and systems in HE has basically changed several forms of centuries-old practices, not only in teaching and learning but in operations, business processes, governance and knowledge management. Similarly, Kidwell, Linde and Johnson (2000, p. 31) claim that the systems and knowledge management applications provide several benefits to university processes and services in research, curriculum development, student and alumni services, administrative services and strategic planning.

To return briefly to ICT impact on social arrangements: IBIMS can support greater access to resources from anywhere and at any time by students, academics and administrators. For example, the online staff portal has been very effective in improving internal communication and interaction capabilities between managers and staff (Bekkers 2003). IBIMS also creates one of the most important platforms to equip research universities with online information management systems for financial, procurement, and human resources by giving greater accountability and transparency in governance. Bertazzoni et al. (2012, p. 157) describes the need for a research IS (such as U-GOV) to manage information and document, a university's aims and social role, and to increase efficiency, control resources and transform university governance and management. Existing technologies such as IBIMS are significant in transferring academic services and management more effectively.

The development and adoption of IBIMS as Internet-based or Web-based portals helps research universities deliver integrated services to stakeholders such as students, internal staff, MOHE, sponsors, parents and so on. As claimed by Kidwell, Linde and Johnson (2000), the Web-based portal is important to create the university's central administration and as a gateway to information for multiple customers or users. They also indicate that the portal will improve information exchange and communication, with knowledge and information widely accessible within the universities.

In MRUs, IBIMS applications are used to enhance dynamic information exchange between individuals and groups in the workplace. These systems improve information flow, create faster feedback from/to students and staff, and provide formal and informal communication channels. IBIMS also represent some of the most important platforms to create and support online collaboration and interaction (Vreede et al. 2003). Hence, the exploitation of the

Internet is providing the impetus for IBIMS being adopted in information management, communication and knowledge management practices in MRUs. The very high national expectations of achievement of research universities' objectives makes the study of employees' attitudes to communication satisfaction and their understanding of contextual change significant.

With the competitive challenges that exist in HE operations, an effective online delivery system is required that enables individual employees and institutions to work efficiently in new research activities (Othman 2009). Management of universities is more complex where researchers, students and others access and share research data or resources through an Internet-based system or on the WWW (Bertazzoni et al. 2012).

The systems play significant roles in providing useful information about a university's research, publications and conferences, innovation capabilities, historical reports on scientific productivity, reports of accreditations, governmental and international funding agencies, and companies that commercialize research products and innovations (Cantu and Ceballos 2010). They support MRUs in the tasks of collecting and managing documentation of research products and resources in digital formats (online repositories), especially research assets, research outcomes, patents, licences, funding and grants, and human resources.

Therefore, IBIMS have the potential to help overall university management processes, especially in administration, teaching and learning, and research management. The data and information in the systems are important to generate useful reports: ones that document a university's strategic plans and guidelines to help management compete with other universities through relevant strategies; and to understand the importance of national

and international levels of ranking, benchmarking, intellectual property protection, publication and innovation.

This study claims that a comprehensive set of basic infrastructures is an important foundation for successful research universities. The use of IBIMS helps universities and people improve professional practices in research and administration. This study looks closely at OCS in using IBIMS. Thus, the developments and achievements of MRU, including ICT, help the government to produce the best model of Malaysian HE in research, publication, management, governance and so on. This study discusses in more detail about the use of IBIMS in research management in Chapter 7.

2.7 Summary

The chapter has presented the background to HE reform in Malaysia monitored by MOHE. MOHE is responsible for the development of four pillars of the HE system: public HE institutions, private HE institutions, polytechnics and community colleges. This chapter describes more specifically public HE institutions, and stresses their importance in producing competent human capital and human resources in order to enhance economic growth. The chapter also discusses the establishment of MRUs to facilitate and focus on research and innovation. It highlights the importance of IBIMS in MRUs with particular emphasis on existing commentary that supports its potential to increase the efficiency of administration, teaching and learning, and research management.

The aim of this study from this point is to examine employees' satisfaction with online communication and to what extent IBIMS have been embraced. The initial objectives are to investigate the effects of usefulness, ease of use, interactivity, and usability and IS quality on the OCS of employees, before turning to investigate the contexts of IBIMS

within the research agenda of employees and their understanding of what technologies can do for research universities. In pursuit of these aims, Chapter 3 discusses the research issues of technology acceptance, theoretical framework and hypotheses.

Chapter 3

Conceptual Framework and Hypotheses

3.0 Introduction

The two previous chapters established that it is important to understand the use and impact of new technologies such as IBIMS, especially for those working in MRUs. The demands made on information management in this era of ICT are having a significant effect on the acceptance and adoption of IBIMS in many types of institutions and are important to the success of Malaysia's national objective of achieving information society status by 2020. Several key factors drive the success of technology acceptance and changes in an organization. Understanding the role of OCS and technology acceptance can help research universities assess users' needs for different online systems, and achieve more efficient IBIMS usage. That, in turn, contributes to the national information society development agenda described in Chapter 2.

This chapter focuses on what is known about issues of technology acceptance, specifically issues of technology usage and changes as discussed in Section 3.2. It also briefly describes several studies in technology usage and acceptance in Malaysia. This chapter investigates specific variables such as interactivity, online collaboration elements and OCS in order to create a framework and hypotheses for this study's focus on research university employees's communication satisfaction. It therefore explains the influential models of adoption: the first is the TAM model (Davis 1989). It also includes an account of Outcome Interactivity Theory (Gleason and Lane 2009); the ways to assess the usability of the system; and the IS Success Model (DeLone and McLean 2003). Details of these models are presented in Section 3.4.

This study also works from the understanding that limited research has been done in Malaysia on user satisfaction with online communication, in association with technology acceptance and use of IBIMS. These concepts are used to explain and examine how new technology is accepted and employed in the workplace, specifically in MRUs. This study develops an empirical approach to understand technology acceptance within universities or HE sectors in Malaysia, and to examine the use and utilization of IBIMS among academics and administrators to achieve successful Web-based implementations in management, administration, teaching, learning, research and innovation.

3.1 Background

A popular research area in the field of technology management, IT and IS focuses on technology acceptance, adoption and usage. According to Mitchell et al. (2012, pp. 736-737), many technological changes adopted in various organizations fail because employees do not fully accept and use them. They state their findings on employee acceptance and support.

> As organizations have high expectations with regards to their IT investments, the results of our studies suggest that these expectations can be better realized when, through a supportive work environment, individual users accept the change, and fully use the system.

Technology acceptance studies help organizations to explore their expectations about technology investment, especially as they help to bridge the gap in the literature about understanding whether users or employees accept technology changes in their organizations as part of the diffusion of ICT in e-government development in Malaysia.

However, contextual characteristics contribute to the pull and push factors in using IS and IT applications among employees. These include the technological, human and social, and

organizational contexts. This study presents an argument on supportive environments in discussing interview findings. For now, this chapter focuses on how factors involved in users' attitudes to online systems can be identified. The analysis and interpretation of the study provide concrete reasons to explain the factors governing technology acceptance in order to understand user attitudes and behaviours, and how these factors and resistances to technology usage specifically affect research universities.

The first specific factors that are important in this study are adopted from earlier work and comprise: usefulness and ease of use (Davis 1989); positive usability of the system (Preece 2001); support for information quality, system quality and service quality (Lin, Fan & Zhang 2009); and user satisfaction (Simha & Kishore 2009). These factors were originally enough to encourage the writer to examine employees' OCS in accepting and using IBIMS in four MRUs. Significantly, Section 3.4 discusses relevant details about these factors in order to develop conceptual frameworks and hypotheses of this study. The long-term significance of this study is to contribute further influential factors aimed at greater understanding of acceptance and usage of Internet-based technologies, specifically IBIMS, by academic and administrative staff.

In choosing to focus on TAM, it can be noted that many studies have examined technology acceptance, and several theoretical models have been used. However, the TAM concept has been one of the most used and well-established models for explaining end user acceptance and usage behavior in relation to various IS and Internet applications, as stated in Park, Son and Kim (2012, p. 378).

> It has become established as a parsimonious yet powerful model for explaining and predicting user acceptance of various information systems such as e-mail, word

processing, spreadsheets, the World Wide Web, online consumer behaviour, and electronic commerce.

Technology acceptance researchers continue to explore whether TAM should be extended as a model, and integrated with other determinants in order to explain acceptance in different contexts, with further research questions posed by different technologies, users and organizations. This study argues that considering other factors brings a significant understanding of users' attitudes and intentions about technology, besides factors of "usefulness" and "ease of use" as stated in TAM. Here TAM serves as the basis or departure point for initially identifying users' OCS and attitudes to IBIMS.

TAM is used to explain that actual IT/IS acceptance is determined by perceived ease of use and relevance when determining attitudes towards utilizing the system and technology (Oye, Iahad & Rahim 2012). Davis, Bagozzi and Warshaw (1989) argue that TAM is a suitable and valid model for investigating technology acceptance. Chen, Li and Li (2011) also clarify the usefulness of analysing the extension of TAM to construct new knowledge by integrating other determinants or factors to ensure that the model leads to consistent results. Further details and information about TAM models are discussed in Section 3.4.1

This study claims, as presented in section 3.4.2, that "interactivity" is an important predictor for explaining the use of technology and systems in various kinds of organizations. For example, Chen and Yen (2004) and Dolen Dabholkar and Ruyter (2007) stress that interactivity features of the system have a positive effect on users' intentions and attitudes when they engage with web sites and online chat rooms. From a different perspective, Fiore (2008) states that interactivity is the influential key factor for improving end users' interaction with information and content on web sites, at the same time enhancing user satisfaction. Poster (2007) reveals that the computer games industry also

focuses on interactivity in their content to achieve real-time interaction, and this can offer positive feelings and experiences in game activities. Poster (2007, pp. 327-328) claims that,

> One need not be a game player to develop this approach to life. As the entertainment industry continues to modify its output for assumed interactivity, all texts are beginning to speak to a general demand for user activity, which is most concentrated in game playing.

Furthermore, he states that the importance of interactivity in enhancing users' feelings, attitudes, satisfaction and motivation to use technologies is evident. He argues that interactivity has improved users' satisfaction regarding how systems are used and accepted. However, the question is how interactivity creates a significant impact on users' OCS for different types of system used.

This study argues that most prior studies on technology acceptance and systems do not examine the impact of interactivity features on users' OCS, especially that of IBIMS uptake and use in MRUs. It is therefore first necessary to understand how interactivity features of the system will influence users' OCS and indeed level of skills in MRUs to use IBIMS.

The Internet provides individuals and organizations with the ability to interact collaboratively via online applications or systems. According to Vreede, Mgaya and Qureshi (2003), Internet-based applications can be used as online collaboration platforms to enhance and support organizations' and employees' collaborative activities. Online collaboration applications offer many advantages. For example, Hodgkinson (2006) found a positive attitude towards the use of online collaboration tools among students, and he suggests that universities should actively develop and understand online collaboration tools

in order to enhance participation, teaching and knowledge sharing, which can take place anywhere and at any time through computers and mobile devices.

Studies have investigated the influence of usability (Koohang & Ondracek 2005) and IS quality (DeLone & McLean 2003) in order to predict end users' acceptance and usage of such systems, but, they have not combined usability of the system and the IS Success Model as online collaboration elements in measuring, OCS, technology acceptance and use. Consequently, this study argues that it is necessary to investigate the effects of usability and the IS quality (information, system and service quality) on OCS to measure IBIMS usage in the context of online collaboration, as discussed in Section 3.4.3.

To understand technology usage and changes in organizations, especially in Malaysia, the following section briefly discusses the current research literature on technology acceptance in Malaysia, together with factors in technology usage and changes, and conceptual frameworks and hypotheses developed to examine OCS and IBIMS usage.

3.2 Several factors in technology usage and changes

According to Allen (1995), many HE institutions develop IS due to internal and external factors driving organizational change. Regarding this scenario, Dawson (1994) claims that several internal and external factors drive such changes: technology, society, economics, government rules and regulations, internationalisation, political influences, the complexity of organizations, people, tasks and administrative structures.

The published studies indicate there are many potential success factors leading to the acceptance of technological changes in various kinds of organizations. Benamati and Lederer (2001) claim that external and internal funding, budgets and costs are significant

factors in this regard. In addition, skills and training are important to enhance employees' knowledge to facilitate IT usage (Broos & Cronje 2009; Jankowska 2004). However, Rash (2010) indicates that users do not fully accept and use new technology because some lack knowledge and information about the usefulness of the system, especially the benefits for raising their organization's efficiency. These studies indicate that organizational initiatives such as training and funding impact on users' attitudes to utilising systems.

Kang and Chiang (2006) emphasise the importance of technical and practical support in supplying end users with common technical services such as helpdesks. On the other hand, some previous researchers also describe the important role of top management supporting employees in technology usage, specifically the role of middle managers and senior administrators in motivating employees to utilise new technology (Broos & Cronje 2009; Seng, Jackson & Philip 2009). From an organizational perspective, change management and good IS management that facilitate day-to-day organizational activities will help and inspire employees in the overall working environment, and consequently improve individual employees' motivation to use technologies and applications (Protti, Bowden & Johansen 2008; Rash 2010; Booth & Philip 2005). They also claim the need for technological support, senior management involvement, change management, and good IS management in motivating users to engage with the systems.

Organizations also need to create special strategic plans and guidelines to change organizational culture so that new technology and systems can be implemented. For example, development of infrastructures such as networks, computers and software (Brown, Chervany & Reinicke 2007) will help create conditions for improving employees' attitudes, beliefs and behaviours (Konings & Dekker 2005). There are also smart collaborative practices between professional colleagues and their peers that can help

promote positive attitudes and knowledge about using new technology (Protti, Bowden & Johansen 2008; Seng, Jackson & Philip 2009).

From the studies cited above, it is evident that key factors in technology acceptance, usage and changes in organisation can be investigated through contexts such as interface, content, ease of use and so on. They can also be evaluated by better understanding technology acceptance in terms of the social and human factors, organizational initiatives, and other external factors. Several studies on technology usage and acceptance in Malaysia (as discussed in Section 3.3) have been undertaken, specifically on linking the technological context to various external factors such as trust, enjoyment and other factors. However, this study argues that they do not focus on how different technologies contribute significantly to employees' OCS in different populations and environments, specifically among academics and administrators in MRUs.

In order to understand technology acceptance and usage in MRUs, this thesis argues the importance of several systemic technological features such as usefulness, ease of use, interactivity features, usability and IS quality to OCS and IBIMS usage. The section below discusses technology usage and acceptance from several points of views, specifically in different populations and environments.

3.3 Technology usage and acceptance in Malaysia

The TAM is one of the most discussed and explained models in predicting users' behavior in technology acceptance and system usage. Many factors that contribute to the acceptance of technology in Malaysia are usefulness, ease of use, social influence, management and government support, and other key factors. For example, it has been shown that Malaysians do not rate MyKad (Malaysian national identity card) highly because they do

not understand its benefits; plus, the card is not well supported, there is anxiety about damaging the card and doubt about its applications (Loo, Yeow & Chong 2009).

Most studies on technology acceptance and usage in Malaysia focus on different types of technologies: Internet banking or electronic banking (Sohail & Shanmugham 2003; Sulaiman, Lim & Wee 2005); ICT usage (Wong & Teo 2009); multipurpose smartcard (Loo, Yeow & Chong 2009); electronic ticketing (Sulaiman, Ng & Mohezar 2008); mobile personal computers (Ramayah & Mohd Suki 2006); wireless Internet using mobile devices (Parveen & Sulaiman 2008); electronic medical records (Mohd & Syed Mohamad 2005); e-learning (Masrom 2007); and web-based training (Hashim 2008).

These studies use quantitative methodology, a survey method with structured questionnaires to collect data. The subjects of these studies highlight the previous study focus on different type of populations. Subjects of these studies are as follows: ICT users (Wong & Teo 2009); mobile phone and Internet users (Amin 2008); Internet banking customers (Sohail & Shanmugham 2003; Sulaiman, Lim & Wee 2005); student teachers (Wong & Teo 2009); smartcard or MyKad holders (Loo et al. 2009); doctors (Mohd & Syed Mohamad 2005); and students in HE institutions (Masrom 2007). These studies reveal that most research studies on technology acceptance in Malaysia focus on empirical findings from quantitative data and results.

This study argues that it is important to understand technology acceptance also from a qualitative perspective in order to evaluate people's feelings and experiences when they use IBIMS. Quantitative approaches are extremely useful for technology acceptance research, to enable the collection of user perceptions on uses of technology; however,

qualitative data is important to enable collection of user opinions and experiences to give deeper insights into patterns of IBIMS use in MRUs.

The mixed method research approach specifically needs to understand technology acceptance more deeply, and show the potential of the qualitative approach to support and triangulate quantitative results. This study claims that the mixed method approach helps the writer to stress the importance of survey, in-depth interview and open-ended questionnaire results to understanding organizations and practitioners in making decisions about technology acceptance, adoption and usage.

In the following studies' authors indicate many "push and pull factors" that influence end users' utilization of new technologies and systems in Malaysia:

- ease of use and usefulness (Amin 2007; Amin 2008; Hashim 2008; Masrom 2007; Mohd & Syed Mohamad 2005; Ramayah & Mohd Suki 2006; Ramayah et al. 2009; Selamat, Jaffar & Boon 2009; Wong & Teo 2009);
- end users' age, education background and income (Sulaiman, Lim and Wee 2005; Sulaiman, Ng and Mohezar 2008);
- Internet accessibility, awareness of the systems, attitude towards change, computer and Internet access costs, trust of security and safety (Sohail & Shanmugham 2003);
- social pressure, enjoyment and fun, and perceived complexity (Selamat, Jaffar & Boon 2009);
- love of new knowledge (IT applications), willingness to take risks, management's support, government's encouragement, and competition between each other (Bakri & Mohamed 2005);
- technological complexity and personal innovativeness (Parveen & Sulaiman 2008);

- interface of the system and information quality (Mohd & Syed Mohamad 2005);
- comfortableness (Hashim 2008);
- self-efficacy, credibility and normative pressure (Amin 2007); and
- credibility and content (Amin 2008).

Conversely, virtually nothing has been published on technology acceptance in HE institutions in Malaysia, specifically on IBIMS usage by academics and administrative staff in MRUs. Neither do we know much about acceptance and use of IBIMS by academics and administrators in order to enhance professional tasks, personal development and quality of working life, specifically in management and administration, and research management and innovation development.

This study argues that most of the technology acceptance studies in Malaysia discussed above have not explained the key factors that influence administrators and academics when using Internet-based applications or online systems in the research university context. In order to overcome this paucity of knowledge, this study examines how these types of university employees are affected by and accept IBIMS.

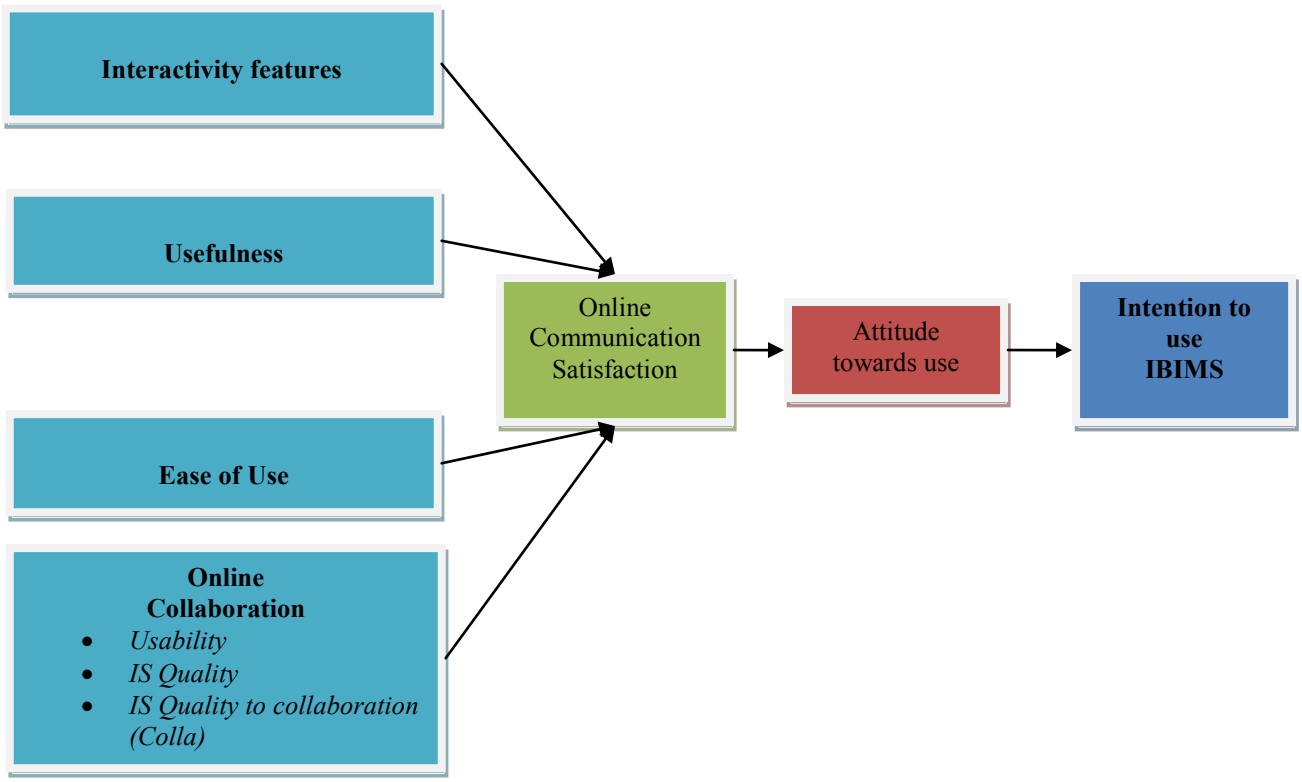
This study claims that there is a definite lack of studies on Internet-based applications or online systems such as IBIMS in HE institutions. It also asserts that it is necessary to investigate the acceptance and usage of IBIMS because then all universities can prepare strategies for expanding online systems, and simplifying how they are employed in everyday operations, especially in the research context as discussed in Chapter 7. This is rapidly developing higher importance in the Malaysian HE sector.

As discussed above, few studies on Malaysia employed the original TAM with other external factors in order to investigate technology acceptance. They provided new information on technology acceptance, yet did not integrate TAM with interactivity features, usability of the system, IS success model and the degree of satisfaction with online communication in measuring IBIMS usage. One limitation of the above studies is their sole focus on the TAM model, yet future studies could usefully combine TAM with other acceptance models or concepts such as the IS success model. The following Section 3.4 discusses the combination of several models and concepts, which also outlines the conceptual framework of the study.

3.4 The conceptual framework and hypotheses of the study

The conceptual framework of this study is based on the design and discussion of the research objectives stated in Chapter 1. The research aims to understand the nature of the influence of usefulness, ease of use, interactivity features, and online collaboration elements (usability and IS quality) concerning OCS when IBIMS are operated. A conceptual framework is often used as a research model and theoretical framework in many kinds of research. The conceptual framework is also a theory or model that serves as a basis for conducting research. The reasons for developing the conceptual framework are : firstly, to clearly state the variables in a study; and secondly, to provide the researcher with a logical framework to develop hypotheses, methodology and suitable data analysis in order to understand the phenomenon being investigated. Figure 3.1 illustrates the conceptual framework in which model, theory and concepts are used to represent the major ideas generated in this thesis.

Figure 3.1: The conceptual framework



In order to formulate the conceptual framework, this research focuses on individual acceptance of technology (especially IBIMS) in MRUs. Previous studies on technology acceptance indicate that many factors, theories and models were used to explain and predict individual intentions and/or actual usage of new technologies. In order to understand more about technology acceptance in MRUs, this study extends TAM and integrates it with interactivity features, online collaboration elements and OCS to produce a significant conceptual framework. In order to understand the framework, the following sub-section describes TAM, interactivity features derived from Outcome Interactivity Theory, online collaboration and its constituent elements, and OCS.

3.4.1 Technology acceptance model (TAM)

IS and Internet-based systems usage have been significant foci of research into ICT for more than 20 years (Premkumar & Bhattachherjee 2008). Acceptance and usage of

Internet-based systems is a key driver in implementing ICT in various kinds of organizations, and has enormous implications for organisational efficiency, performance and productivity. It is thus advantageous to understand the key factors influencing ICT acceptance and how organizations use electronic systems. A successful model that explains and empirically measures acceptance of IT/IS is TAM (Legris, Ingham & Collerette 2003) as shown in Figure 3.2. The TAM was developed in 1989 by Fred D. Davis. TAM forms a basis for explaining the acceptance process and the causal links between beliefs, attitudes and intention behaviour (Ghazizadeh, Lee & Boyle 2012).

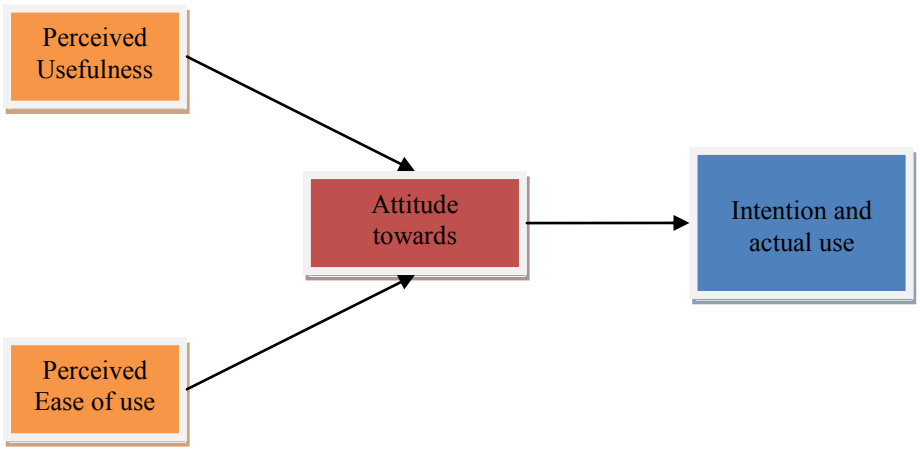
In order to predict the levels and extent of computer usage and adoption, Davis modified the determinants of attitude of Theory of Reasoned Action (TRA) using two key factors: perceived ease of use (PEOU) and perceived usefulness (PU). Ghazizadeh, Lee and Boyle (2012, p. 40) write:

> The IS community has developed one of the most broadly used models of acceptance: Technology Acceptance Model (TAM) (Davis 1989; Davis et al. 1989). TAM posits that users' perceived usefulness and ease of use are the main determinants of their attitude toward a technology, which, in turn, predicts their behavioral intention to use and accept the system.

This model is a dominant and widely used model in various studies associated with understanding technology acceptance with different type of technologies, populations and organizations. Furthermore, TAM uses these two primary determinants to predict users' attitudes, intentions and actual usage behaviour. According to Davis (1989), PU can be described as "the degree to which a person believes that use of particular system would enhance his or her job performance" (p. 320). In contrast, PEOU is "the degree to which a person believes that the use of a particular system would be free of effort" (p. 320). These

definitions contend that PU and PEOU can predict individuals' acceptance of technology, attitudes to systems, and how they use new technology (Pynoo et al. 2012).

Figure 3.2: Technology Acceptance Model



In TAM, Davis explains ease of use and usefulness as primary effects of an individual's satisfaction and intention to actually use the IS (Davis 1989; Rampersad, Plewa & Troshani 2012). Castaneda, Leiva and Luque (2007) claim that, using these two factors, the TAM model strongly supports users' attitudes to employing IS in their work. For example, several empirical studies by Agawal and Prasad (1999), Karahanna, Tung, Chang and Chou (2007), Premkumar and Bhattacherjee (2008), Straub and Chervany (1999), and Taylor and Todd (1995) have generated convincing results that support TAM's ability to estimate acceptance of technology in various organisations. According to one critical review of TAM by Legris, Ingham and Collerette (2003), most researchers highlight that ease of use and usefulness have been strong predictors of user intention to utilize IS and related products. Legris, Ingham and Collerette (2003, p. 202) state:

> TAM has proven to be a useful theoretical model in helping to understand and explain use behaviour in IS implementation. It has been tested in many empirical researches and the tools used with the model have proven to be of quality and to yield statistically reliable results.

This shows that TAM remains an important, quality, reliable and viable measurement tool for scholars and researchers in this field.

The proposed framework (see Figure 3.1) in this study argues that ease of use and usefulness are important in providing OCS when operating IBIMS. Two hypotheses are proposed here and they make links between ease of use and usefulness and OCS:

Hypothesis 1: Usefulness (U) vs. Online Communication Satisfaction (OCS)
H1: There is a positive relationship between Usefulness and Online Communication Satisfaction when using IBIMS.

Hypothesis 2: Ease of Use (EOU) vs. Online Communication Satisfaction (OCS)
H2: There is a positive relationship between Ease of Use and Online Communication Satisfaction when using IBIMS.

Based on recent research examining technology acceptance, this study uses ease of use and usefulness, attitude towards use, and intention to use according to TAM as a basis for developing the conceptual framework shown in Figure 3.1.

3.4.2 Interactivity features

IBIMS has emerged as a very effective online IS because it has the potential to improve successful communication processes, tasks, and organizational efficiencies. According to Reinig, Briggs and Vreede (2009), users tend to abandon their technology when they feel dissatisfied with its application. This point of view shows the importance of positive experience and satisfaction among end users when using any type of IT and systems. This study aims to investigate to what extent interactivity features derived from Outcome Interactivity Theory (Gleason & Lane 2009) influence employees' OCS with their use, and intention to use, IBIMS. According to Rafaeli (1988), interactivity is an expression of the

"extent to which, in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges refer to even earlier transmissions" (p. 111).

In 1995, Steuer defined interactivity as the "extent to which users can participate in modifying the form and content of a mediated environment in real time" (p. 46). The most recent definition by Gleason and Lane (2009) is that interactivity is the "perception of a degree to which the integration of relevant user experiences, technological features and reactive content results a positive interactivity and satisfaction" (p.17). They also point to the significant contribution of interactivity to people's perceived satisfaction with the communication event, which can vary from user to user. Gleason and Lane (2009, p. 5) note in their study:

> This outcome-based conceptualization of interactivity is ultimately central to the outcome-based perceived satisfaction with the communication event itself. Only the individual receiver can recognize the extent of the perceived interactivity at play, and this varies from user to user.

They claim that individuals perceive satisfaction with communication when they perceive interactivity. In order to establish that in relation to IBIMS uptake, this writer uses this statement to argue the significant relationship between interactivity and communication satisfaction, especially through online system such as IBIMS. This study argues that end users experience OCS when they feel that the IBIMS is interactive and provides more interactivity features to enhance their usage and interaction with the system. The writer therefore proposes the following framework in order to show the relationship between these two variables.

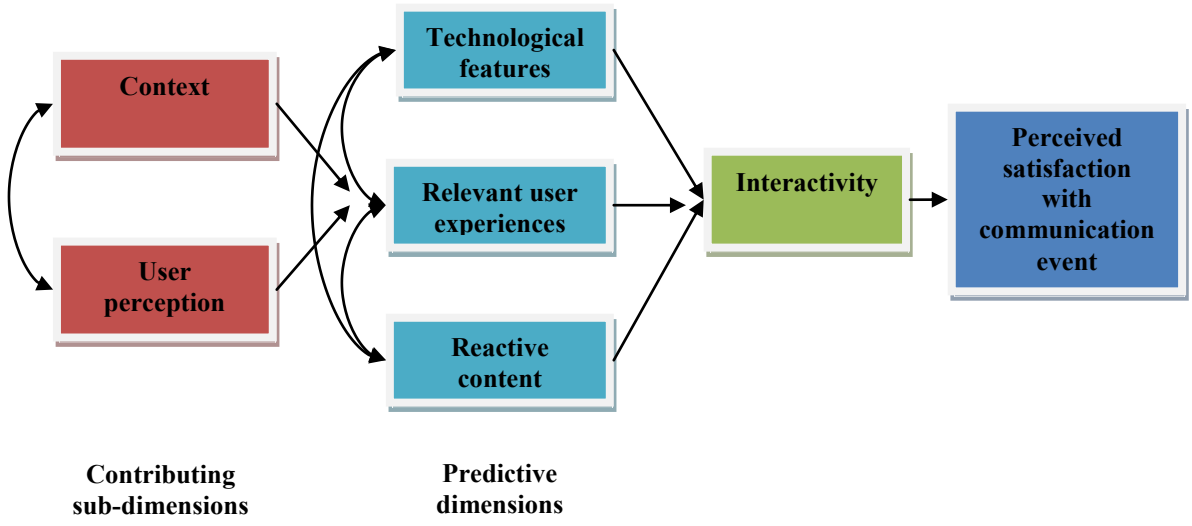
The proposed framework (Figure 3.1) suggests that interactivity features are important in providing OCS when using IBIMS. Here a third hypothesis is proposed: that there is a link between interactivity features and OCS:

Hypothesis 3: Interactivity features (IF) vs. Online Communication Satisfaction (OCS)
H3: There is a positive relationship between Interactivity features and the Online Communication Satisfaction when using IBIMS.

It is proposed here that interactivity features, as an independent variable and use to evaluate OCS. Furthermore the study adopts the key elements proposed by Gleason and Lane (2009) to investigate the impact of interactivity features on OCS when people use IBIMS in the workplace.

According to Outcome Interactivity Theory (Gleason & Lane 2009) as shown in Figure 3.3, the facets of interactivity measure users' perceptions based on three important key elements: technological features, user experience, and reactive content. The next section defines these concepts.

Figure 3.3: The outcome interactivity theory



Firstly, technological features are items of technology used within a system to enhance participation and interaction. They also enhance and provide active facilitation processes to obtain data so that prompt feedback and information can be generated. Examples of these features are user control, communication speed and customisation. Gleason and Lane (2009, p.5) suggest:

> The term *interactive* refers to technological channel features or content elements that *facilitate* an active communication transaction in which these elements act upon or with other technologies and technological features to obtain data or commands, and in response give immediate results or updated information.

In this definition, they highlight the need for technological features, specifically content elements, to enhance interactivity in order to improve communication processes. Additionally, the better quality of interactivity enables technologies such as IBIMS to provide high levels of communication satisfaction among end users. This feature is an important dimension providing significant effects on OCS with positive attitudes towards the IBIMS, intention to use the system, and actual usage of it.

Secondly, user experiences can be measured by the extent to which an individual user responds to and recognizes one or more interactive elements in a system in order to perceive interactivity. Examples of these elements are the system's ability to interact, link with other contents and respond to instructions. Gleason and Lane (2009, p. 20) further comment with regard to relevant user experiences:

> As discussed above, the perception of interactivity depends first on the ability of the user to recognize it. How an individual responds to one or more interactive elements (and the opportunity for potential increases in interactivity they present) ultimately determines the perceived level of interactivity.

Thirdly and finally, reactive content can be defined as elements such as data, information, menu and hyperlinking that facilitate active participation and interaction. The authors indicate that content in system or technology is one of the key factors to construct and influence the perception of interactivity of a particular technology. Gleason and Lane (2009, p.6) state:

> The recognition of content as a key contributing element in the construct enables interactivity to emerge from the confines of a largely interpersonal perspective generally defined by the technology or the user to encompass additional and equally important mass communication dimensions. Content can directly influence the perception of interactivity and resulting communication outcomes in a manner independent of the particular technology or medium used to communicate its messages.

They also believe that how technological features are perceived, as well as user experiences and content, all have a direct impact on the degree of interactivity attained. These authors also claim that there is a positive relationship between interactivity and user satisfaction with communication events. According to Gleason and Lane (2009, p. 18):

> Together, these dimensions mutually influence the receiver's recognition of interactivity, and this recognition is in *reaction* to these influences. Further, this level of perceived interactivity positively influences the perceived level of satisfaction with the communication event by the participant.

All these elements lead them to explain why interactive elements influence user perception and satisfaction when employing communication media in order to measure OCS.

This study seeks to explain the integration of the three key elements noted above in order to develop external variables that can predict whether and how these elements reflect users' satisfaction and acceptance of IBIMS when engaged in online communication. In

the past, scholars have advanced several theories and models of technology acceptance. However, they lacked data on those interactivity features in order to explain OCS in using online systems or IBIMS. Gleason and Lane (2009, p. 21) claim that the significant contribution of Outcome Interactivity Theory lies in constructing a new basis to understand how interactivity is perceived by the user in multiple types of computer-mediated communication. Bridging this gap is significant in showing that interactivity features will enhance end users' interactions through/with communication technologies. Using the interactivity features, the above theory serves as the basis for a suitable conceptual framework and hypothesis that explains users' OCS and attitudes to IBIMS in MRUs. This extends earlier research described above.

3.4.3 Online collaboration elements

This study claims that most of the technology acceptance studies in Malaysia (as discussed in Section 3.3) did not use online collaboration as an external key factor to examine OCS and to predict users' attitudes to systems. Neither did they employ usability and the IS Success Model to measure the influence of system usability and system quality on OCS in the context of online systems. These gaps make it possible for this thesis to integrate technology acceptance, usability and the IS Success Model in constructing a workable conceptual framework to examine the relationship, and examine how these elements have a significant impact on end user' OCS with IBIMS. Online collaboration is also important for creating a community of practice that can collaborate, interact and participate with other sections of an organization, especially in management, administration, teaching, learning, and research. Thus, the writer argues the importance of online collaboration elements in affecting employees' OCS in using online systems, specifically IBIMS.

In order to understand the acceptance of IBIMS and to develop a suitable conceptual framework this study adapts and combines the updated version of DeLone and McLean's IS Success Model with usability as the important online collaboration element. DeLone and McLean's IS Success Model (2003) is one of the most successful models for understanding and empirically measuring acceptance of technology. Usability of the system is also important to determine the quality of online collaboration tools and consequently how users employ it (Koohang & Ondracek 2005).

Further, the combination of three IS quality dimensions (system quality, information quality and service quality) is used to examine the relationships and effects of IS quality with OCS attained when using IBIMS. This study argues that these dimensions play important roles in providing high quality facilitation and enhancement of online collaboration through IBIMS. DeLone and McLean (2003) claim there is a link between system quality and user satisfaction in the context of everyday work (p. 11):

> In contrast to a process model, a *causal* or *variance* model studies the covariance of the success dimensions to determine if there exists a causal relationship among them. For example, higher system quality is expected to lead to higher user satisfaction and use, leading to positive impacts on individual productivity, resulting in organizational productivity improvements.

Added to this, the higher quality of the system to facilitate online collaboration will lead to higher end user satisfaction and use of the system. Thus, this study proposes the hypothesis that facilitating collaboration and OCS are linked by IS quality.

Hypothesis 6: IS Quality to Facilitate Collaboration (Colla) vs. Online Communication Satisfaction (OCS)

H6: There is a positive relationship between IS Quality to Facilitate Collaboration and the Online Communication Satisfaction when using IBIMS.

3.4.4 Usability of the system

The lack of usability features in the system may cause dissatisfaction and frustration for users trying to complete tasks. Inefficiencies also have a direct negative impact on an individual's acceptance of technology when interacting with the system, collaborating with colleagues and exchanging information online. As claimed by Koohang and Ondracek, "usability is the degree to which users easily and effectively use a system" (Koohang and Ondracek 2005, pp. 408-409). According to Preece (2001), usability is important in investigating the success of online system features and to evaluate how satisfied end users are with the system in terms of communication and interaction experience, information design, navigation, and responsiveness.

Koohang and Ondracek (2005) indicate that usability is important in examining the system's features and design, especially for determining ease of use, effectiveness, efficiency and to understand user acceptance of a system. Koohang and Ondracek (2005, p. 418) state:

> First, 12 usability properties have been identified to guide design improvement. These properties are inherent to a usable digital library system and influence user acceptance, enabling users to accomplish tasks easily, effectively, and efficiently. Thus, designers must take these 12 key properties into account during all phases of the digital library's design process.

On this theme, Koohang and Ondracek (2005) measured users' perceptions of usability when accessing digital libraries and found that it plays a significant role in satisfying their needs. Wichansky (2000) also suggests that usability testing is a suitable and important technique with which to examine end users' acceptance of and satisfaction with products and systems. Wichansky (2000, p. 998) writes:

> Usability testing is a widely used technique to evaluate user performance and acceptance of products and systems. It was introduced in the late 1980s and rose to popularity in the past decade. This paper provides a view of the current status of usability testing as a method and describes how it will be used in the 21st century. Although usability testing may not be the most efficient technique for discovery of usability problems, it is a reliable way to estimate quantitatively users' performance and subjective satisfaction with products.

Despite there being different points of view, usability is also a key variable for measuring system specification and users' needs when developing and purchasing a new management system (Robertson 2007). In other words, the above arguments describe the importance of usability with the objective of providing satisfaction with technology acceptance. However, it is evident that studies are lacking on technology acceptance and adoption, especially those that empirically and qualitatively employ usability to measure users' OCS. It is also important to measure the impact of the system's usability on end users' OCS in order to understand the acceptance and use of IBIMS.

This study seeks to understand systems' usability in measuring OCS, which in turn allows the researcher to evaluate its influence on users' acceptance of IBIMS. The main reason for referring to usability (as an online collaboration element) is because it generally contributes to overall user satisfaction in terms of system design and development of collaboration tools. Previous studies also found that usability of the system is one important factor in user satisfaction (Chui et al. 2004) and acceptance of the system (Thong, Hong & Tam 2004). This indicates that usability of the system in this study can potentially benefit OCS, and offer possibilities for observing technology acceptance. An analysis of usability will illustrate a better understanding of OCS in predicting users' acceptance of IBIMS. For this reason the study proposes another hypothesis where there is a link between usability and OCS:

Hypothesis 4: Usability (USA) vs. Online Communication Satisfaction (OCS)

H4: There is a positive relationship between Usability and the Online Communication Satisfaction when using IBIMS.

3.4.5 Information system quality (IS Quality)

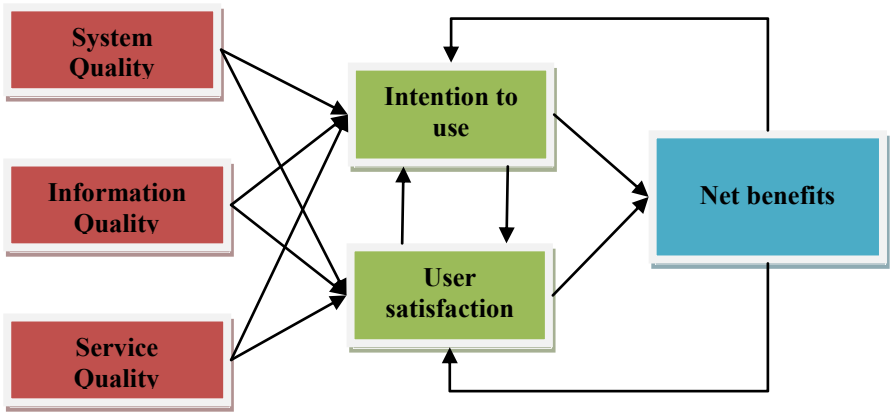
Technology acceptance in organizations is driven by a combination of IS and communication technology that aims to deliver quality of service to employees. In order to study the acceptance of technology, users' perceptions of the quality of the systems should be considered. This study argues that users' perceptions may positively influence satisfaction and attitudes towards uptake it in various kinds of organizations. As stated by DeLone and McLean (2008, pp. 23-24): "For example, in one instance a high-quality system will be associated with more use, more user satisfaction, and positive net benefits". It is necessary to understand whether IS quality dimensions influence users to accept systems and obtain a positive OCS through IBIMS. In this respect, the study can also understand the benefits of IS quality dimensions to develop competent online collaboration systems so that universities can accommodate collaboration platforms in staff development, especially by sharing experiences and knowledge.

The main reason for using IS quality as an online collaboration element in evaluating OCS is because the quality dimensions in the IS success model contribute to overall user satisfaction and system use for individuals and the organization (DeLone & McLean 1992). DeLone and McLean (2003, p. 23) comment that, as was true in the original formulation of the D&M Model, "use" and "user satisfaction" are closely interrelated. "Use" must precede "user satisfaction" in a *process* sense, but positive experience with "use" will lead to greater "user satisfaction" in a *causal* sense. Similarly, increased "user satisfaction" will lead to increased "intention to use," and thus "use". It is shown that

positive use of IBIMS among employees in research universities contributes to user satisfaction in order to increase employees' positive attitudes towards use and intention to use the system in daily tasks.

Previous studies have indicated the importance of IS quality to enhance user satisfaction and positively influence the acceptance of systems (DeLone & McLean 2003; Petter, DeLone & McLean 2008). Here the updated version of DeLone and McLean's IS Success Model is shown in Figure 3.4. It has three quality dimensions: information quality, system quality and service quality.

Figure 3.4: The updated DeLone and McLean IS success model (2003)



These three components are theoretically significant in their ability to gauge intention to use the system, as well as to provide user satisfaction. These arguments are supported by previous studies where most researchers used this model to evaluate system usage and acceptance in any type of business environment (DeLone and McLean 2003; Lin and Lee 2006; Lin, Fan & Zhang 2009; Petter, DeLone & McLean 2008).

Lin and Lee (2006) and Lin, Fan and Zhang (2009) indicate that IS quality dimensions play important roles and can contribute to the success of WKCs and to online communities being accepted. According to these authors, system quality is the degree to which web sites and software tools execute their responsibilities. Lin, Fan and Zhang (2009) claim that system quality can be measured by looking at four things: accessibility, navigation, entertainment, and hyperlinks. Lin and Lee (2006) and Lin, Fan and Zhang (2009) also claim that information quality refers to the overall usefulness of information in the system. They and Palmer (2002) contend that information quality can be evaluated based on relevance, currency, reliability, scope and format. They also indicate that service quality serves as a key factor in influencing end users' operating of systems, and provides a significant contribution to user satisfaction when using online communities. They identified that IS quality dimensions influence user satisfaction and system usage. These three quality dimensions reflect the importance of IS quality in successful implementation of IBIMS. Because of the potential contribution of these dimensions to the individual user's satisfaction and system usage, this study uses IS quality dimensions to examine OCS with IBIMS.

Consequently this study proposes a hypothesis that a link exists between IS quality and OCS. It is worded as follows:

Hypothesis 5: IS Quality (ISQ) vs. Online Communication Satisfaction (OCS)

H5: There is a positive relationship between IS Quality and the Online Communication Satisfaction when using IBIMS.

3.4.6 Online communication satisfaction

Abercrombie and Longhurst (2007) define communication as "[t]he transfer of messages from one party to another" (p. 69). These communication processes function to transfer

data, information or messages from one place to another and between individuals. This process can occur using various types of old and new media. New media are media of communication that can access and distribute messages based on digital technology and access to the Internet (Abercrombie & Longhurst 2007). The Internet has introduced a new platform to individuals and organizations so that they can communicate through new media technology such as e-mail, online forums, social networking systems and Internet-based systems.

This study concerns with the importance of communication satisfaction in online environments, especially users' communication satisfaction with Internet-based systems. In 1977, Downs and Hazen stated that communication satisfaction is important to examine and determine how individuals discover the relationship between communication and satisfaction. They used a Communication Satisfaction Questionnaire (CSQ) with eight key factors (communication climate, supervisory communication, organisational integration, media quality, co-worker communication, corporate information, personal feedback and subordinate communication) to determine individual communication satisfaction (Downs & Hazen 1977). A year later (1978) Hecht defined communication satisfaction as the positive reinforcement that fulfills positive communicative expectations in an organization. Two decades later, Mount and Back (1999) defined communication satisfaction as individual satisfaction with communication which is related to the individual's satisfaction and position in the workplace.

During the last two decades, studies in organizational communication and human communication have discussed the needs of communication satisfaction and investigated employees' communication satisfaction (Downs & Hazen 1977; Sparks 1994). They indicate the importance of research in understanding the effectiveness of communication in

generating communication satisfaction. Downs (1988) claims that a significant correlative relationship exists between communication satisfaction, job performance and job satisfaction. These studies have been done in last two decades, but this study stresses the importance of communication satisfaction in order to understand online communication through IBIMS. In this respect, communication satisfaction becomes important to evaluate the acceptance of communication media and new media technology from OCS perspectives (Anderson & Emmers-Sommer 2006; Pi et al. 2008; Pornsakulvanich, Haridakis & Rubin 2008).

Further, Chang (2010) stresses that user satisfaction should be studied and explored to ensure the success of several applications and systems from web-based communication perspectives. On the other hand, the measurement of users' satisfaction contributes significantly to our understanding of individual users' acceptance and adoption of technologies in the workplace. Wang (2012) claims that satisfaction is the key motivation element to developing a positive attitude and intention to use certain technologies such as online banking. Park, Son and Kim (2012, p. 383) also indicate that user satisfaction is one of the main motivations for constructing an adequate indicator of acceptance of web-based training:

> The results demonstrate that the proposed model successfully accounts for how construction professionals come to accept WBT. In particular, it was found that user satisfaction is an adequate indicator of acceptance of WBT in the construction industry, hence that to facilitate the acceptance of WBT, a construction firm should focus on the satisfaction of its employees with WBT.

This theme has been commented on by Mitchell et al. (2012) and Bhattacherjee (2001), who state that user satisfaction has a positive relationship in determining a user's attitude and intention to use and adopt new IT applications or systems. Ainin, Bahri and Ahmad

(2012) claim the need for further analysis in measuring end users' satisfaction to assess the success of IS implementation, especially the interaction between the user and a system's user interface. Al-Busaidi and Al-Shihi (2012) indicate the importance of satisfaction to create and develop individual users' intentions to use a LMS. Consequently, these studies illustrate the direct and indirect relationships between satisfaction and technology acceptance and usage among end users.

This study focuses on users' OCS in order to measure their attitude to and intention to use IBIMS within a particular context of implementation and activity. The study employs the above key elements of CSQ to develop a suitable yardstick for assessing individual OCS in using IBIMS. The study adapts CSQ as its basic foundation because it is the most widely used method for examining communication satisfaction, and Chang (2010) reveals that CSQ is absolutely consistent and fit to determine end users' satisfaction with web-based communication.

This thesis proposes a hypothesis that there is a link between OCS and attitude to use and intention to employ IBIMS:

Hypothesis 7: Online Communication Satisfaction (OCS) vs. Attitude towards Use (ATU)
H7: There is a positive relationship between Online Communication Satisfaction and Attitude regarding the IBIMS.

Hypothesis 8: Online Communication Satisfaction (OCS) vs. Intention to Use (ITU)
H8: There is a positive relationship between Online Communication Satisfaction and Intention to use IBIMS.

3.4.7 Attitude towards use and intention to use IBIMS

Davis (1989), with reference to TAM, explains that end users' acceptance of new technology and systems is strongly influenced by their attitudes and behaviour. He

indicates that attitude towards use has a direct effect on intention to use, and actual use, of new technology. In other research, Chang and Chou (2007), and Oye, Iahad and Ab. Rahim (2012) claim that attitudes of individual people will affect behavioural intention and actual behaviour. Previous studies (Castaneda, Leiva & Luque 2007; Kim, Lee & Law 2007; Pynoo et al. 2012) have also used TAM to understand people's attitudes and intentions to use new technology. In addition, Neill and Richard (2012) indicate that the behavioural intention will significantly and positively influence users to access the Internet portal.

Ramayah and Suki (2006, p. 8) emphasize the importance of attitude in shaping user intention, technology acceptance and technology adoption in teaching and learning:

> Attitude is also positively related to the intention to use. It is also further shown that attitude partially mediates the relationship between PEU, PU and intention which goes to show the importance of attitude in technology adoption. Thus, it is vital for the academic institutions to indoctrinate the importance of using technology in the process of learning and to integrate the use of mobile PC into the classroom teaching.

In another study, Ramayah et al. (2009) indicate the need for a favourable attitude in order to stimulate a user's intention to use the Internet for stock trading. This is in line with Davis, Bagozzi and Warshaw (1989), who state that there is a positive relationship between attitude towards use and actual use of the online system. They further claim that users' attitudes in using certain systems will have a significant effect on their intentions. On this theme, Castaneda, Leiva and Luque (2007) and Kim, Lee and Law (2007) suggest there is a positive relationship between end users' attitudes regarding use and intention to use a specific system. Lim and Ting (2012, p. 55) state that attitudes to use have a positive and significant relationship with intention to use the system. They state:

> Thus, the significant role of attitudes in shaping behavioural intention has been visible when a relationship between attitude and behavioural intention is studied. The assumption that attitude (sic) towards online shopping have a strong, positive direct influence on intention to shop online is reinforced when the coefficients of attitude is examined (refer Figure 2).

The above points of view explain an empirical and significant relationship between users' attitudes and intention to use the system. Hence, this study proposes a hypothesis that there is a link between attitude towards use and intention to use IBIMS:

Hypothesis 9: Attitude towards Use (ATU) vs. Intention to Use (ITU)
H9: There is a positive relationship between Attitude Towards and Intention to use IBIMS.

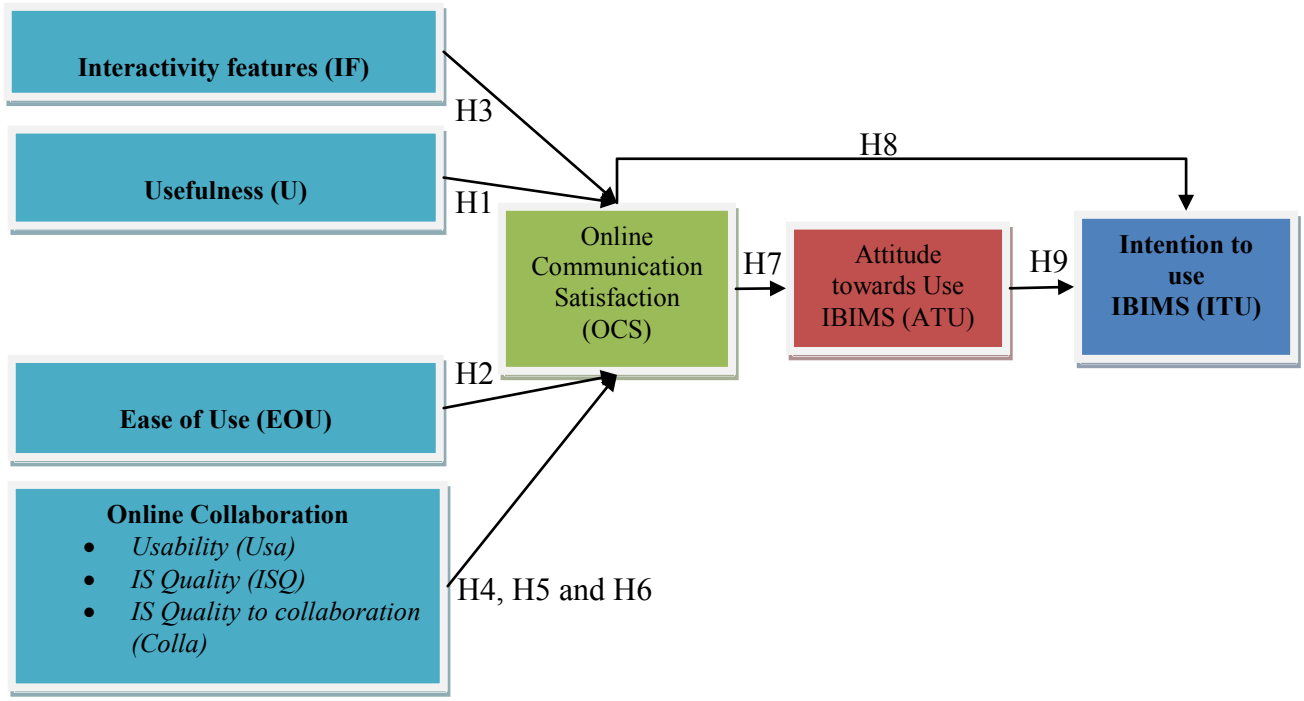
3.5 Summary of research hypotheses

In this study, the researcher tests the effects of usefulness, ease of use, interactivity features and online collaboration elements with the OCS when employees use IBIMS at MRUs. The various relationships and important information are summarized in Table 3.1. All these independent variables can reveal a positive relationship with dependent variables when examining individuals' acceptance of IBIMS technology. The combinations of these key variables (usefulness, ease of use, interactivity features, usability, IS quality and OCS) can be analyzed in the context of how IBIMS are utilized at MRUs, especially in management, administration, teaching, learning and research management. The items developed in the questionnaire (Chapter 4) support all of the following hypotheses.

Table 3.1: Summary of research hypotheses

Group	Hypotheses	Independent Variable	Dependent Variable
Ease of use and usefulness	H1	Usefulness (U)	Online Communication Satisfaction (OCS)
	H2	Ease of Use (EOU)	Online Communication Satisfaction (OCS)
Interactivity features	H3	Interactivity features (IF)	Online Communication Satisfaction (OCS)
Online collaboration elements	H4	Usability (USA)	Online Communication Satisfaction (OCS)
	H5	IS Quality (ISQ)	Online Communication Satisfaction (OCS)
	H6	IS Quality to Collaboration (Colla)	Online Communication Satisfaction (OCS)
Online communication satisfaction	H7	Online Communication Satisfaction (OCS)	Attitude Towards Use (ATU)
	H8	Online Communication Satisfaction (OCS)	Intention to Use (ITU)
Attitude	H9	Attitude Towards Use (ATU)	Intention to Use (ITU)

Figure 3.5: Summary of research hypotheses



3.6 Summary

This chapter has discussed important issues concerning the study of technology acceptance, usage and change from various perspectives. It has also described the significance of the study in examining the impact of ease of use and usefulness, interactivity features, usability of the system, and IS quality dimensions on end users' OCS. It is important to resolve several research gaps in understanding technology acceptance and usage of online systems in MRUs. It is argued here that technology acceptance and usage in HE institutions can best be evaluated when several models and concepts are integrated. Additionally, it is claimed that the proposed variables are important in examining end users' OCS, and to understand why and how users deploy IBIMS in their universities. Finally, the conceptual framework and hypotheses developed here are important to create the appropriate methodology and measurement tools, which are explained in Chapter 4.

Chapter 4

The Mixed Method Research Design and Process

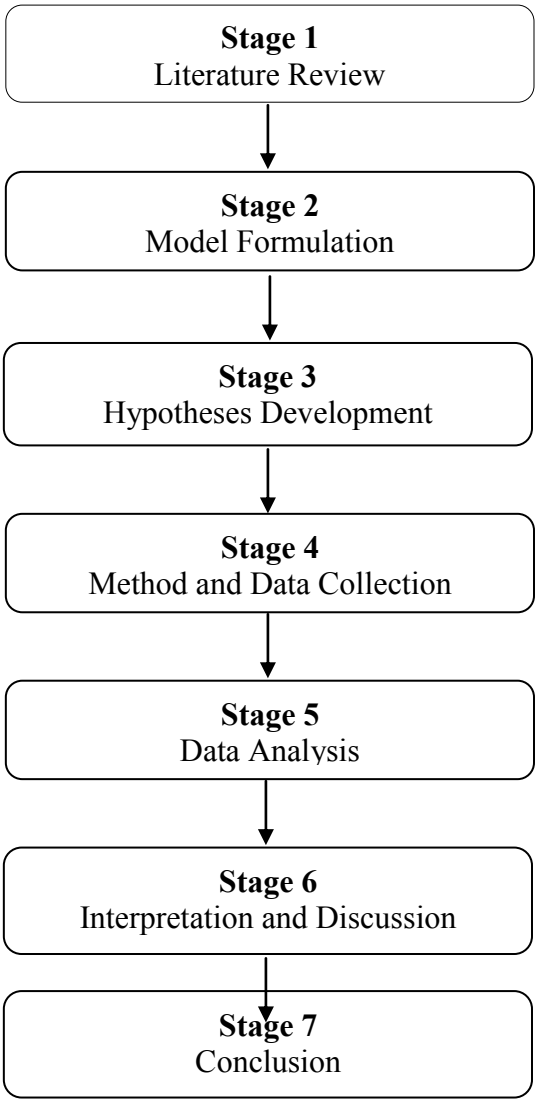
4.0 Introduction

This chapter presents a detailed explanation of the research design and methodology used in this study. The mixed methods have been chosen to examine the relationships between variables where research university employees use IBIMS in Malaysia. First, the quantitative method utilises a survey technique with a questionnaire to examine the use of IBIMS. Second, the qualitative method uses in-depth interviews to understand a range of people's feelings and experiences, to explore the topic, and to support and triangulate the quantitative results. These approaches are chosen in order to better understand and achieve the research objectives. The chapter begins with an introduction to the research process, followed by the mixed methods sequential explanatory approach. The first phase is the quantitative research approach, comprising instrument development, description of participants and procedures, pilot test, and the reliability and validity of the study. Then the second phase is outlined in terms of the qualitative approach for the in-depth interviews, including comments on question development, conduct of interviews, and transcribing, coding and analysing the data. The chapter ends with a brief summary of the main points discussed.

4.1 Research process

The research process is a linear one that investigates the topic logically and more effectively. This study involves seven stages of the research process (Figure 4.1).

Figure 4.1: Overview of the research process



The research process undertaken is as follows:

Stage 1: This phase involves desktop research to find more information documented in already published studies to understand and identify the issues for further analysis of the use and acceptance of IS and Internet-based systems. This stage provides background information about various issues including ICT, IBIMS, HE and MRUs (see Chapter 2).

Stage 2: This stage develops a model of the study based on the specific factors influencing and affecting OCS in a specific setting and group. An information model and theory were

used to develop a basic model or framework in order to answer the research objectives (see the discussion in Chapter 3).

Stage 3: This stage describes and explains the hypotheses' development for this study based on the above model and framework. This stage is discussed in detail in Chapter 3.

Stage 4: This stage explains the methodological approaches and data collection. Here, a questionnaire was developed to collect data. This study also consists of in-depth interviews of employees to get answers to specific questions and to support the research objectives.

Stage 5: This stage explains the analysis and results from the data obtain in both methods: i.e., quantitative (survey with questionnaire) and qualitative (in-depth interview and open-ended questionnaire). Chapters 5, 6 and 7 discuss the data analysis and results.

Stage 6: This stage is discussed in detail in Chapter 8: it incorporates the findings of stage 5 with the literature review undertaken in Chapters 2 and 3 in order to explain and interpret the relevant factors for using IBIMS at MRUs.

Stage 7: The last stage in the research process explains the conclusions by interpreting what the quantitative and qualitative results mean. Chapter 9 covers details of this stage.

4.2 Methodology of the study

As discussed in Chapter 3, most studies on technology acceptance have employed a quantitative survey methodology. However, the mixed methods approach has recently been used by IS researchers to understand technology acceptance (Wu 2012). A mixed methods approach refers to the combination of quantitative and qualitative techniques in collecting

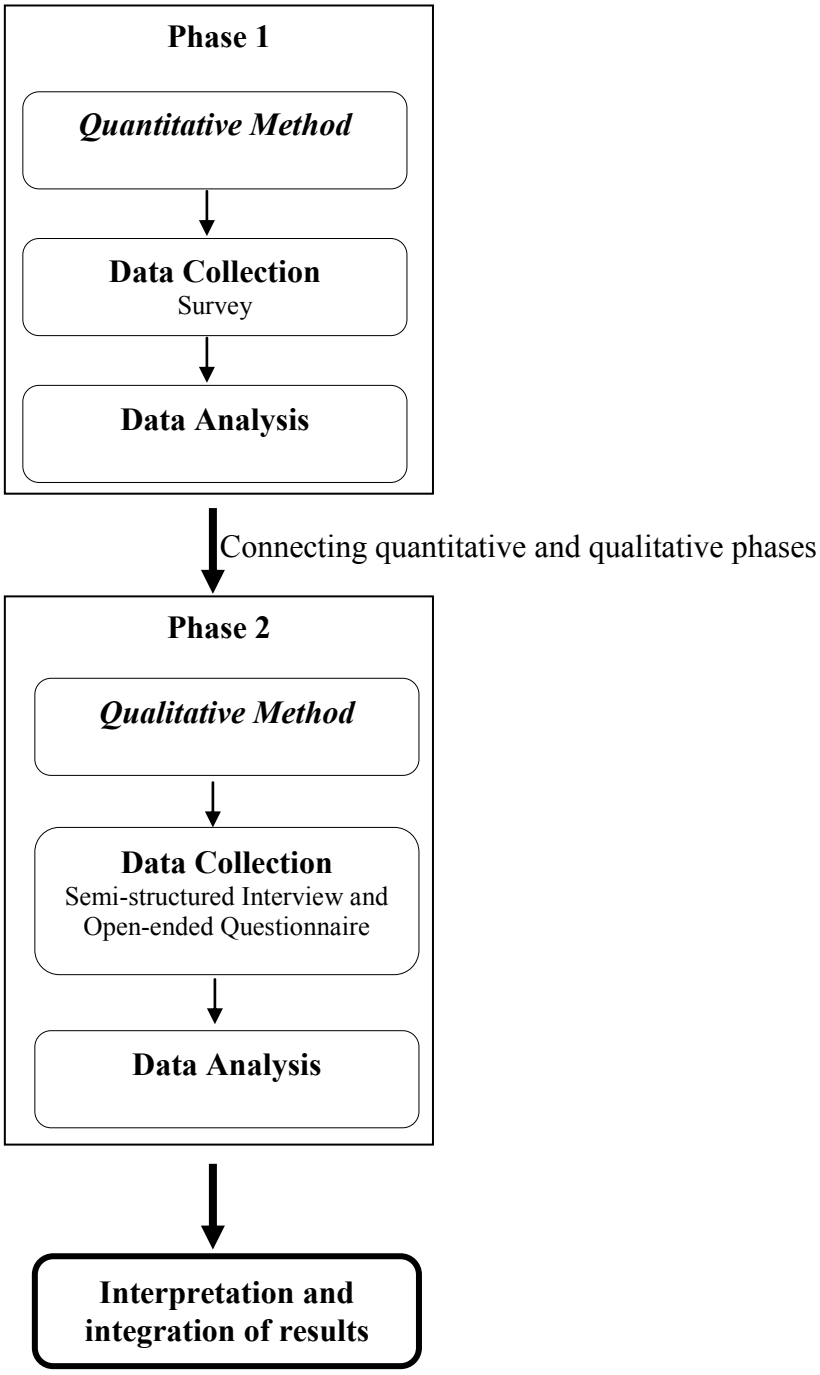
and analysing data for a single study (Johnson, Onwuegbuzie & Turner 2007; Tashakkori & Creswell 2007). Furthermore the mixed methods strategy has been used by researchers in several disciplines and knowledge areas to answer research questions and objectives (Tashakkori & Creswell 2008), such as social sciences and health sciences (Ivankova, Creswell & Stick 2006).

According to Tashakkori and Teddlie (2003), there are forty mixed methods research design strategies. However, Creswell et al. (2003) claim that one of the most popular is the mixed method sequential explanatory design (see Figure 4.2 below). This method has two distinct phases (Ivankova, Creswell & Stick 2006). A researcher collects and analyses quantitative data, followed by a qualitative investigation. Qualitative data is important to explain or support the quantitative results obtained in the first phase. The qualitative phase builds on the quantitative phase and they are integrated during the intermediate stage of the study (Ivankova, Creswell & Stick 2006). The purpose of this approach is to provide qualitative data and findings, in order to understand the research issues, problems and objectives.

4.3 The mixed methods sequential explanatory research approach

This study uses the mixed method sequential explanatory approach to answer the research questions. In addition, it is important to describe the process in designing the strategies and procedures of the study.

Figure 4.2: The mixed methods sequential approach



As shown in Figure 4.2 above, the approach has two distinct phases. In the first phase the researcher uses a quantitative method to collect the data (via, in this case, a survey) and analyses the numerical data to answer several hypotheses based on the framework outlined in Chapter 3. In this approach, the positivist paradigm is used to answer the research questions and objectives based on the measurement of hypotheses for examining the

relationships between variables. In the second phase the researcher uses a qualitative collection method involving in-depth interviews and open-ended questionnaire to collect textual data and analyse the important themes. Data and findings from this approach provide a constructivist paradigm perspective that explains and supports quantitative numerical data. The combination of these two approaches makes it possible to analyse issues in detail and make valid inferences or conclusions. The two distinct phases will be discussed in the following sub- sections.

4.4 Phase 1: Quantitative research method

A quantitative method was used to examine the impact of usefulness, ease of use, interactivity features, usability, IS quality and the importance of IS quality to collaboration with OCS when research university staff use IBIMS.

The first stage involved a questionnaire to gather empirical data so that the effects of the above variables on OCS with the use of IBIMS could be investigated. A questionnaire was chosen for data collection because most previous studies have used this technique to evaluate the acceptance of IS (Davis 1989; Kim, Lee & Law 2007; Lin & Lee 2006; Morris & Dillon 1997; Premkumar & Bhattachherjee 2008). This method is popular because the results can be generalised to the wider population and used to measure the perceptions and behaviours of people who use IBIMS in the workplace. The following section describes the quantitative approach for these processes.

4.4.1 Participants and procedures

The empirical data in this study was collected through a field survey carried out among employees at four MRUs. Data for the study was collected via a paper-based survey administered by the researcher in the following MRUs: UM, USM, UPM and UKM.

Research universities were selected because they use Internet-based IS throughout their administrative, teaching and learning, and research capacities in order to manage specialised information functions officially suggested by the Malaysian government.

Data for the survey was gathered from 240 respondents through face-to-face interviews with a paper-based survey for each university's employees. Paper-based surveys through such interviews have several advantages: they provide the best response rates; the interviewer can get detailed responses; and they permit the longest interviews (Gunter 2002). VanVoorhis and Morgan (2007, p. 48) suggest that the reasonable number of participants or general rule of thumb is not less than 50 to examine relationships, for a correlation and regression. They also state that 200 participants is fair to conduct factor analysis (VanVoorhis and Morgan 2007, p. 49). In order to conduct this study, this general rule of thumb is used to derive the number of respondents above. This study focuses on random purposeful sampling among administrative officers (professional and management group) and academic staff (lecturers) in MRUs. In this sampling procedure, the proportion of the category of academics such as professor, associate professor and lecturer was not further identified. This method is important as it provides interesting inferences and increases the statistical validity of the sample. These respondents were selected because they spend significant amounts of time using several types of IBIMS in their routine working environment and daily tasks.

4.4.2 The instrument development

The instrument for this study was a questionnaire. The scale items for the instrument were developed using multiple-item scales adapted from the many studies on technology acceptance, IS quality, communication satisfaction and interactivity, as described in the

literature review. As presented in Appendix 3, the items for the instrument were created, adapted and modified from previous studies to suit the context of IBIMS use in MRUs.

The statements given in the instrument are grouped into six sections and all the scaled items measured using a five-point Likert scale to measure the level of agreement, as shown in Table 4.1. The first section of the instrument that measures perceived usefulness and ease of use was adapted from Davis (1989) in TAM. Each variable consists of six items measuring the acceptance of IBIMS as indicated in the questionnaire. The items were examined for overall usefulness and ease of use regarding IBIMS. This study was adapted for all the items in TAM because these two predictors are widely used in measuring technology acceptance and usage as claimed by Legris, Ingham and Collerette (2003), Premkumar and Bhattacherjee (2008), and Pynoo et al. (2012).

The second section examines interactivity features. All the scale items in this section are new and their development based on the Outcome Interactivity Theory suggested by Gleason and Lane (2009). This section examines interactivity features based on three dimensions: technological features, user experiences and content. This section consists of twelve items used to measure interactivity features on the use of IBIMS. For example user control, communication speed, ability, connectedness, accessibility, and so on. This study uses Outcome Interactivity Theory because there is a relationship between interactivity and user satisfaction with communication events (Gleason & Lane 2009).

The third section measures online collaboration based on two main elements, usability and IS quality, which incorporate system quality, information quality and service quality. All the items for this section were adapted and reworded from a usability measurement tool developed by Koohang and Ondracek (2005). This is because the items originally from

Koohang (2004), are highly valid and able to examine end users' perceptions about usability of systems (Koohang & Ondracek 2005). In addition, all the items for IS quality were adapted from the IS Success Model employed in older studies by Lin and Lee (2006) and Kim, Lee and Law (2007). This study uses again the items in the IS Success Model (DeLone & McLean 2003) because it has been validated in studies by Lin and Lee (2006) and Kim, Lee and Law (2007). Overall, thirteen items are used to measure usability, and eighteen items for the IS quality concerning use of IBIMS.

The fourth section relates to questions about OCS in organizations utilising IBIMS. This section adapts and rewords some of the items from the CSQ developed by Down and Hazen (1977) to create new items, in order to examine OCS with IBIMS. These items are widely used in measuring communication satisfaction, and the consistency and reliability of the items are highly significant in measuring OCS (Chang 2010).

The fifth section asks questions about attitudes towards use, intention to use and actual use of IBIMS. Six items have been adapted from Castaneda, Leiva and Luque (2007) and Kim, Lee and Law (2007) to assess attitudes towards use. Items regarding intention to use IBIMS were based on items from Castaneda, Leiva and Luque (2007) and Tung, Chang and Chou (2007). All items were chosen because these studies confirmed their validity and reliability. The final section documents respondents' characteristics such as age, ethnicity, gender, position (such as occupation, income), education level, experience using computers and the Internet, and perception of computer and Internet skills.

Table 4.1: Five-point Likert Scale

Statements	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Scales/Codes	1	2	3	4	5

4.4.3 Pilot test

A pilot test is also known as a "feasibility test" (Lancaster, Dodd & Williamson 2004) and is generally a small-scale test to measure or collect data and information before a larger study is undertaken. This test ensures that the research instrument and procedures are well designed and function properly. Furthermore, a pilot test can highlight several problems and limitations when trying to generate good information (van Teijlingen & Hundly 2001). The pre-testing phase of a particular research instrument and measurement tool is very beneficial to a questionnaire or interview schedule (Baker 1994, pp. 182-183). The purpose of the pilot test is to measure the validity of the measurement tool (questionnaire) and procedures.

Lancaster, Dodd, and Williamson (2004) state that the pilot test can describe the goals and objectives and refine further the methodological rigour, validity and reliability of an investigation. In order to develop a good quality measurement tool, this study conducts a pilot test to check the instructions and languages given to respondents, so that it operates correctly and validates the research process. The study's particular instrument was tested on Malaysian postgraduate students in Adelaide. Most of these were staff and academics originally from various universities in Malaysia. They were experienced in using many types of IBIMS in their working environment.

The result of Cronbach's alpha of the reliability test for each section in the pilot instrument is between 0.733 and 0.931. This shows that the results do exceed the minimum value of acceptability in the social sciences, 0.60 (Hair et al. 1998). In order to enhance the quality of instruction and information in the instrument, some items were revised and reviewed,

such as the sequence of scales in Five-point Likert scale, based on comments and feedback from respondents involved in the pilot test before these items were used in the major study.

4.4.4 Data collection and analysis

When the pilot test was completed the researcher conducted a formal data collection project through a questionnaire survey for the main study in Malaysia. The survey was completed in four MRUs as stated in Section 4.4.1. Data collection took place within a two-month period from 22 February, 2010 to 18 April, 2010. The latest research university to be named in Malaysia – UTM – was excluded from this study because it became a research university after the fieldwork timeframe.

The research was conducted by the researcher in person. A considerable effort was made to meet respondents face-to-face at their workplaces in order to increase the response rate. The researcher did not use telephone calls to field questions, mail questionnaires or online survey. Questionnaires were distributed through face-to-face meetings with all respondents who used IBIMS at their workplaces or campuses directly. Questionnaires included an information sheet, an approval letter from the Director-General, Department of Higher Education, MOHE Malaysia, the questionnaire itself, and instructions about how to return the questionnaire and envelope. These documents were important for all respondents in order to explain the objectives of the survey so that respondents understood the purpose of the work.

The researcher visited each research university for two weeks based on the following timetable:

- UKM – 22 February, 2010 to 7 March, 2010
- UPM – 8 March, 2010 to 21 March, 2010

- UM – 22 March, 2010 to 4 April, 2010
- USM – 5 April, 2010 to 18 April, 2010

The researcher made subsequent personal visits to each university and distributed the questionnaire among academics and officers. Sometimes the researcher conversed with some respondents when they needed more information about the objectives of this survey, the types and examples of IBIMS, the information sheet and ethics approval (from the MOHE Malaysia and from the University of Adelaide). The researcher allowed all respondents to answer and return questionnaires in sealed envelopes put on notice boards outside their offices. After two to three days, the questionnaires were picked up by the researcher with a second visit to respondents' workplaces/offices. In order to increase the response rate, the researcher visited respondents' workplaces to check the questionnaire responses on the notice board.

The participation from respondents was on a voluntary and convenience basis. The response rate was very high because respondents preferred to answer paper-based questionnaires rather than in other formats. Some respondents suggested and encouraged the researcher to meet individual academics and executives directly for face-to-face conversations because this type of survey technique is easy to follow up with staff members.

Table 4.2: Summary of data collection at MRUs

University	Questionnaire Returns	Response Rate (%)
Universiti Malaya (UM)	58	96.67
Universiti Sains Malaysia (USM)	51	85
Universiti Kebangsaan Malaysia (UKM)	54	90
Universiti Putra Malaysia (UPM)	60	100
Total	**223**	**92.92**

Table 4.2 summarizes the data collection at the universities and the response rates. The overall response rate for this study was very high (92.92%) because the researcher made personal visits to each university and gave questionnaires directly to the participants. The response rate in UPM was the highest (100%), followed by UM (96.67%), UKM (90%) and USM (85%).

4.4.5 Validity

Validity analysis is a way of confirming and explaining the rigour of research processes and their findings (Roberts, Priest & Traynor 2006). In this study, a factor analysis was conducted in order to examine the validity of the construct of the measurement scales. This analysis was done to confirm and validate the respondents' perceptions of the accuracy of the concept being measured (Roberts, Priest & Traynor 2006). In order to ensure the validity of the item, Hair et al. (1998) and Straub et al. (2004) suggest that the factor loading value should be at least load 0.4, and no cross-loading of items above 0.4. Furthermore, the validity analysis in this study was performed and described in the following sub-topic. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity were employed to examine the suitability of factor analysis and correlation of the variables within certain factors. The output of the validity analysis based on the KMO, Bartlett's test and factor loading value of the component analysis are explained in the following section.

Usefulness (U) – Validity

Table 4.3 shows the results for the factor analysis of usefulness and it indicates one factor solution with the eigenvalues greater than 1, thus suggesting unidimensionality. This result demonstrates that the factor loading of usefulness is valid because the loading values of the items exceed the cut-off level of 0.4 and no cross-loading, while the variance explained

was 81.605% of the total. The KMO was 0.909 which indicates sufficient inter-correlations and the Bartlett's test for sphericity was significant (Chi-Square = 1406.231, $p<0.01$). This outcome further explains that all the items for usefulness are consistent and valid for the next level of analysis.

Table 4.3: Factor loading of usefulness

Item	Factors 1
USEFUL1	**0.878**
USEFUL2	**0.900**
USEFUL3	**0.925**
USEFUL4	**0.921**
USEFUL5	**0.881**
USEFUL6	**0.915**

Ease of use (EOU) – Validity

Table 4.4 summarizes the factor analysis for ease of use. The factor analysis shows a one factor solution with the eigenvalues greater than 1 and suggesting unidimensionality. This finding indicates that the factor loading for ease of use is valid because the loading values of the items exceed the cut-off level of 0.4 and no cross-loading, while the total variance explained was 81.605% of the total variance. The KMO was 0.909, which indicates sufficient inter-correlations, and the Bartlett's test for sphericity was significant (Chi-Square = 1123.801, $p<0.01$). This result explains that all the items for ease of use are consistent and valid for the next level of analysis.

Table 4.4: Factor loading of ease of use

Item	Factors 1
EOU7	**0.851**
EOU8	**0.826**
EOU9	**0.871**
EOU10	**0.893**
EOU11	**0.902**
EOU12	**0.910**

Interactivity Features (IF) – Validity

Table 4.5 summarizes the results for factor analysis done on the interactivity features. It is evident that the two factors' loading for interactivity features is valid because the loading values of the items exceed the cut-off level of 0.4 and no cross-loading over 0.4, while the variance explained was 68.713% of the total. The KMO was 0.937, which indicates sufficient inter-correlations, and the Bartlett's test for sphericity was significant (Chi-Square = 1936.134, $p<0.01$). However, the researcher decided to remove one item (TF13) because there is only one item to represent one component. Therefore, all the items for factor loading 1 are consistent and valid for the next level of analysis.

Table 4.5: Factor loading of interactivity features

Item	Factors	
	1	2
TF13	0.072	**0.960**
TF14	**0.773**	-0.008
TF15	**0.726**	0.022
TF16	**0.733**	0.197
UE17	**0.799**	0.082
UE18	**0.818**	0.171
UE19	**0.751**	0.217
UE20	**0.791**	0.335
CON21	**0.839**	0.047
CON22	**0.858**	-0.039
CON23	**0.858**	0.134
CON24	**0.802**	0.302

Usability (USA) – Validity

Table 4.6 tabulates the factor analysis for usability. The factor analysis shows a one factor solution with the eigenvalues greater than 1 and suggesting unidimensionality. This result explains that the factor loading for usability is valid because the loading values of the items exceed the cut-off level of 0.4 and no cross-loading, while the total variance explained was 62.014% of the total variance. The KMO was 0.931, thus indicating sufficient inter-correlations, and the Bartlett's test for sphericity proved to be significant (Chi-Square = 1737, $p<0.01$). It is therefore evident that this result confirms that all the items for usability are consistent and valid for the next level of analysis.

Table 4.6: Factor loading of usability

Item	Factors 1
USA25	**0.820**
USA26	**0.862**
USA27	**0.840**
USA28	**0.780**
USA29	**0.755**
USA30	**0.783**
USA31	**0.809**
USA32	**0.786**
USA33	**0.762**
USA34	**0.707**
USA35	**0.747**

Information system quality (ISQ) – Validity

Table 4.7 presents the results for factor analysis concerning IS quality. Here the two-factor loading for this variable is valid because the loading values of the items exceed the cut-off level of 0.4 and no cross-loading over 0.4, while the variance explained was 65.821% of the total. The KMO was 0.933, which indicates sufficient inter-correlations, and the Bartlett's test for sphericity was significant (Chi-Square = 3286.409, $p<0.01$). However, the researcher decided to create two variables based on the loading values: IS quality for

(1) factor loading 1, called "IS Quality (ISQ)"; and (2) factor loading 2 called "IS Quality to facilitate collaboration (Colla)". All the items in factor loading 2 are grouped together because the questions related to the effect of system quality, information quality and service quality on online collaboration. In terms of factor loading values, all the items for both variables are consistent and valid for the next level of analysis.

Table 4.7: Factor loading of information system quality

Item	Factors	
	1	2
SYSQ36	**0.651**	0.370
SYSQ37	**0.687**	0.331
SYSQ38	**0.739**	0.253
SYSQ39	**0.740**	0.312
SYSQ40	**0.749**	0.383
SYSQ41	0.388	**0.806**
INFOQ42	**0.643**	0.365
INFOQ43	**0.699**	0.389
INFOQ44	**0.685**	0.299
INFOQ45	**0.752**	0.335
INFOQ46	**0.811**	0.139
INFOQ47	0.289	**0.843**
SERVQ48	**0.720**	0.253
SERVQ49	**0.741**	0.322
SERVQ50	**0.794**	0.313
SERVQ51	**0.748**	0.213
SERVQ52	**0.765**	0.273
SERVQ53	0.249	**0.871**

Online communication satisfaction (OCS) – Validity

Table 4.8 outlines the factor analysis for OCS. The factor analysis shows a one factor solution with the eigenvalues greater than 1 and suggesting unidimensionality. This finding demonstrates that the factor loading for communication satisfaction is valid because the loading values of the items exceed the cut-off level of 0.4 and no cross-loading, while the variance explained was 64.462% of the total. The KMO was 0.934, which indicates sufficient inter-correlations, and the Bartlett's test of sphericity was significant (Chi-Square = 2317.821, $p<0.01$). Building on this, the result confirms that all items for OCS are consistent and valid for the next level of analysis.

Table 4.8: Factor loading of online communication satisfaction

Item	Factors 1
CS54	**0.818**
CS55	**0.854**
CS56	**0.832**
CS57	**0.855**
CS58	**0.860**
CS59	**0.790**
CS60	**0.835**
CS61	**0.592**
CS62	**0.805**
CS63	**0.734**
CS64	**0.802**
CS65	**0.820**

Attitude towards use (ATU) – Validity

Table 4.9 shows the factor analysis for attitude towards use. The factor analysis shows a one factor solution with the eigenvalues greater than 1 and suggesting unidimensionality. This result represents the view that the factor loading for this variable is valid because the loading values of the items exceed the cut-off level of 0.4 and no cross-loading, while the variance explained was 83.125% of the total. The KMO was 0.879, which indicates sufficient inter-correlations, and the Bartlett's test of sphericity was significant (Chi-Square = 1571.680, $p<0.01$). Further, this result confirms that all the items for attitudes towards use are consistent and valid for the next level of analysis.

Table 4.9: Factor loading of attitude towards use

Item	Factors 1
ATU66	**0.904**
ATU67	**0.905**
ATU68	**0.909**
ATU69	**0.892**
ATU70	**0.921**
ATU71	**0.938**

Intention to use and actual usage – Validity

Table 4.10 presents the factor analysis for intention to use and actual usage. The factor analysis shows a two-factor solution. This result shows that the factor loading for this variable is valid because the loading values of the items exceed the cut-off level of 0.4 and no cross-loading over 0.4, while the variance explained was 81.496% of the total. The KMO was 0.886, which indicates sufficient inter-correlations, and the Bartlett's test of sphericity was significant (Chi-Square = 2081.652, $p<0.01$).

The researcher decided to create two variables based on the loading values: (1) Intention to use (ITU) for loading 1; and (2) the actual usage for factor loading 2 was changed and called "required by the organization". This is because all the statements did not represent intention to use and actual usage in total. Nonetheless the researcher decided to exclude the item ITUNAU77 even though this item achieved an acceptable factor loading value. This is because the statement of this item is related to the influence of peers when using IBIMS.

Following a discussion with the thesis supervisors, the researcher decided to exclude this item from hypotheses testing. In order to confirm the validity again, the second round of factor analysis was conducted on all items in this section without ITUNAU77, and the result shows (Table 4.11) that all items are consistent and valid to split up by two variables as discussed above. Therefore, all the items in Table 4.11 are consistent and valid for the hypotheses testing.

Table 4.10: Factor loading of intention to use and actual usage

Item	Factors	
	1	2
ITUNAU72	**0.868**	0.295
ITUNAU73	**0.871**	0.268
ITUNAU74	**0.901**	0.202
ITUNAU75	**0.882**	0.269
ITUNAU76	**0.861**	0.190
ITUNAU77	**0.594**	0.323
ITUNAU78	0.306	**0.871**
ITUNAU79	0.238	**0.941**
ITUNAU80	0.261	**0.929**

Table 4.11: Factor loading of intention to use and actual usage without ITUNAU77

Item	Factors	
	1	2
ITUNAU72	**0.880**	0.306
ITUNAU73	**0.876**	0.277
ITUNAU74	**0.906**	0.212
ITUNAU75	**0.879**	0.278
ITUNAU76	**0.852**	0.197
ITUNAU78	0.301	**0.875**
ITUNAU79	0.230	**0.943**
ITUNAU80	0.254	**0.932**

4.4.6 Reliability

Reliability analysis is one method to describe the rigour, consistency and stability of research processes and findings (Roberts, Priest and Traynor 2006). A reliability analysis was conducted here to examine the internal consistency of research tools that measure the Cronbach's alpha coefficient values for all sections (variables) in the main study. As shown in Table 4.12 below, the values for all variables before the application of factor analysis in this study indicate alpha values that also exceed the minimum value of acceptability in the social sciences, 0.60 (Hair et al. 1998). Cronbach's alpha value of 0.60 means 60% of the variability in the observed value is true and 40% is due to error. The alpha values are as follows: usefulness (0.955), ease of use (0.939), interactivity features

(0.867), usability (0.938), IS quality (0.959), OCS (0.947), attitude towards use (0.959) and, finally, intention to use and actual usage (0.929). These values show that the constructions of items for each section are reliable and consistent for this survey. Cronbach's alpha values are above 80%, which has been recommended in most published studies.

Table 4.12: Reliability and variables before factor analysis

Variable Before Factor Analysis	No. of Items	No. of Cases	Reliability Before Factor Analysis
Usefulness	6	223	0.955
Ease of Use	6	223	0.939
Interactivity Features	12	223	0.867
Usability	11	223	0.938
IS Quality	18	223	0.959
Online Communication Satisfaction	12	223	0.947
Attitude Towards Use	6	223	0.959
Intention to Use and Actual Usage	9	223	0.929

The factor analysis was performed in order to measure the validity, factor loading and suitability of the constructed items for each section in this survey. The researcher conducted this analysis to confirm that the items and variables within the factor loading are significant before performing the next major levels of analysis, such as descriptive analysis, simple linear regression and stepwise multiple regression to test the hypotheses and the best model.

Following this, the reliability test was done again on the new variables and construct items as presented in Table 4.13. However, the values for the new group of variables in this study also show alpha values exceeding the minimum value of acceptability in social sciences, 0.60 (Hair et al. 1998). The alpha values are as follows: usefulness (0.955), ease of use (0.939), interactivity features (0.946), usability (0.938), IS quality (0.957), IS quality

to collaboration (0.881), online communication satisfaction (0.947), attitude towards use (0.959) and, intention to use (0.950) and required by the organization (0.950). At the end, these values show that all data in this survey are reliable and consistent for the next level of analysis, because the Cronbach's alpha values are above 80% as recommended in most studies.

Table 4.13: Reliability and variables after factor analysis

Variable After Factor Analysis	No. of Items	No. of Cases	Reliability After Factor Analysis
Usefulness	6	223	0.955
Ease of Use	6	223	0.939
Interactivity Features	11	223	0.946
Usability	11	223	0.938
IS Quality	15	223	0.957
IS quality to Collaboration	3	223	0.881
Online Communication Satisfaction	12	223	0.947
Attitude Towards Use	6	223	0.959
Intention to Use	5	223	0.950
Required by the Organisation	3	223	0.950

All these variables and items (in Table 4.13) were used to conduct the next level of analysis: descriptive analysis and testing the hypotheses. A total of 78 items from the data sheet (SPSS 17) were used to execute the analyses. It is therefore evident that the variables and items in this study are highly reliable, consistent and valid. Details on the quantitative data analysis and results for testing the hypotheses are explained in Chapter 5.

4.5 Phase 2: Qualitative research method

A qualitative method was developed to provide a deeper understanding of the influence of usefulness, ease of use, interactivity features, usability and IS quality with reference to OCS with the use of IBIMS. This method assisted in building knowledge and a greater understanding of the relationships of the above variables with OCS. The acceptance factors

of the use of IBIMS could then be predicted. The data collection method for this approach consists of semi-structured in-depth interviews.

The purpose of using the qualitative approach is to support and triangulate the quantitative findings in phase 1. According to Myers (1997), qualitative research methods make it possible to understand and explain IS research. In order to extend the methodological approach, Markus and Lee (2000) suggest that researchers in IS should use a qualitative method in order to obtain a better understanding of the phenomenon under study. They also argue that the "interpretivist paradigm" or "qualitative approach" is becoming increasingly popular among researchers in IS to evaluate and judge positivist paradigms in quantitative approaches (Markus & Lee 2000). Ekdahl et al. (2000) confirm that a qualitative approach is important to answer and understand the research questions and research objectives pertaining to a particular topic. This approach allows researchers to obtain much better and more valid results when interpreting a topic. Thus this thesis uses the qualitative method to understand the relationships between key variables and other factors which contribute to the theory and practices investigated.

4.5.1 The in-depth interview

In-depth interviews collect data using semi-structured questions and in this study twenty-one informants from four MRUs took part. This study uses purposive sampling from the same group of respondents in phase 1 (quantitative method): executive officers and academic staff. Participation in the study was voluntary and no payment was offered for agreeing to be interviewed. The interviews proceeded in the manner described below.

4.5.2 Development of questions

One objective of the interview is to support and triangulate results from phase 1 (quantitative) to obtain a better understanding of the influence of several variables involved in OCS with IBIMS. The questions for the interviews were adapted from the conceptual framework of this study, and the context of the study in phase 1 with regard to the technology acceptance, interactivity features, usability, IS quality and OCS. As presented in Table 4.14, the questions for the interviews were created, adapted and modified from previous studies (phase 1) to suit the context of how IBIMS is used by people working in MRUs.

In order to gain more insight into this topic, questions to measures perceived usefulness and ease of use were adapted from Davis (1989) in TAM. The questions consist of two main items to understand the acceptance of IBIMS, such as usefulness and ease of use. The next question examines the important interactivity features which contribute to people's OCS. The question is based on the Outcome Interactivity Theory as suggested by Gleason and Lane (2009). Then respondents were asked questions that referred to usability, system quality, information quality, service quality, and IS quality (Koohang & Ondracek 2005; DeLone & McLean 2003).

The researcher included additional questions to understand and collect more data reflecting people's feelings, opinions and experiences about OCS when using IBIMS. These questions are important to obtain detailed information about people's perceptions and beliefs about satisfaction using online transactions and paper-based transactions in their daily work. Information is also documented about important differences between online systems and face-to-face communication, the main features of IBIMS that contribute to overall satisfaction, and other factors that influence respondents' use of IBIMS.

Table 4.14: The questions for the interviews

No	Question	Probe Question
1	What are the actual **benefits** of the systems (IBIMS) to **you**?	**If they do not tell about usefulness, please ask:** ***Usefulness*** *of the systems important to your satisfaction?*
2	What in your view are the actual **benefits** of the systems (IBIMS) to your **organisation**?	
3	Do you think **ease of use** of the systems is a key factor in your satisfaction with IBIMS?	Why? What does your job entail?
4	How important are **interactivity features** to you in the use of IBIMS?	Why?
5	What are the **main features** of IBIMS which contribute to your **overall satisfaction**?	
6	How important is information accuracy **(information quality)** to you in communication satisfaction?	Why?
7	How important is it to have flexibility and reliability **(system quality)** in IBIMS?	Why? Can you give an example of the system working/not working well?
8	In terms of **service quality** of IBIMS, what is the most important to you?	Why?
9	How important is **information system quality** to your online communication satisfaction?	Why? Can you give an example of the system working/not working well?
10	Are you satisfied with **e-compliance/online transactions** through IBIMS to do your daily job?	If yes, why? If no, why?
11	Which do you prefer: **online transactions** through IBIMS **or paper-based** forms to do your work?	Why?
12	To do your work and communicate with peers/HoD, do you prefer the **online system or face-to-face communication**?	Why?
13	Is IBIMS **easy** to navigate?	If yes, why? If no, why?
14	Do you always use IBIMS as **required** by your institution?	If yes, why? If not, why not? **Please ask the following question for more details from respondents:** *Is there something about the system you think could be improved?*
15	Can you tell me how the systems help you to **collaborate** with others?	
16	What are the **other factors** that influence your use of IBIMS in your office?	Let the respondents give their answer. **If they do not mention the following topics, please ask all of them with:** - *Skill and training* - *Technical/practical support* - *Knowledge of understanding (benefit, promotion and etc.)* - *Change management*
17	Is there anything you want to say about **communication satisfaction** in using IBIMS?	

4.5.3 The interviews

The first stage in phase 2 was to contact and collect data from the respondents using semi-structured in-depth interviews. Interviews were conducted by the researcher personally to obtain the optimum qualitative data based on each respondent's personal feelings, opinions and experiences of IBIMS. Furthermore, the researcher took one week (the first week) to contact and conduct personal visits to all target respondents to discuss the available date, and venue for the interview. When the staff member agreed to participate in this research, a face-to-face conversation was held about the objectives of the interview in order to clarify this study's objectives: for example, the topic of IBIMS.

The interviews were conducted, based on the appointment made between the writer and each respondent. After individual consent had been obtained, the researcher conducted the interviews in participants' offices or at convenient venues. Interviews were recorded using a digital audio recorder, but no names were used in any reports or publications that will emerge from this study. Table 4.15 presents the summary of respondents' details and it should be noted that participation was on a voluntary basis. Participants were able to share their real feelings about their use of IBIMS.

Table 4.15: Summary of respondents' demographic details

University	Number respondents	Gender		Group	
		Male	Female	Lecturer	Executive
Universiti Malaya (UM)	5	2	3	2	3
Universiti Sains Malaysia (USM)	4	2	2	2	2
Universiti Kebangsaan Malaysia (UKM)	7	3	4	4	3
Universiti Putra Malaysia (UPM)	5	3	2	2	3
Total	**21**	**10**	**11**	**10**	**11**

4.5.4 Data transcription, coding and analysis

The second stage in phase 2 involved data transcription, coding and analysis using the qualitative software package. Nvivo version 9.0 was used to encode all the data. The

researcher developed different procedures in order to answer the research objectives and research questions. The following information describes all the steps. In the early parts of this phase of the research process, audio data from the digital recorder (interviews) was copied to the researcher's personal computer for safety and confidentiality reasons. Only the researcher could access the computer and the audio data for the next process. Secondly, audio data was transcribed by the researcher into Microsoft Word format after the field trip. The transcripts contained grammatical errors because the respondents were not native English speakers and the writer did not change any phrases from the original audio data to present the findings (respondent's quotation) in Chapter 6.

Following this, each transcript was assigned a name/serial number before it was entered into Nvivo. For example, LA_UA denotes Lecturer A in University A and EA_UA refers to Executive A in University A. When all the transcripts had been entered into Nvivo, the researcher employed coding and analysis. At this stage, the researcher qualitatively analysed responses and phrases, and these were categorised to make sense of the interview texts and the topics they covered. The researcher focused on meaningful data according to specific topics or themes in order to meet the objectives of study. In this way, the themes can be identified to understand, explain and offer a valid interpretation of the study. Finally, the researcher triangulated the data to attain a deeper understanding of the relationships between the variables so that the quantitative results could be validated.

4.5.5 Open-ended questionnaire

The second stage in phase 2 was to collect data from respondents, especially academic staff, using the open-ended questionnaire (see Appendix 4). This approach was conducted by the researcher personally to obtain rich data so that academics' personal feelings, opinions and experiences of IBIMS in the research context could be better understood. The

researcher took two weeks to contact all the target academic staff to discuss their consent. When the academic staff member agreed to participate in this research, the open-ended questionnaire was sent to them by e-mail.

Further, the open-ended questionnaire was distributed to all ten academics involved in the second phase of the study (in-depth interview) so that more information about the usefulness of the IBIMS was elicited, particularly from the research perspective. Seven (70%) people responded to the questionnaire with their feedback to the researcher. The original textual data were analysed, based on the question in each open-ended questionnaire. Then the researcher quoted the important statements/quotations (in Chapter 7) to understand how well academics conceptualise the importance of IBIMS in their research management processes, especially day-to-day research management tasks. This approach is important to answer several questions, especially the following: how and why is the system important in managing data and information about people's research?

4.6 Ethics approval for this research

The study was granted ethical approval from the University of Adelaide's Human Research Ethics Committee to ensure the integrity, anonymity and confidentiality of the respondents/informants, information and organizations involved in this thesis. The first ethical approval was granted on 25 November, 2009 for one year between 1st December, 2009 and 30th November, 2010 (see Appendix 1) to conduct phase 1: i.e., the process of quantitative data collection. After one year, the researcher needed to renew the ethical approval so that phase 2 could be carried out: i.e., the process of qualitative data collection. Subsequently, ethical approval was granted on 2nd November, 2010 for another year until 30th November, 2011 (see Appendix 2) to do this. In addition to ethics approval granted by the University of Adelaide, approval was in a formal letter by the Director-General of the

Department of Higher Education, MOHE (see Appendix 5) so that employees at MRUs could take part in this study.

4.7 Summary

This chapter has described the reasons for, and the sequence of, the mixed methods approach to analysis by examining its two main and distinct phases in the study. The approach made it possible to understand the relationships between variables when people use IBIMS at certain MRUs. The processes involved in phase 1, the quantitative research method, were explained in detail with reference to instrument development, participants and procedures, pilot testing, reliability and validity. This explanatory work was similarly outlined with phase 2 (qualitative research method) where question development, the method of interviews, transcription, coding and analysis of the data were described. This chapter also outlined the ethical approval needed. In order to answer the research questions and objectives, the next chapters discuss the quantitative results (Chapter 5) and the qualitative findings (Chapter 6 and Chapter 7).

Chapter 5

Quantitative Results in Understanding Online Communication Satisfaction and Attitude when Using IBIMS

5.0 Introduction

This chapter describes the results of the first phase of the data collection conducted to answer the four overarching research questions stated in Chapter 1. This chapter begins with an introduction to the three levels of analysis. It also briefly explains data analysis, prior to the statistical results being presented on the profiles of study respondents, descriptive statistics, results of the hypotheses test, and summary of hypotheses. The chapter concludes with a brief summary of the chief findings from quantitative data. Figure 5.1 below summarizes the quantitative data analysis processes in order to understand the analysis approach. Data from the survey was used in order to understand and examine the effects of usefulness, ease of use, interactivity features, usability and IS quality in employees' OCS. The findings indicate that the variables do have significant effect on employees' OCS, attitude to and intention to use IBIMS. The end of this chapter presents the argument for the influence of satisfaction with online communication on the attitude to and intention to use IBIMS at MRUs.

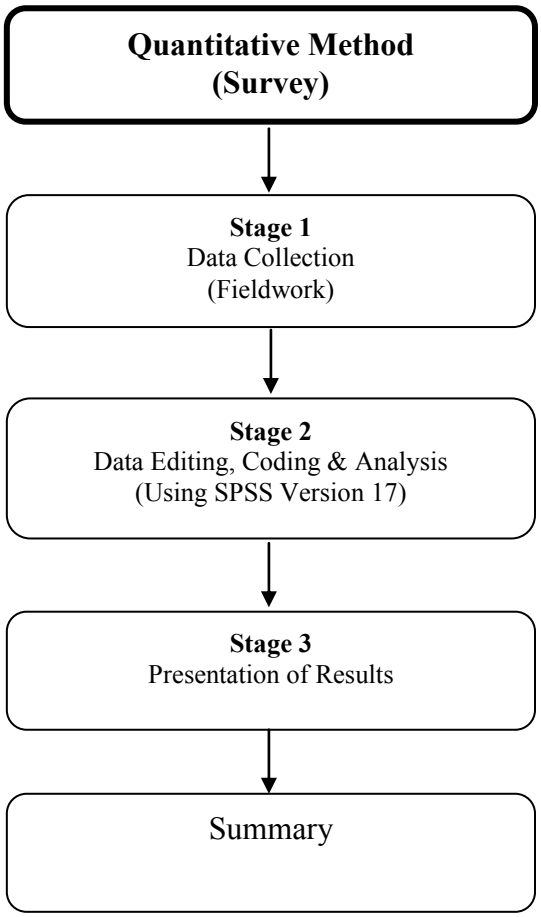
Quantitative data collection is one of the most important methods for assessing the influence and adoption of IS. Survey methods are widely used, and results accepted, by IS researchers when collecting data for studying organizational issues concerning technology acceptance as described in Chapter 1 and Chapter 4. The first objective of the survey in this research is to collect and examine the effect of usefulness, ease of use, interactivity features, usability, and IS quality on OCS in using IBIMS at four MRUs. The second

objective is to examine the influence of OCS on users' attitude to and intention to use the IBIMS in the MRUs.

As mentioned in Chapter 4, the survey was randomly distributed among two groups of employees: i.e., academic staff and executive officers in MRUs. The fieldwork ran over a two-month period from 22 February, 2010 to 18 April, 2010, and 223 completed surveys were received from 240 samples. The overall response rate for this study was very high (92.92%).

To test the proposed hypotheses the data was analyzed using SPSS Version 17.0 software program. The following sections describe and explain in detail the results of the analysis.

Figure 5.1: Overview of the quantitative data analysis



5.1 Levels of analysis in the procedure in measuring hypotheses

In the first level, the study was conducted a factor analysis and reliability test was conducted in order to confirm and validate the measurement tool. The findings indicate that the variables and items in this study are highly reliable, consistent and valid. In this chapter, this study demonstrates in the systematic procedure to evaluate the hypotheses and relationships between variables as discussed in Chapter 3. This study reveals that the hypotheses are significant and accepted where specifically the independent variables did have a significant influence on employees' OCS, and effect attitudes and intention to use IBIMS.

Furthermore, to understand and emphasize the findings in the study, Figure 5.2 and Table 5.1 show three levels of data analysis procedure in order to measure the hypotheses.

Firstly, in level 1 the reliability and validity were tested to all the variables (as stated in Figure 5.2) in order to examine the consistency and validity of the measurement tool. Data analysis according to this level was presented in Chapter 4. Then, in level 2, descriptive analysis was conducted to measure the frequency, percentage, mean, and standard deviation for each variable through SPSS. The results for level 2 will be described in the following section. Furthermore, level 3 was conducted to test each hypothesis using regression analysis in order to answer the research questions as shown in Table 5.1.

This study used a regression analysis to measure the effect of predictors on the dependent variable. In addition, a regression analysis is important to model the relationships between the dependent variable and independent variables. The findings for this level will be presented in the following section. The analysis was conducted in this study by working through all the levels above.

Therefore, the following sections describe the findings (as stated above) to show all the variables, namely usefulness, ease of use, interactivity features, usability and IS quality, are important in influencing employees' OCS when they utilize IBIMS.

Figure 5.2: Levels of analysis

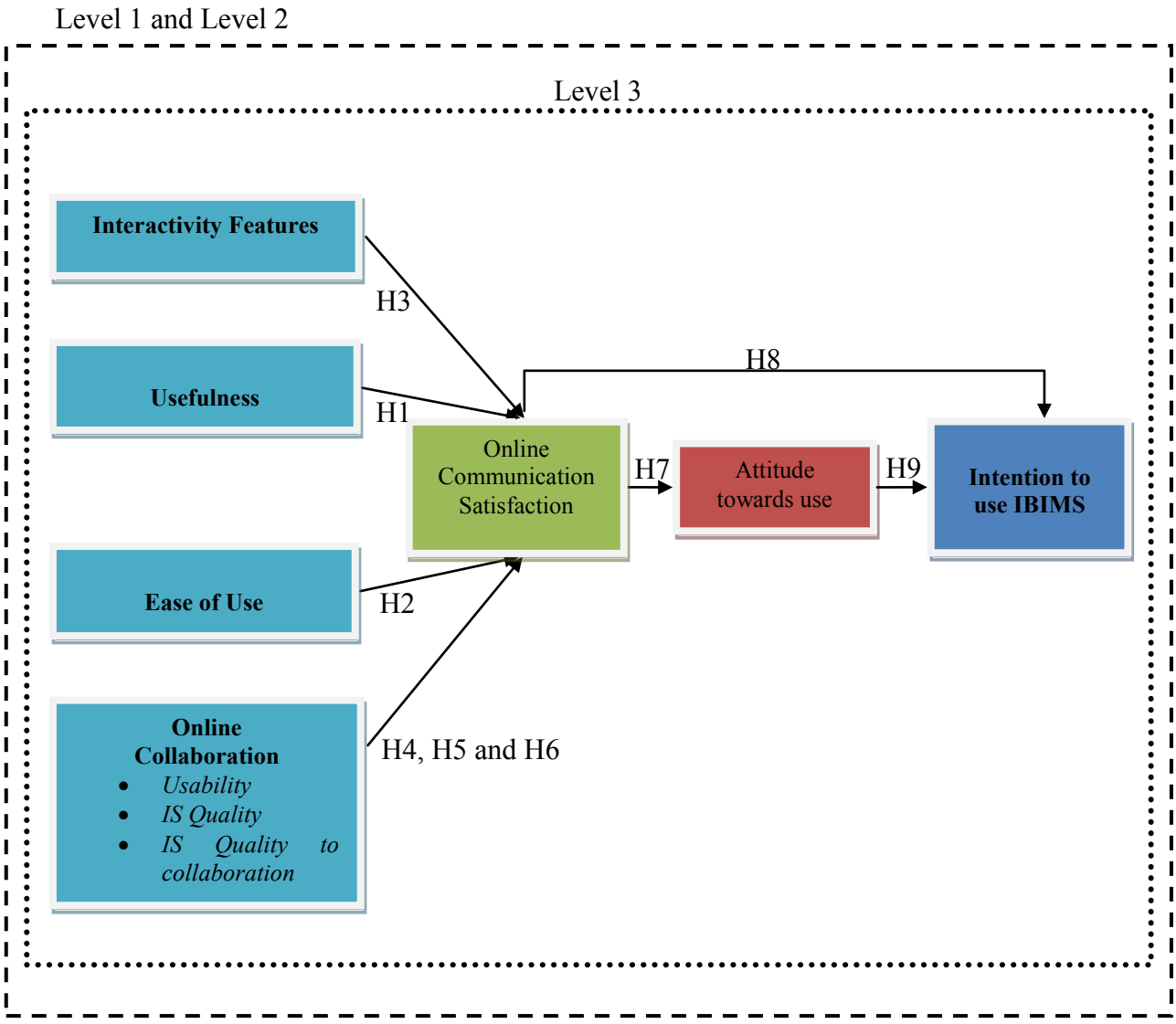


Table 5.1: Types of analyses used to test the hypotheses

Level and Type of Analysis	Hypotheses	Independent Variable	Dependent Variable
Level 3 (**Multiple Regression**)	H1 H2	Usefulness (U) Ease of Use (EOU)	Online Communication Satisfaction (OCS)
Level 3 (**Simple Linear Regression**)	H3	Interactivity Features (IF)	Online Communication Satisfaction (OCS)
Level 3 (**Multiple Regression**)	H4 H5 H6	Usability (USA) IS Quality (ISQ) IS Quality to Collaboration (Colla)	Online Communication Satisfaction (OCS)
Level 3 (**Simple Linear Regression**)	H7	Online Communication Satisfaction (OCS)	Attitude Towards Use (ATU)
	H8	Online Communication Satisfaction (OCS)	Intention to Use (ITU)
	H9	Attitude Towards Use (ATU)	Intention to Use (ITU)

5.2 Profile of respondents

As presented in Table 5.2, the majority (86.1%) of respondents are aged 20 – 49 years. In terms of ethnicity or race, the majority (85.7%) of respondents are Malay, followed by Chinese (4.5%), Indian (4.0%) and Bumiputera and others (4.0%). In terms of gender, the ratio of male to female respondents is almost equal: 49.3% male and 50.7% female. With respect to employment position, 44.4% of the respondents are part of the executive staff and 48.9% are lecturers. 6.7% of the respondents are from other positions such as language teacher (academic) and research officer (executive). In terms of monthly income, most respondents receive a salary above RM2000. The educational background shows that two-thirds (65.0%) of the respondents had a postgraduate degree (Masters and PhD), 33.6% hold a bachelor degree and 1.3% have a diploma.

Table 5.2: Demographics data

Demographics	Items	Frequency (f)	Percent (%)
Age	Less than 20 years	0	0
	20 – 29 years	46	20.6
	30 – 39 years	70	31.4
	40 – 49 years	76	34.1
	50 – 59 years	29	13.0
	More than 60 years	2	0.9
Ethnicity	Malay	191	85.7
	Chinese	10	4.5
	Indian	9	4.0
	Bumiputera Sabah and Sarawak	4	1.8
	Others	5	2.2
Sex	Male	110	49.3
	Female	113	50.7
Position	Executive (Management and Professional)	99	44.4
	Lecturer (academics)	109	48.9
	Others	15	6.7
Monthly income	Less than RM2000	7	3.1
	RM2001 - RM4000	84	37.7
	RM4001 – RM6000	62	27.8
	RM6001 – RM10,	64	28.7
	More than RM10, 001	5	2.2
Highest education	SPM	0	0
	STPM	0	0
	Technical (Vocational)	0	0
	Diploma	3	1.3
	Bachelor Degree	75	33.6
	Masters	66	29.6
	PhD	79	35.4

Table 5.3 shows that 87% of the respondents have used computers for more than seven years and 82% of the respondents also have more than seven years' experience in using the Internet in their daily work. This study shows that the majority of respondents have the expected experience, knowledge and skills in both computers and Internet, so that they are able to execute their tasks using IBIMS.

Table 5.3: Experience in using computers and the Internet

Statements	Frequency (f)	Percent (%)
Experience in using Computer		
Less than 2 years	2	0.9
3 – 4 years	13	5.8
5 – 6 years	13	5.8
More than 7 years	194	87.0
Experience in using Internet		
Less than 2 years	0	0
3 – 4 years	15	6.7
5 – 6 years	24	10.8
More than 7 years	183	82.1

5.3 Descriptive results

Table 5.4 presents the mean and standard deviation for each independent and dependent variable in this study. This section reports on the respondents' perceptions when using IBIMS at research universities illustrated by mean values. The summaries for mean values show that the respondents generally agree on having high expectations regarding their intention to use IBIMS. This outcome reveals that the respondents have a positive expectation and intention to use IBIMS. The other variables – usefulness, ease of use, interactivity, usability, IS quality and OCS, the importance of IS quality to facilitate collaboration, attitude towards use and requirement by the universities – also have more than average mean value and represent significant findings for employees in using IBIMS. In summary, the results reveal that the respondents have a positive perception of the importance of these variables in using IBIMS at their university workplace.

Table 5.4: Mean and standard deviation (n=223)

Variable	Mean	Std. Deviation
Intention to use (ITU)	4.002	0.791
Usefulness (U)	3.976	0.817
IS quality to collaboration (Colla)	3.886	0.794
Attitude towards use (ATU)	3.873	0.847
Ease of use (EOU)	3.694	0.783
Interactivity features (IF)	3.667	0.701
Usability (USA)	3.638	0.705
IS Quality (ISQ)	3.550	0.688
Online communication satisfaction (OCS)	3.515	0.706

Employees in MRUs have high expectations of the usefulness of IBIMS as shown by the mean of 3.976. Most of them agree that IBIMS enable them to accomplish tasks quickly, makes it easy to perform tasks and are useful in daily tasks. Further, there is a moderate expectation that IBIMS will improve job performance, productivity and effectiveness on the job. In addition, this finding shows that employees have positive expectations of ease of use of IBIMS, because the mean is 3.694. The mean values indicate that most of the employees believe that IBIMS are easy to learn, can be understood and navigated, and allow for flexibility of interaction.

Employees have moderate expectations about the interactivity features in using IBIMS, where the mean is 3.667. This result also indicates that the mean values for the statements measuring interactivity reflect positive expectations of IBIMS in providing good responses to any requests or instructions by end users, ability to participate with the content, provide suitable content, functionalities and hyperlinks so that other content can be accessed to perform tasks.

Employees also have positive expectations about the usability of the systems in using IBIMS, as demonstrated in a mean value 3.638. This result indicates that some of the

employees agree that IBIMS provide full control and adequate information when used. For example, they claim that information from IBIMS was uncluttered and readable. It was easy to understand all the features and functions in IBIMS. IBIMS were quick to provide responses in a reasonable time, and the terms, words and actions were consistent. Also the visual characteristics of content such as typeface boldfacing, italicizing and underlining work in attracting end users' attention. The result also indicates that usability of IBIMS is important for giving employees the ability to collaborate with their peers, superiors and others.

It is evident that employees have positive expectations about the IS quality in IBIMS with a mean value 3.550. The results indicate that some employees agree that IBIMS provide quick responses, complete information and individual attention in executing tasks. Yet they claim that IBIMS provides them with reliability of operation, accessibility, accuracy and relevance of information, user friendliness, easy problem-solving and user needs, providing up-to-date, correct solutions and prompt service, were well-organised and had a suitable visual appearance and appealing materials. Employees drew attention to the importance of IS quality elements such as system quality, information quality, and service quality provided by IBIMS to support online collaboration. The IS dimensions indicate moderate expectations that IBIMS provide online collaboration tools by a mean value of 3.886.

Furthermore, employees have positive expectations of perceived OCS by a mean value of 3.515. They are satisfied with the data and information provided to solve their problems, and are comfortable with exchanging confidential information and communicating with other employees through IBIMS. The results also indicate that employees are satisfied with data and information in IBIMS for problem-solving, on-time performance of tasks,

exchange of confidential information and accurate, free-flowing communication processes. Overall, employees were satisfied with IBIMS in their ability to support online communication for remote locations and to access data and information. The overall statement shows that respondents indicated communication satisfaction when using IBIMS.

The employees have a positive attitude to using IBIMS with a mean value 3.873. They indicate that IBIMS are desirable systems in their organization. They also enjoy using IBIMS. This study indicates that employees have a positive intention to use IBIMS, with a mean value 4.002. This study also suggests that most of the respondents intend and expect to continue utilizing IBIMS. They also agree that IBIMS are swift and efficient systems for doing everyday work.

5.4 Testing the hypotheses

A regression analysis was used because this part of the study aims to: understand the effects of predictors on OCS; model the relationship and strengths between variables; and test the hypotheses. It is important to make a significant claim about the importance of potential predictors to another dependent variable in order to understand the same phenomena under study.

To test the hypotheses, simple linear regression and multiple linear regression analyses were conducted on the data. The researcher used SPSS 17.0 software to test the hypotheses and established a number of assumptions about the data, namely sample size, multicollinearity, outliers, normality, linearity, homoscedasticity and independence of residuals. All the assumptions are described next.

First, sample size is an important issue because it makes it possible to generalize the results in line with other researchers' samples. Pallant (2007) recommends that for stepwise regression, about forty cases for every independent variable should be used. However, the acceptable number for social science research is about fifteen cases per predictor for a reliable equation (Pallant 2007, p. 148). This study uses an acceptable number of samples: 223 employees in four MRUs.

Second, the reasonable normality of the distribution of scores can be assumed because the scale of the sample size was large enough (StatSoft Inc 2012). Third, multicollinearity refers to the relationship and correlation between predictors (Hair et al. 1998; Pallant 2007, p.149). The multicollinearity can be guided through two statistical indications in regression analysis. These are the variable inflation factor (VIF) and tolerance measures. Pallant (2007) and Hair et al. (1998) recommend that the acceptable value for tolerance is over 0.1 and the VIF is below 10. Table 5.5 presents the value of tolerance and VIF of predictors in this study, and both are in the acceptable value and range.

Table 5.5: Collinearity statistics of predictors

Dependent Variable	**Independent Variable**	**Statistics Collinearity**		**The Results**
		Tolerance	**VIF**	
Online Communication Satisfaction	Usefulness	0.353	2.830	**Acceptable**
	Ease of Use	0.322	3.104	**Acceptable**
	Interactivity Features	0.230	4.339	**Acceptable**
	Usability	0.218	4.577	**Acceptable**
	IS Quality	0.218	4.577	**Acceptable**
	IS Quality to Collaboration	0.462	2.165	**Acceptable**

Fourth, linearity and homoscedasticity are important for checking the residuals' scatterplots that emerge from the multiple regression output. Pallant (2007) recommends that acceptable linearity is a straight line relationship with predicted dependent variable

scores. Homoscedasticity means that the variance of the residuals for predicted dependent variable scores is the same for all the data. One of the methods used to examine homoscedasticity is to check the residual plots of the actual standardized values (ZRESID) of the dependent variable against the predicated residual values (ZPRED) of the dependent variable (Pallant, 2007). Furthermore, the outliers can also be checked for their residual independence by examining the Durbin-Watson and Cook's Distance that are executed and provided by the multiple regression procedure in SPSS (Pallant 2007). Pallant (2007) recommends that Cook's Distance is better when it is less than 1 (p. 158). The outliers do not have any effect on the regression result if the Durbin-Watson is closer to 2 (Hair et al. 1998). The Durbin-Watson values are shown in the regression results (in the following sub-section) in each tested hypothesis with a preferable range and they do not have any effect on the regression model.

Finally, the regression analysis was used to examine the proposed hypotheses after the data met the assumption of regression analysis. The results for the proposed hypotheses are described below.

5.4.1 Research question 1: Hypothesis 1 and Hypothesis 2

The hypotheses are: (H1) *there is a positive relationship between usefulness and online communication satisfaction when using IBIMS*; and (H2) *there is a positive relationship between ease of use and online communication satisfaction when using IBIMS.* These hypotheses were examined to test the effects of two factors in the Technology Acceptance Model (TAM), i.e., usefulness and ease of use with OCS when using IBIMS. The multiple regression analysis was used for both factors and OCS served as the dependent variable.

Table 5.6 summarizes the model for the multiple regression analysis. R square value (0.527) indicates that the two factors proposed in this study, such as usefulness and ease of use, can explain 52.7% of the variance in OCS.

Table 5.6: Model summary

Model	Dependent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	OCS	0.726(a)	0.527	0.523	0.48790	1.726

a. Predictors: (Constant): U, EOU

Table 5.7 below shows the results of the regression analysis to ensure the validity of the proposed model. The finding shows that the overall regression model is statistically significant for OCS with F= 122.477 and p=0.000< 0.01.

Table 5.7: The results of the regression analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	58.311	2	29.156	122.477	0.000*
	Residual	52.371	220	.238		
	Total	110.682	222			

a. Predictors: (Constant): U, EOU
b. Dependent Variable: OCS

* p<0.01

The next table, Table 5.8, shows that two of the causal relationships between variables proposed in the study are well accepted and supported.

Table 5.8: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.886	.172		5.144	.000
	Usefulness	.274	.058	.317	4.712	.000*
	Ease of Use	.417	.061	.462	6.864	.000*

a. Predictors: (Constant): U, EOU
b. Dependent Variable: OCS

* p<0.01

- **Hypothesis 1: Usefulness (U) vs Online Communication Satisfaction (OCS)**

Employees' perception of usefulness has a significant direct effect and impact on their level of satisfaction with online communication when using IBIMS. As shown in Table 5.8 the findings of the first hypothesis indicate that the standardized coefficient (beta) value is positive and the significance level is 0.000 (<0.01). Furthermore, the first hypothesis was accepted and supported. Therefore, the outcome reveals that as far as research university employees are concerned there is a significant relationship between usefulness and OCS in using IBIMS.

- **Hypothesis 2: Ease of Use (EOU) vs Online Communication Satisfaction (OCS)**

Employees' perception of ease of use has a significant direct effect and impact on employees' OCS in using IBIMS. As shown in Table 5.8, the findings of the first hypothesis show that the standardized coefficient (beta) value is positive and the significance level is 0.000 (<0.01). Additionally, the second hypothesis was accepted and supported. Therefore, the result indicates there is a significant relationship between ease of use and OCS in using IBIMS for research university employees.

5.4.2 Research question 2: Hypothesis 3

The hypothesis is as follows: (H3) *there is a positive relationship between interactivity features and online communication satisfaction when using IBIMS.* This hypothesis was examined to test the effects of the interactivity features on OCS when employees utilize IBIMS. The simple linear regression analysis was used to evaluate the relationship between variables, interactivity features and OCS.

- **Hypothesis 3: Interactivity Features (IF) vs Online Communication Satisfaction (OCS)**

As shown in Table 5.9 below, simple linear regression was used to assess and test this hypothesis where the interactivity features constituted the independent variable and OCS as the dependent variable. The analysis shows that interactivity features had a statistically significant effect on OCS ($p<0.01$). In the model, interactivity features explained 60.1% of the variance in OCS. Thus, the third hypothesis was accepted and supported and this result demonstrates there is a significant relationship between interactivity and OCS when using IBIMS.

Table 5.9: Simple linear regression analysis for online communication satisfaction (OCS) and interactivity features (IF)

Model (independent variables)	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
H3: IF	0.781	0.043	0.775	18.247	0.000*
R	0.755				
R Square	0.601				
F	332.951*				
Durbin-Watson	1.826				

* $p<0.01$ – Dependent Variable OCS

5.4.3 Research question 3: Hypothesis 4, Hypothesis 5 and Hypothesis 6

The hypotheses are: (H4) *there is a positive relationship between usability and online communication satisfaction when using IBIMS*; (H5) *there is a positive relationship between IS quality and online communication satisfaction when using IBIMS; and* (H6) *there is a positive relationship between IS Quality to collaboration and online communication satisfaction in using IBIMS.* These hypotheses were examined to test the effects of three elements from online collaboration: usability, IS quality and IS quality to collaboration with OCS in using IBIMS. The multiple regression analysis was used to evaluate each element and OCS served as the dependent variable.

Table 5.10 shows the proposed model summary for the multiple regression analysis. R square value (0.721) indicates that the three factors proposed in this study such as usability, IS quality and IS quality to collaboration can explain 72.1% of the variance in OCS.

Table 5.10: Model summary

Model	Dependent Variable	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	OCS	0.849(a)	0.721	0.718	0.37521	1.789

b. Predictors: (Constant): USA, ISQ, Colla

Table 5.11 below highlights the results of the regression analysis to ensure the validity of the proposed model developed here. The finding shows that the overall regression model is statistically significant for OCS with F= 189.059 and p=0.000 < 0.01.

Table 5.11: The results of the regression analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	79.850	3	26.617	189.059	0.000*
	Residual	30.832	219	.141		
	Total	110.682	222			

a. Predictors: (Constant): USA, ISQ, Colla
b. Dependent Variable: OCS

* p<0.01

Table 5.12 shows that two of the causal relationships between variables (i.e., usability and IS quality) proposed here are well accepted and supported.

Table 5.12: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.422	.172		2.956	.003
	Usability	.169	.071	.169	2.382	.018**
	IS Quality	.774	.071	.753	10.884	.000*
	IS quality to collaboration	-.070	.045	-.078	-1.538	.125

a. Predictors: (Constant): USA, ISQ, Colla
b. Dependent Variable: OCS

* p<0.01 and **p<0.05

- **Hypothesis 4: Usability (USA) vs Online Communication Satisfaction (OCS)**

Employees' perceptions of usability have a significant direct effect and impact on their OCS in using IBIMS. As shown in Table 5.12, the findings of the fourth hypothesis show that the standardized coefficient (beta) value is positive and the significance level is 0.018 (<0.05). Thus, the fourth hypothesis was accepted and supported and consequently the result reveals there is a significant relationship between usability and OCS when using IBIMS.

- **Hypothesis 5: IS Quality (ISQ) vs Online Communication Satisfaction (OCS)**

Employees' perceptions of IS quality have a significant direct effect and impact on their OCS in using IBIMS. As shown in Table 5.12, the findings of the first hypothesis show that the standardized coefficient (beta) value is positive and the significance level is 0.000 (<0.01). In addition the fifth hypothesis was accepted and supported and thus the results indicate there is a significant relationship between IS quality and OCS when using IBIMS.

- **Hypothesis 6: IS Quality to Collaboration (Colla) vs Online Communication Satisfaction (OCS)**

Employees' perceptions of IS quality to facilitate collaboration have no significant direct impact on their OCS when using IBIMS. The findings in Table 5.12 for the first hypothesis show that the standardized coefficient (beta) value is negative while the significance level is 0.125. This means that the sixth hypothesis was rejected and not supported. Consequently the outcome is that there is no significant relationship between IS quality to facilitate collaboration and OCS when using IBIMS.

5.4.4 Research question 4: Hypothesis 7 and Hypothesis 8

The hypotheses are: (H7) *there is a positive relationship between online communication satisfaction and attitude toward the use of IBIMS*; and (H8) *there is a positive relationship between online communication satisfaction and intention to use IBIMS.* These hypotheses were examined to test the effects of OCS on attitude towards use and intention to use IBIMS. The simple linear regression analysis was used to measure the relationship between variables.

- **Hypothesis 7: Online Communication Satisfaction (OCS) vs Attitude towards Use (ATU)**

In Table 5.13 below, simple linear regression was used to examine and test the hypothesis where OCS served as the independent variable and attitude towards use acted as the dependent variable. The analysis shows that OCS had a statistically significant effect on attitude towards use ($p<0.01$). In the model, OCS explained 60.4% of the variance in attitude towards use. Thus the seventh hypothesis was accepted and supported, and furthermore this result indicates there is a significant relationship between OCS and attitude toward using IBIMS.

Table 5.13: Simple linear regression analysis for attitude towards use (ATU) and online communication satisfaction (OCS)

Model (independent variables)	**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
H7: OCS	0.932	0.051	0.777	18.347	0.000*
R	0.777				
R Square	0.604				
F	336.606*				
Durbin-Watson	1.812				

* $p<0.01$ – Dependent Variable ATU

- **Hypothesis 8: Online Communication Satisfaction (OCS) vs Intention to Use (ITU)**

As shown in Table 5.14, simple linear regression examined and tested the hypothesis between OCS as the independent variable and intention to use as the dependent variable. The analysis shows that OCS did have a statistically significant effect on intention to use ($p<0.01$). In the model, OCS explained 43.6% of the variance in intention to use. This led to the eighth hypothesis being accepted and supported. Therefore, the result indicates that there is a significant relationship between OCS and intention to use IBIMS.

Table 5.14: Simple linear regression analysis for intention to use (ITU) and online communication satisfaction (OCS)

Model (independent variables)	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
H8: OCS	0.739	0.057	0.660	13.065	0.000*
R	0.660				
R Square	0.436				
F	170.687*				
Durbin-Watson	1.831				

* p<0.01 – Dependent Variable ITU

5.4.5 Hypothesis 9: Attitude towards Use (ATU) vs Intention to Use (ITU)

This hypothesis examines the link between attitude towards use and intention to use IBIMS, and the hypothesis here is: *there is a positive relationship between attitude towards use and intention to use IBIMS.* As shown in Table 5.15, simple linear regression was employed to examine and test the hypothesis between attitude towards use as the independent variable and intention to use as the dependent variable. The analysis shows that attitudes towards use had a statistically significant effect on intention to use (p<0.01). In the model, attitude towards use explained 74.7% of the variance in intention to use and consequently this result reveals employees' attitudes towards using the system did have a significant effect on their intention to use IBIMS.

Table 5.15: Simple linear regression analysis for attitude towards use (ATU) and intention to use (ITU)

Model (independent variables)	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
H9: ATU	0.808	0.032	0.865	25.576	0.000*
R	0.865				
R Square	0.747				
F	654.110*				
Durbin-Watson	2.254				

* p<0.01 – Dependent Variable ITU

5.5 Summary of the hypotheses

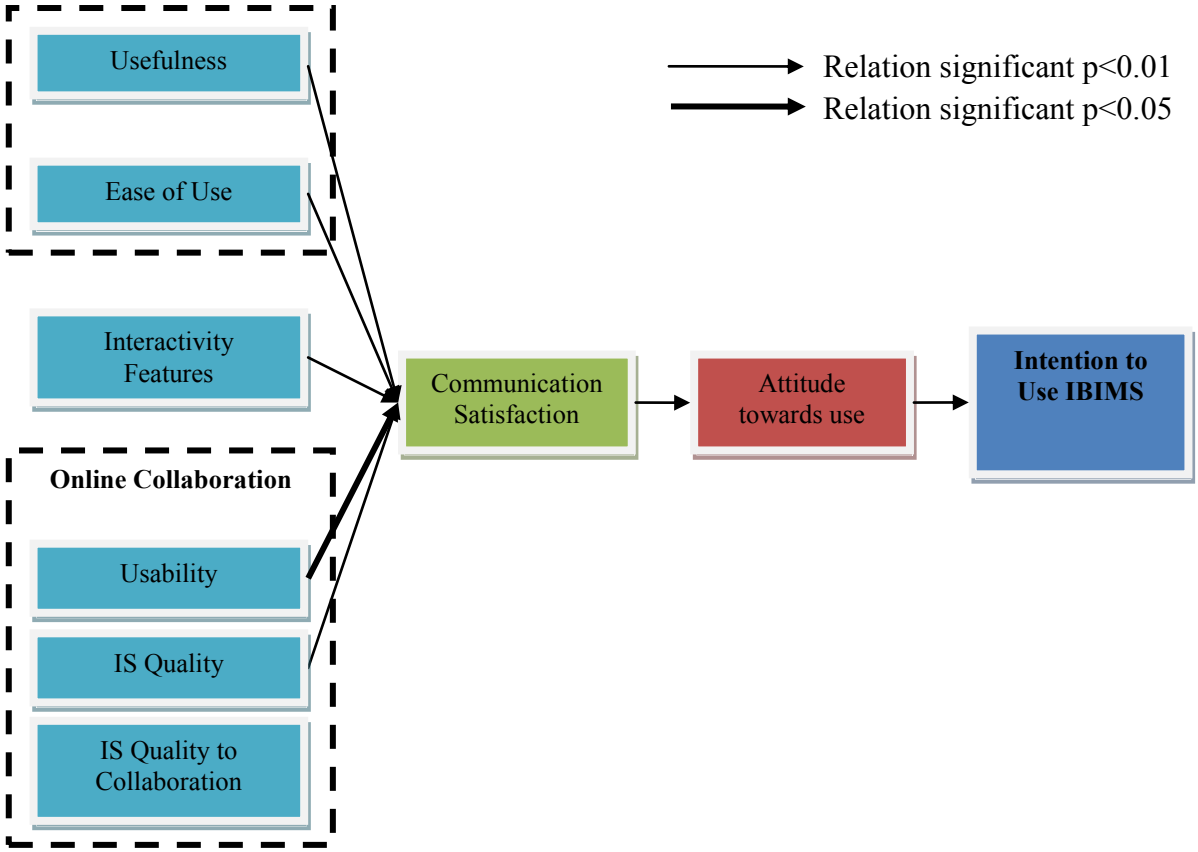
Table 5.16 and Figure 5.3 summarize and demonstrate the significant relationships between variables once the regression model had been executed. Most of the hypotheses in this study are significant and accepted where specifically the independent variables did have a significant effect on dependent variables. These results reveal that all the variables, namely usefulness, ease of use, interactivity features, usability and information system quality, are important in influencing employees' OCS when they utilize IBIMS. Furthermore, these results emphasize the importance of OCS in influencing employees' attitude to and intention to use IBIMS.

Table 5.16: Summaries of hypotheses

Level and Type of Analysis	Hypotheses	Independent Variable	Dependent Variable	Result of the Analyses	Results
Level 4 (**Multiple Regression**)	H1	Usefulness (U)	Online Communication Satisfaction (OCS)	**0.000***	**Supported**
	H2	Ease of Use (EOU)		**0.000***	**Supported**
Level 3 (**Simple Linear regression**)	H3	Interactivity Features (IF)	Online Communication Satisfaction (OCS)	**0.000***	**Supported**
Level 4 (**Multiple Regression**)	H4	Usability (USA)	Online Communication Satisfaction (OCS)	**0.018****	**Supported**
	H5	IS Quality (ISQ)		**0.000***	**Supported**
	H6	IS quality to Collaboration (Colla)		0.125	Not supported
Level 3 (**Simple Linear regression**)	H7	Online Communication Satisfaction (OCS)	Attitude Towards Use (ATU)	**0.000***	**Supported**
	H8	Online Communication Satisfaction (OCS)	Intention to Use (ITU)	**0.000***	**Supported**
	H9	Attitude Towards Use (ATU)	Intention to Use (ITU)	**0.000***	**Supported**

Statistical Significance
* Correlation is Significant at <0.01
** Correlation is Significant at <0.05

Figure 5.3: Significant relationships



5.6 Summary

This study employed regression analysis to predict the effects of several predictors on OCS. It also tested the hypotheses and modelled the relationships between variables. The results that have been explained in this chapter describe the high expectations that employees have regarding their attitude to and intention to use IBIMS. The regression analysis reveals that five of the variables do have a significant effect on and contribute to employees' OCS when they are using IBIMS. Furthermore, OCS significantly influences employees' attitudes to and intention to use IBIMS in four MRUs. Additionally, this chapter reports that employees' attitudes towards using the system have a significant effect on the intention to use IBIMS. It can thus be argued that the first phase of the study

highlights the importance of usefulness, ease of use, interactivity features, usability and IS quality in enhancing employees' OCS. Chapter 8 discusses the significance of these findings to those obtained in other studies in the field of technology acceptance and usage.

Chapter 6

Qualitative Findings in Understanding Online Communication Satisfaction and Attitude to Use of IBIMS

6.0 Introduction

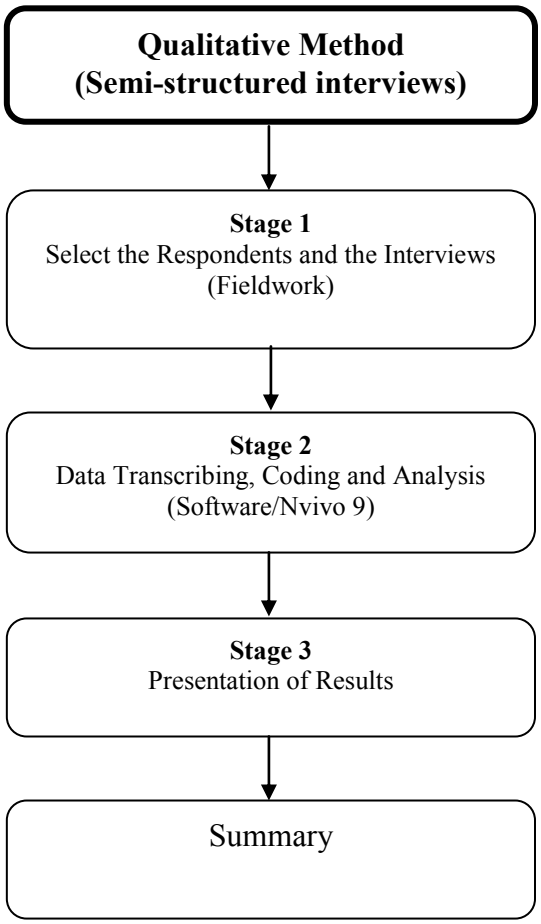
The findings for the second phase of the data collection are described in this chapter. The second phase data was gathered through a qualitative research approach aiming to better understand four MRUs' employees' sense of satisfaction with online communication when using IBIMS. Here the findings of the in-depth interviews are documented in order to support and complement the quantitative results in Chapter 5. In Chapter 8, the results of both Chapter 5 and 6 will be integrated in an argument about the significance of usefulness, ease of use, interactivity features, usability and IS quality in influencing employees' OCS.

As shown in Chapter 5, the quantitative results demonstrate the validity of the claim that some employees accept and are positively satisfied when using IBIMS. The quantitative results reveal the significant impact of usefulness, ease of use, interactivity features, usability and IS quality in influencing employees' OCS when utilizing IBIMS. To confirm and understand these results, a qualitative research strategy was then employed in the form of semi-structured interviews to provide rich data and information from employees' perceptions and experiences.

Figure 6.1 depicts the qualitative data analysis process. In phase 2, 21 respondents were purposely chosen from the major sample in phase 1 (i.e., the quantitative method) to collect qualitative data derived from semi-structured interviews. This is because most participants understand the issues described in this study, and can provide detailed feelings,

opinions and experiences about the particular predictors (discussed in phase 1) that influence their OCS when using IBIMS. These 21 people consisted of 10 academic staff and 11 executive officers.

Figure 6.1: Overview of the qualitative analysis



The interviews were conducted in the four pioneer MRUs over a period of one-and-a-half months, from 17 January, 2011 to 2 March, 2011. Then, when the interview data was collected, the researcher transcribed, coded and analyzed it using Nvivo version 9.0. In the section that follows all the findings are presented in order to understand the effect and importance of predictors on employees' OCS.

6.1 In-depth interview objectives

Qualitative methods through in-depth interviews are a widely used and accepted approach by IS researchers when collecting data. Markus and Lee (2000) recommend to those who want to conduct intensive research in IS that they should employ a qualitative approach. Ekdahl et al. (2000) agree that a qualitative approach is important to provide answers about certain phenomena in order to reach conclusions in a study. For this reason the study uses a qualitative approach to complement the quantitative data and better understand employees' perceptions of how they use and accept IBIMS in their universities. In future research, the qualitative approach can potentially extend knowledge of the factors involved technology uptake.

The objective of the in-depth interviews is to support the quantitative results from the survey in phase 1, and to understand real users' experiences in order to triangulate and provide a deeper explanation of the influence of usefulness, ease of use, interactivity features, and online collaboration elements (usability and IS quality) on OCS. Secondly, they seek to measure the use of IBIMS in a university's core business, especially in research management (more detail in Chapter 7). The significance of phase 2 is to enhance the interpretative approach (qualitative) so that it complements other approaches and in turn allows us to understand issues better.

The issues discussed in this chapter are based on the original conceptual framework from Chapter 3, and the context of the study in phase 1, with regard to the technology acceptance, interactivity features, usability, IS quality and OCS. This is important in order to integrate the relationship between quantitative and qualitative findings to enhance the significant results in Chapter 5. In addition to that, interviews were conducted by the researcher personally to obtain the optimum qualitative data based on each respondent's

personal feelings, opinions and experiences of IBIMS on specific context in Table 4.14 (Chapter 4). In addition to that, the study also notes additional issues highlighted by respondents, for example, the need for internal training in using IBIMS, disconnections or miscommunications between the organization and staff about the implementation of IBIMS, and the features of acceptance and adoption of IBIMS among administrative staff and academics.

To confirm the significance of the findings in Chapter 5, this study enhances the methodology approach to get deeper information from individual perspectives. Then, in phase 2, several processes are involved to analyse the raw data of in-depth interviews such as data transcription, coding and analysis using the qualitative software package, Nvivo version 9.0. Coding and analysis, focused on meaningful data according to specific topics or themes in order to substantiate the results in Chapter 5. In this way, findings in the following section are important to explain and offer a valid interpretation of the study, specifically the objectives with respect to the final conclusions and recommendations.

The following section describes the findings of phase 2 to ascertain the actual relationships of the specific predictors in the context of communication satisfaction when university staff use IBIMS.

6.2 Findings of phase 2

In general, phase 2 indicates that the majority of respondents had positive feelings of satisfaction about acceptance and use of the systems in their workplace. They also exhibited positive perceptions about usefulness, ease of use, interactivity features, usability and IS quality. These predictors assisted in collaborative endeavors, significantly influencing employees' OCS, and attitudes to and intention to use IBIMS. The following

sections present the findings, together with some of the original participants' comments, the purpose of which is to argue the impact of the above predictors on communication satisfaction when using IBIMS.

6.2.1 Usefulness of the system

The findings of phase 2 indicate that 20 respondents claim that usefulness of the system is one of the important factors that promotes perceptions of satisfaction when using online communication. Participants feel that IBIMS are useful in their university, especially with reference to OCS in their daily tasks. As academic staff members, they need this type of system in order to enhance their work. Lecturer H indicates that IBIMS do enhance interoperability and offer access to up-to-date data and information. For example, IBIMS as learning management systems, such as LMS and interactive teaching and learning management system (SPIN), help academic staff to update teaching material and communicate with students. Lecturer H said:

> Oh yes, most definitely. The usefulness of the system is very useful…it's very up-to-date, and it's very quick and you did mention about speed I think, its very speed and time consuming, time…very…very quick. So it's very useful and also now we can update lecture materials, we can also do interactive communication with students through the portal systems…we call it LMS – Learning Management System here. I think UKM call it e-learning…and yea…SPIN. So, those are some of the things which I think very useful as compared to conventional approach on paper. (Lecturer H)

Lecturer D also claims that the system provides a flexible university environment where it is possible to access information from remote places such as home, or anywhere else and at any time. This usefulness of the system provides satisfaction to employees when they can communicate online. Lecturer D stated that:

> Usefulness of the system?...because…because…for me because…I don't…I'm not station at the office all the time… so therefore, it would be very easy for me if I can get to

> information and things like this for the purpose of work anywhere and not something that, I have to go to the office to have to access to it. And if I can just access the thing online at home or anywhere else for that matter, it would be the best. So that's how I see…how this structure of system is useful to me. (Lecturer D)

Executive G claims that the system is useful for obtaining information and directions from top management. Executive G stated:

> Usefulness of the system for me is good...because for me if we use all the information about the system, we can get the information...and also direction from boss more easily. (Executive G)

Executive D also claims that the system helps the senior managers to monitor staff performance and internal activities:

> The usefulness of the system, yes of course...because...let say...if the system is not really useful then we will having difficulties to see the performance of each of the supporting staff...so, in that case whatever we need to know something about the test we will use the system and it kind of useful for us and also to the boss to track all the activities inside the office. (Executive D)

The respondents' perceptions reveal that usefulness of the system is important to their online satisfaction when using IBIMS. This finding constitutes a reliable indicator for the argument that the system is useful and positively influences employees' OCS when they are using IBIMS. This is in line with the results in Chapter 5 which indicate that usefulness of the system contributes significantly to employees' OCS with IBIMS. Thus, in order to perceive OCS in using IBIMS, the system should provide useful capabilities and benefits to end users, especially academics and administrative officers in MRUs.

6.2.2 Ease of use of the system

In the findings, 20 respondents described their experiences by referring to "ease of use" being one of the factors that helps them feel satisfied with the IBIMS online communication system. Some claim that ease of use is important to them and one of the factors that improves their OCS. For example, according to Lecturer B, the ease of use in IBIMS helps the individual employee, for less time is needed to deal with technical issues or breakdowns that can beset any system. In addition, ease of use enhances employees' skills and increases their satisfaction and motivation to use the system. Lecture B said:

> I would consider myself as computer-literate but not computer expert. So ease of use is important for people like me who are able to use a computer…but my knowledge is nothing beyond, let say the Word, Internet surfing and a few things that I learn by attending courses and stuff like that. So I think ease of use, I think it's the key, if the website is very difficult to manoeuvre, I think we'll get fed-up because we don't have a lot of time to deal with technical issues…sometimes the tutoring itself can be quite problematic, if the internet is slow because you cannot download certain programs and what not. I think ease of use is very important, hmm…because I don't have a lot of time to deal with technicalities. I think that's very important. (Lecturer B)

According to Lecturer I, the time-consuming aspects of having to deal with technical issues explain why some people in the MRUs need ease of use and a user-friendly system. When the system provides "ease of use" and reduces the time needed to perform tasks, employees perceive IBIMS as producing OCS. Lecturer I claimed:

> Of course, this is very important because people are very busy at this time, so if you give a manual to read, people wouldn't like the system. They really need the system that is user-friendly and easy to fill it up. (Lecturer I)

Consistent with this, Executive G claims that "ease of use" is important and has a significant impact on communication satisfaction because the system can support and provide an interactive platform. In the globalisation era, employees in MRUs preferred to

use more interactive systems in their workplaces in order to complete tasks. Executive G suggests that MRUs should implement new technology in interactive forms as a "backbone" for universities in dealing with online transactions. Executive G said:

> Ok, for me yes...that's the key factor of my satisfaction...because...because what we...as we know the information system is one of the...yes backbone of the organisation because, today we are in globalisation era and also interactive era...so why not we try our technology, interactive method in the organisation. (Executive G)

Executive I also indicates that ease of use of the system is one of the key factors that enhance satisfaction when staff search for and distribute relevant information through IBIMS to other employees. Executive I said:

> Yes, I think ease of use is a key factor in my satisfaction in IBIMS. It is easy for me to search for the information needed...or to distribute it to relevant staff...to extract whatever data that I need...and if it needs to be printed, I will print it easily. (Executive I)

In this study the majority of employees indicate that "ease of use" of the system is important in increasing their OCS when using IBIMS. This finding makes it possible to argue that "ease of use" of the system is one of the most important contributors to better OCS. The finding is in line with the result in Chapter 5 which indicates that ease of use impacts significantly on employees' OCS. Thus, in order to encourage OCS when using IBIMS, the system should continue to provide "ease of use" features to people who work in MRUs.

6.2.3 Interactivity features in the system

The interviews in phase 2 indicate that 20 respondents understand the importance of the IBIMS' interactivity features in providing positive OCS. Lecturer B remarked on these features as eliciting an interactive user interface for communication processes:

> I think…interactive features are very very important because as I said earlier it will allow you to actually communicate with the organization directly because we have one, let's say if we have to complain, then you can just go in and complain about certain things. (Lecturer B)

Lecturer E also indicates that interactivity features support them with direct interaction and communication processes in group discussions with their students. Lecturer E said:

> The interactivity...definitely...is really helpful because it is a direct interaction especially with the students when you can have your group discussion...for us but still...you've got to spend more time on the computer. (Lecturer E)

Executive D highlights the importance of interactivity features in providing information quickly to complete daily tasks. For example, speed of infrastructure such as the server and Internet helps to improve response times and interactivity. Executive D said:

> Well...interactivity features, for example...ok, it is very kind important for us...for example, if the server is down or if the speed is not that high...then we will having a difficulties to do our task. (Executive D)

Both Lecturer E and D noted the length of time spent online. Lecturer F further noted the speed of interactions:

> Firstly it is the speed...again I said the time is important. So speed is important, if speed is slow it quite a problem for us to access. So, sometimes the internet is quite slow, and then...so it is the problem. First thing, I put there is speed...speed must be good...so we can access...fastly on that thing. (Lecturer F)

Seventeen respondents were concerned with obtaining better communication speed and quicker responses from the system. For example, its speed is important for making their daily work more efficient. These findings confirm the importance of interactivity features,

and the speed of the system creating further satisfaction for employees' online communication when using IBIMS. One of them said:

> Yes, speed is very important as I said, people are very busy...nowadays people are very busy and have a lot of commitment, so speed is very important and navigation easier to go to the different menus, it's also very important. (Lecturer I)

Executive E claimed:

> Yea it is very important...especially is the speed ok, when we do work, without speed...in an efficient way, so it will be delay in your job. (Executive E)

Furthermore, 18 people suggested the system should provide relevant content (information) and a well-designed interface to increase employees' satisfaction. This is especially the case when the system is used as a tool for searching and managing information in everyday work. For example, two of them stated:

> I look into how visuality is appealing to me…also information within the system is very important. (Lecturer D)

> Yes...it is provide relevant content because all the information or answer that we have to give to our employer is a something that...ok, it's relevant content because it makes my work easier. (Executive J)

With reference to the visual and interface features of the system, 14 respondents highlighted the importance of the links for navigating and interacting with other people and parts of the system. Lecturer J remarked:

> Very important…of course like speed, ease for navigation, the link we'll get to what you want, the available content and everything else, these are the important features otherwise why use this technology if it's still the same as the old way of doing things? So I would say there are very important. (Lecturer J)

According to Executive K:

> The most important is the link, the speed and also how the system is done (construct). Especially with the most technology now, we have the speed, we can get all the information very fast and the navigation that means we can get…we can link to with all of other people. (Executive K)

The above findings reveal that the new interactivity features of the system do have a significant relationship with employees' OCS when using IBIMS. Indeed, understanding the value of several interactivity features (i.e., speed of the system, relevant content and information, visual and interface, links and navigation) is essential for enhancing employees' satisfaction when communicating with other university staff. This finding is consistent with the result in Chapter 5 and confirms that interactivity has a positive and significant relationship with employees' OCS. With this in mind the system should provide and develop interactivity features and capabilities for end users, especially employees in MRUs. Interactivity features are important to speed up interaction processes between employees and systems in order to increase the speed of universities' business such as administration, teaching and research. Further, it will make the MRUs more competitive among HE institutions in Malaysia and the world.

6.2.4 Usability of the system

Some respondents indicate that the usability of IBIMS is important in providing them with OCS. This study claims that simple (16 respondents), easy-to-use (12 respondents) and user-friendly systems (14 respondents) are important usability features for creating OCS. For example, Lecturer G claims that simplicity of use and ability to perform any transaction constitute usability elements that improve satisfaction. Lecturer G said in the interview:

> But then, if you make it simple enough for us, we have no problem. So, it has to be…created such that simple to use, it's easy and is not going to make you crack your head just to go in for some simple transaction. (Lecturer G)

The user-friendliness of the system, better downloading speed, and simple content in the system help people's satisfaction with online communication. Lecturer I remarked:

> As I said the first thing is must be user-friendly and the other thing is we have also to look at the speed in downloading certain form and the simple of the question in the system. (Lecturer I)

Similarly, Executive L indicates the need for usability elements such as user friendliness, simplicity and ease of use in order to contribute to overall satisfaction. Executive L said:

> OK, the system is user friendly and simple. So, for me simple instructions and it is easy to fill up the form. This makes me feel it's easy to use the system and all of this main features contribute to my overall satisfaction. (Executive L)

Executive A also claimed that:

> I am very satisfied if the system is very easy to use, very user-friendly and it's very simple for me to do the job. (Executive A)

The above statements enhance our understanding of employees' feelings and demands for usability features through online interactions with IBIMS. Since the employees' feelings emphasize usability, this study indicates that there is a positive relationship between systems' usability and OCS. This finding is in line with the result in Chapter 5 which indicates that usability of systems increases employees' OCS. Thus, systems should provide better usability elements for employees in MRUs. It will increase their sense of

enhanced OCS when using IBIMS, as the systems support key features of their employment demands, increased speed of business and the need for system functionality.

6.2.5 IS quality of the system

The interviews indicated that 19 respondents emphasized the importance of IS quality dimensions (i.e., information quality, system quality and service quality) in IBIMS in providing OCS. IS quality is important in providing quality information (accurate and up-to-date) because in this way academic reputations are enhanced and are competitive in the HE environment. For example, Lecturer B stated:

> Of course, I think the quality of the information system is of paramount importance…because if what we get is inaccurate, if we get is…for example, is not up to date, then as I said, we as academician, we are always, kind of requested, to be always in front. (Lecturer B)

Executive B also supported this contention:

> OK, it's very important...and the main keyword is communication. So, the important of the quality of the system is actually, we want to communicate... So that is why information system quality is very important, especially to do or the main point of the communication satisfaction. So, that is important. (Executive E)

In their desire to obtain IS quality when using IBIMS, 20 respondents indicated that quality of information is important to them if they are to be satisfied as MRU employees, especially with online communication. They are looking for reliable systems that can provide more up-to-date and accurate information, to stay ahead of other kinds of knowledge in online organizations. For example, Lecturer I said:

> It is very important, it is very important...the accuracy is very important to me because otherwise you will not get the...you will not achieve the objective when you use the system if the information is not accurate. (Lecturer I)

For this reason Executive B stated:

> Yes, I think because it's very important for us…because to accurate and up-to-date data and information from the system. (Executive B)

Participants also desire system quality elements such as reliability and flexibility from the IBIMS. Seventeen respondents indicated that IBIMS must be reliable and flexible enough to provide efficient and accessible systems in their workplace and the larger organization. Lecturer C indicated that:

> Hmm…any system has to be reliable, and to make it reliable and to make it efficient, it has to be flexible as well. (Lecturer C)

Having a flexible and reliable system helps users improve their connection to IBIMS whenever it is needed to complete daily business. It is also provides more online satisfaction to employees in term of accessibility to the system in MRUs. Executive I claimed:

> It is important to have a flexible and reliable system...because...it is important to have flexible and reliable IBIMS because it is important for the system to be accessible...to be use whenever it is needed. (Executive I)

At the end of the discussions on IS quality dimensions only 7 respondents indicated their feelings about the importance of service quality in IBIMS in giving them a sense of satisfaction. These qualities included correct solutions and prompt service, being well-organized and having a suitable visual appearance. In addition, Executive D also stressed the important of service quality, especially in providing the right solution and response to transactions needed to complete tasks.

This section reveals the importance of IS quality dimensions of the system, enhancing and influencing employees' OCS when using IBIMS. The dimensions of IS quality, namely information quality, system quality and service quality, help employees increase their online satisfaction and improve their attitude when utilising the system in daily tasks. This finding is in line with the result in Chapter 5 which indicates that IS quality of the system has a significant relationship with employees' OCS. Therefore IS quality is very important and one of the key elements for enhancing employees' OCS in MRUs.

6.2.6 IS quality of the system in facilitating collaboration

IBIMS provides a platform for lecturers to collaborate with students and peers in teaching and learning, research and publication. Similarly, university executives use the system to collaborate with each other, communicate instructions and/or policies, and manage daily tasks. For example, Lecturer H remarked that the system helps them to collaborate in teaching and research:

> We use the system quite a lot…extensively in terms of collaborations, for example when it comes to teaching, when it comes to research projects, when it comes to publications, we do collaborate with our colleagues. (Lecturer H)

Lecturer F also indicates that IBIMS are important for collaborating with other departments such as the library, human resources and treasury/finance:

> Collaboration is...yea I used it...especially on library to renew the books...easy to me to renew a book...even I am in overseas, I can renew it...although I forgot my dues are very near...so...I easily to renew them by Internet collaboration on that things...and also I have also...very easy to apply something from human resource or the treasury, they can give information on that things. (Lecturer F)

Thirteen respondents indicated that the system allows them to communicate better when they collaborate with their peers. For example, Executive E claims that IBIMS does this by offering an open "virtual" environment. She said in her interview:

> Ok, yes! it's very important...the collaboration or what I am saying the communication with others is very important, go through the system, OK, whereby you see like...the leave system, about the attendance system, so...anywhere you are in the library or anywhere you are in...you can always login...you can always apply...even though at home, you can apply for your leave, all that. (Executive E)

The findings highlight that specific IS quality is important in facilitating people's tasks and supporting employees' online collaboration. These features help the organization to increase employees' interaction and sense of communication satisfaction when dealing with other people. Indeed, they improve employees' attitudes to IBIMS and their perception of better OCS in the workplace. It can therefore be argued that the significance of IS quality lies in facilitating employees' collaboration and enhancing OCS via IBIMS. The results here indicate low levels of functional or service delivery collaboration, not the kind of collaboration expected in a research university.

6.2.7 Online communication satisfaction

The interviews indicated that respondents gained OCS when they operated IBIMS. They felt satisfied with the systems in their organizations, especially when communicating and managing daily work routines, enabling them to provide efficient service outcomes to other people and peers. Lecturer A claims that satisfaction comes from ease of use in terms of four key success factors: accessibility, availability, speed and user-friendliness. He said in the interview:

> When we talk about satisfaction, come back to the very beginning, we talk about how easy the user finds it to use the system. When you asked me about what contribute to the easiness or what they called the satisfaction, so I told you just now the 4 factors like

> accessibility, availability, speed and the user-friendliness to the design so far. (Lecturer A)

The findings also show that employees in the research universities interviewed here experience OCS through IBIMS in their workplace environment. One of the participants stated:

> Yes, I got the communication satisfaction because...what that I said before...the first thing...easy and less my time to do any work and...just can give me a good information and give me the...we can share the data and information to everybody. (Executive G)

This employee understands that communications satisfaction is defined by individual users' needs. IBIMS enhance workplace efficiency and improve cost effectiveness when retrieving and sharing information in the organisation. Executive A indicates that the efficiency of the communication process in minimizing or negating distances between people will increase satisfaction when using IBIMS. Executive A said:

> I think the system satisfied me because it provides communication services more efficiently and also minimizes the distance without any cost. (Executive A)

The above findings make it possible to argue that IBIMS in MRUs provide OCS, that in turn encourages employees to use the system. They perceived OCS through ease of use of the system in term of several features (e.g., user-friendly, speed of the system and accessibility) in order to provide efficient services in meeting individuals' needs.

This section also presents the employees' views about OCS with IBIMS, in order to understand and provide a general definition of OCS. In each interview the researcher asked the respondents a question about their OCS. The answers gained were wide-ranging and can be categorized into three themes. Firstly, respondents remarked on their needs

regarding certain technical features of the IBIMS such as ease of use, being user friendly and easily understood, using time efficiently, reliability of content, integration with other systems, and being up-to-date and accurate. Executive K indicated that:

> The communication satisfaction for me is that, whatever the system that we use is easy for us to access, to get and also to use it... the communication is easy for us to use... for me it's that the system is easy to use. (Executive K)

Executive G commented on communication satisfaction when use of IBIMS provided good data and information that could be shared with other people:

> Yes, I got the communication satisfaction because...what that I said before...the first thing...easy and less my time to do any work and...just can give me a good information and give me the...we can share the data and information to everybody. (Executive G)

Lecturer A perceived that OCS occurred when systems are integrated with each other. This makes them easy to access and enables the retrieval of particular data and information from several online systems. Lecturer A said:

> The integration of all the services…OK, so the satisfaction, yes and definitely the importance is there, so…the example that I can give you like maybe you are talking about the integration of like, example only, lately I talk about…I am ask to put into all the evaluation of my own self, self-evaluation. So, the system has all my particulars including my record of research, publication and everything, this are all come from separate…separate section. So this information system has provided that kind of quality to integrate them when the time that I need to retrieve the information, so it's just by pressing the button then everything will come out in my CV. So, I think that help a lot in term of…in term of retrieving the information required, OK. (Lecturer A)

In particular the respondents commented on the importance of social and human factors in obtaining OCS when using IBIMS. For example, Lecturer H indicates that, in order to experience OCS through IBIMS, the system should provide prompt results for end users,

especially the right and correct information. This shows that the end results of the system are closely linked to employee satisfaction. Lecturer H remarked:

> In terms of communication satisfaction, it depends on the end result. For example, if you need information online about certain things…if you get that information, then I would clarify that as communication satisfaction. (Lecturer H)

Respondents also commented on the importance of human factors in experiencing OCS when using IBIMS. Human factors are participation, help and support from other people in workplaces, such as heads of department, friends and peers, to provide facility and information about IBIMS. For example, one respondent felt that these factors should operate concurrently with technological features so that OCS was experienced. According to Lecturer A:

> So I would rather say not only the high tech, I repeat, but also high touch. So high tech and high touch should go concurrently. So, high tech is actually providing you the facility but the high touch is the one that I would say contribute more towards your satisfaction....So, I will always say we cannot run away from the human factor…we cannot run away from the human factor. (Lecturer A)

Two respondents shared their feelings about the importance of organizational initiatives to promote and support system use. For example, one person indicated several initiatives should be promoted and managed by the organisation:

> I think...like University C must promote or promote all the staff to use the system...or maybe they have to do some road tour to every faculty and college. (Executive J)

Furthermore, Lecturer F remarked:

> It is good. I think they must introduce to every department or every government sector on that thing...and...but they must be implement gradually not immediately...the important things is everyone know about the system. (Lecturer F)

The above findings indicate that OCS is gained through the provision of benefits and meeting the needs of end users. It is evident that OCS results from positive reinforcement of the system's technological features, with social and human factors, and organizational initiatives.

6.2.8 Attitude towards using the system

As revealed in the interviews, 18 respondents claimed that IBIMS are good online systems and they are happy with them. They enjoy and feel comfortable using IBIMS in everyday work because they obtain quick responses and feedback from other people. For example, Lecturer I said:

> I prefer online because I want a fast feedback from the person, to the party that I send the information to. (Lectutrer I)

This was backed up by Executive K, who remarked:

> For me, I prefer online system, because…you know like sometimes to get the information from other people, sometime certain question it's very difficult for us to ask face to face, if the online we can ask direct. (Executive K)

Lecturer C claims that today's technological advances are influencing her use of IBIMS in the workplace. She said in the interview:

> Yeah, I'm very happy doing it…so that's not an issue because… the practice of using online systems has been…has been the trend now in everywhere, in all organization, so…University A is also doing the same thing… so…yeah, I'm happy. It's actually much faster and more convenient for me. (Lecturer C)

On the other hand, Executive J claims that he likes accessing and using IBIMS in order to enhance and achieve his organization's goals and mission, especially to become a world class university with high ranking profile based on teaching and research. He stresses the use of IBIMS in helping the MRUs to meet their business goals and specifically to build up organizational profile in administration, teaching and research management. He said:

> Definitely I will use the system...because one thing...they develop must be for good reason for staff to use...and maybe can help the organisation to achieve their goals or mission. (Executive J)

The use of IBIMS enables MRUs to improve their online transactions and communication between employees and administrators, and academics and students. Such findings indicate that employees like to use an online systems or IBIMS rather than traditional forms (paper-based applications) of documentation in their administrative work, to facilitate teaching and learning, and research management. Indeed, this section shows that employees are positive about online systems or IBIMS in their universities.

6.2.9 Intention to use the system

The interviews also demonstrate that 16 respondents intend and expect to continue to use IBIMS. There are definite benefits of the systems when executing daily tasks. Some employees claim that they appreciate the usefulness of the systems which make it much easier to fill in relevant forms. As suggested by Lecturer D, "I will still use it…because it makes thing easier, I don't have to fill-up forms. Fill-up forms are a boring thing to do." Lecturer H also intends to use the systems due to their usefulness, reliability and timeliness. In the interview he made the following comment:

> Yes…yes…most definitely…even if I'm not being made to use it, I will definitely use it…because, I can see of that…usefulness, reliability, timeliness. (Lecturer H)

Some people have technical skills and knowledge, and no problems with technophobia when using any kind of online system. This may help to develop a good self-motivation and attitudes to IBIMS. For example, Executive E said:

> Yes! of course you know, because I'm not a...what people say...phobic on the system, no...because since we are a very young generation, so the system really can help us and no doubt the system can be one of good source. (Executive E)

Similarly, Executive A noted:

> Yes I think so…because, it is…you are working in a very technology world, so I think…we have to use whatever the system had given to you. (Executive A)

IBIMS are seen as allowing MRUs to achieve their goals by making the working environment more efficient and effective, and keeping up to date with current technology. This section reveals that employees intend to use IBIMS in their organization or section, not only for current duties but in future. However, the findings also show that the use of IBIMS in MRUs did not involve full participation and intentions for future use from respondents (four of them) even though they don't have a choice to ignore. This section indicates that the enforcement of using online systems in universities cannot influence employees to use IBIMS unless they gain satisfaction from technological features, human factors and organizational initiatives.

6.3 Summary

This chapter reveals that usefulness of the systems, ease of use, interactivity features, usability and IS quality are important key factors in influencing employees' OCS in MRUs. This means that specific factors have an effect on OCS when research university staff are using or intending to use IBIMS. The results obtained from this chapter describe the positive perceptions that employees have regarding the issues studied here. The

qualitative data in Chapter 6 supports the quantitative results in Chapter 5. Furthermore, all the predictors or factors are significant and important to perceived OCS and the use of IBIMS. Finally, the positive perception of OCS significantly affects and influences staff attitudes towards IBIMS and their intention to use them in the MRU context. The findings of the in-depth interviews above are discussed in more detail in Chapter 8 to complement and support the results in Chapter 5, and to complete the objectives of the study with respect to the final conclusions.

Chapter 7

IBIMS in Managing Research Universities' Core Business

7.0 Introduction

A university's core business consists of teaching, learning, research, publishing academic research papers or studies, and managing staff, classrooms, and student information. Closely linked to these activities is the fact that new technologies have transformed how universities conduct and manage their core business areas in order to improve university governance and performance. This chapter describes further findings from the second phase of data collection: i.e., the in-depth interviews on how IBIMS are used to improve core business objectives. The author argues that how individual academic staff and the university use IBIMS to facilitate their research management processes is the key to improving professional profiles, reputations and competitiveness. The chapter provides more details about use of IBIMS, based on additional data from the open-ended questions.

7.1 General use of IBIMS by employees

This section describes the findings from the second phase of the data collection – the in-depth interviews. This section explains the general use of IBIMS by 21 MRU employees. The findings reveal that respondents indicated the importance of the IBIMS in management, administration, teaching, learning, and research.

7.1.1 Management and administration

All respondents acknowledge the importance of IBIMS in management and administration functions. Respondents indicate that IBIMS help them to improve individual or oganisational efficiency in managing daily tasks, and providing better service to staff,

students and other clients. For example, Lecturer A claims the benefit of the system by stating:

> OK, in term of organization, because of did not only that actually giving the…what they called the satisfaction in terms of the easiness to the staff, or the employee, but the system itself make things run faster and make the organization to operate more efficiently…and definitely then it can deliver the what they called service much better to the client. In this case the clients are the students. (Lecturer A)

And, Executive B also remarked:

> For example Sistem Maklumat Pelajar, En. Azul…through the system…we can service our clients, our students more user friendly…more efficient through the system. Maybe that's all…and for our staff, we can manage more efficiently and faster. I think the system, we can manage our job more faster and efficiently to service our client, our student. (Executive B)

As a resource platform for the university, IBIMS provide data and information to staff and clients for such things as financial data, human resources, records of staff achievements and in ensuring that government policies are carried out. According to Lecturer H, the system helps his daily work as postgraduate coordinator in accessing information about examiners' profiles for Masters and PhD programs:

> OK, it's very important I feel…because number one, we can get information immediately. For example, I am one of the coordinator of graduate studies programs, so when it comes to appointment of examination for Masters and PhD thesis, I will have to contact examiners. I use to contact to Dr. Faridah from UKM, Prof Safar from UKM and a few others, so sometimes they don't gave us the latest updates curriculum vitae...CV, so what I do, I'll get into the UKM's system, and get their latest CV. (Lecturer H)

Executive A highlights the importance of IBIMS from the students' point of view, especially in managing accurate, up-to-date information about fees and payments. Executive A said in the interview:

> It is very important. That information must be accurate and up-to-date…so that the user can understand and rely on the information given. User in here is the student, for example student can access their…the statement of the fees…So, user in here, for us is the student. Student can view their statement of the fees every day because the data is already updated. (Executive A)

Respondents also indicate that IBIMS help managerial staff monitor the organization's operations. For example, senior management and other staff in the university use the system to monitor student fees, staff activities and punctuality, research grants, library transactions and loans, and student attendance. For example, Executive F said, "It is important...for instance, when I am talking about the payment system...I would want to know information such as the deduction made and I should be able to track...years of contribution, years of loan payment that have been made and things like that". On this theme, IBIMS link and enhance a collaborative working environment, and at the same time open various modes of communication and collaboration platforms to staff, students and other stakeholders. For example, Executive C said:

> OK, I give one example, for our system in the library, actually our system in the library have a protocol that make all of the university or institution able to share their data. So I mean, that the way we collaborate actually, we now, we can get the data from other institutions such as UPM and then, they also can get our data. (Executive C)

Executive C highlights the important of IBIMS such as the virtual library system in order to share resources and data in an open collaboration environment between users and library databases. For example, a virtual library system allows end users from other universities to access journal databases and online books over the Internet. Furthermore, IBIMS create opportunities to develop a paperless environment through online forms, better access to other resources and ability to work off-site. A paperless environment in the era of globalisation may make employees' work easier and faster in MRUs. On the other hand,

online transactions through IBIMS help individual employees in MRUs to save time. The university saves on buying paper. As noted by Lecturer D in the interview:

> I must say that the main benefit of the system would be…aaa…ease of use and aaa…and also efficiency. It makes work easier and faster because when I can do things online…then I don't have to use paper. It saves time and it saves paper, it saves resources. That would be…I say the main benefit of the system. (Lecturer D)

This study indicates that all respondents understand the importance of IBIMS in management and administration, especially in managing employees' data as well as students' information. In addition, IBIMS also help MRUs in monitoring and organization's operations, sharing resources and open collaborative working environments between people (e.g., academics, officers and students).

7.1.2 Teaching and learning

IBIMS also help staff develop projects that promote the organization's goals and global education ambitions, and to increase human capital and knowledge. IBIMS help with information management systems, online and interactive. They improve job satisfaction, and enact government policy on ICT for creating a knowledge-based society in 2020. According to Executive G:

> For me...that kind of thing of the system is good...for me, I really support communication system using internet because as I said we are in the globalization era and also interactive and also...technology based. So why not we support our government policy to use the information and communication system to support our country towards the 2020. (Executive G)

IBIMS moderate human errors in administration, especially in managing data and information about students. Executive A claimed that:

> Benefits to our organization…one thing is increasing performance in our daily work…easy to view information about the students, about the fees…hmm…another thing is paperless in your job, decrease of human errors…and one more thing is so many people can use the system at one time…much faster. (Executive A)

Ten respondents claim that IBIMS facilitate teaching and learning processes between academic staff and students. More specifically, they do this by providing communication platforms and collaboration opportunities to staff that improve supervision and consultation in a flexible way. Lecturer A indicates that systems help respondents in providing communication platforms for academic staff and students, in improving supervision and consultation, supporting them with forms for evaluation of teaching and learning, and enhancing academic staff's interoperability skills so that they can access resources and work from other place, ideally 24 hours a day. Lecturer A said:

> So that online transaction help me in the sense that I can also do my work at home, or when I come to office I can just go to my mailbox and I read all the material there and not only that, I think that even the coursework so called like slide presentation and everything, I would just provide them the softcopy and it is not mandatory for them to get the printout. So, I think…this actually also give you the flexibility and you can access, you can do it anywhere, anytime that you're talking about the freedom that you have. (Lecturer A)

Today's teaching and learning pedagogy uses the digital environment's potential to deliver course materials, better communication and interaction, and access to teaching content. It is evident that IBIMS help academic staff raise the standard of their teaching processes: for example, uploading course materials, question papers, forums, announcements, grades and examination results, and details of students' attendance. Furthermore, the system incorporates online learning or e-learning facilities. As stated by Lecturer C: "It is very beneficial to the organization in terms of making the students…we can put in all our notes, question paper, forums, everything in that system and the students can access it." Furthermore, Lecturer G remarked:

> Then there are some systems they actually…for example the Student Portal, it's good, we can just go in and then we can check the students that we are actually…the mentor and then we can look at the CGPA and then we can look through. So, I have no problem with it, but then there are some that they have to actually make sure that they should re-evaluate and then make it easier so that…if for example I love to use some, it shows that I love to use the new system. (Lecturer G)

Teaching and learning in today's universities require less physical means to deliver course materials and information to administrative personnel, academics and students. In other words, teaching and learning occur through LMS that complement and support face-to-face learning, and improve learning processes, especially virtual communication, online tutorials and online interactions in e-learning. As suggested by Executive E:

> You know like...one good thing is now since also I also teaching a GSSX class you know...with the system that they have, we can do online tutorial. That is one good thing where our library can develop our collection and also develop our knowledge in sense of that. I think they give a very good support to the library...not only to library but actually the whole University B. (Executive E)

IBIMS, such as a LMS, are important for improving the effectiveness and efficiency of learning processes and making the physical proximity of students and lecturers, such as in a lecture hall, redundant. Lecturer B remarked on this:

> By having that kind of system, it will allow you to be present without physically present. So, the education continues without you, but it doesn't mean that you can just sort of let go like that. What I'm saying is, it allow us to adventure into other things, to fulfill the needs of our job and also it will make us more effective because it also make us think of different ways of teaching our students or communicating our education to our students, meaning that they don't have to rely on us 100 percent and we can rely on the system to deliver the information when we are not able to be there. I think that's very important. (Lecturer B)

This study highlights that ten respondents understand the importance of IBIMS in facilitating teaching and learning in MRUs, especially to provide platforms for

communication, for collaborative work, and to upload and access course materials.

7.1.3 Research and innovation

All academic staff and four executive officers claim the importance of IBIMS in facilitating research and publications. IBIMS help individuals and organizations to manage research and publications, provide methods for information storage and retrieval, and enhance interoperability, where research and study projects can be monitored and discussed in detail. For example, Lecturer C claims that SMPU (Sistem Maklumat Penyelidikan Universiti – Research University Information System) in her university assists lecturers and administration to manage various data, including financial information, details of duration of the research, and details about members of a research team. She said in the interview:

> [F]or example like you open up the…SMPU or the research, Sistem Maklumat Penyelidikan Universiti, there will write down there two…one whether you are a leader of a research team or where you can have access to…hmm…the financial information on how much you have spent for that research and the other one…is whether you are just a co-member of the research team. (Lecturer C)

Data and information about individual publications can be registered on an electronic repository or e-Rep, where the system helps people to create their own curriculum vitae (CV) or resume for personal and organizational use. For example, Lecturer C said that "for example like every year we have to register whatever publications that we have into e-Rep…we called it e-Rep, so once we have put that in, it's like…a CV for us, so we can go back to the page and print it out for future use". Lecturer H indicates that IBIMS help him to conduct a personal audit and to evaluate the latest academic publications of academic staff. He stated in his interview:

> Number two, resume of staff, list of publications, we can also get the latest listing of publications of our internal staff. For example, we do have audit evaluations, so before the

> audit begins, we got to make sure that all the system online is compatible with the documentation. For example if staff said that they got 10 publications this year, it must be reflective of that their files, their documents. (Lecturer H)

As a university researcher, Lecturer A refers to "talking about, as a innovator, you need to do something ahead. If you are not ahead also…the IT or the system is there, you need to be hands-on, really use it...". It increases skills and knowledge in new technologies so that staff can function effectively at the global and international level. For example, some respondents claim that IBIMS enable them to conduct research with other people in research or collaborative teams. As noted by Lecturer G:

> OK, I'm able to work with some of my friends not from this university but…from other university through this online system, and it's very helpful, we are conducting research…collaboration of research. (Lecturer G)

Based on the above findings, this section concludes that IBIMS are important in expanding the potential of MRUs' core business, especially in management, administration, teaching and learning, and facilitate research and publications. This study shows that ten (all) academics and four officers understand the importance of IBIMS in MRUs. However, in order to understand more about the widespread acceptance and use of IBIMS, the author argues the importance of focusing on academic staff members' feelings about IBIMS. In order to do that, it is necessary to examine more deeply the use of IBIMS among academics through open-ended questions (as described in Chapter 4).

In MRUs in a developing country, the use of IBIMS as online platforms may vary among individual academics and organizational cultures in facilitating research input (resources), research processes (research tasks) and research outputs (research outcomes).

Thus, the following section explains in more detail the use of IBIMS based on responses to the open-ended questionnaire. Answers seek to complement the above findings and to describe in more detail the significant use of IBIMS by academics in the university context, specifically from research university perspectives.

7.2 Academics' conceptualisation of role of IBIMS in research management

Today's universities have been transformed by significant research management processes where the virtual environment and Internet connectivity is increasingly influencing how they work. The above section revealed that IBIMS are important in managing functions such as research, teaching and learning. However, the important question for research universities is: how and why is the system important in managing data and information about people's research? To answer this question, the author created an open-ended questionnaire format, distributed by electronic mail to all ten academic staff involved in the second phase of the study so that more information about the usefulness of the IBIMS was elicited, particularly from the research perspective. Seven (70%) people responded to the questionnaire.

The original textual data was analysed to understand how well academics conceptualise the importance of IBIMS in their research management processes, especially in day-to-day tasks. It also explains what functions IBIMS undertake in helping and supporting academic staff in research collaboration, research performance, and in their individual and organizational profile. The following sub-sections describe the main findings of this approach.

7.2.1 Functionalities of the IBIMS

Lecturer D indicates that IBIMS provides access to online forms and digital documents at any time and in any place. With the Internet, IBIMS help in several functionalities: for example, accessing and filling in online forms and documents linked to research. She said:

> When everything (for example information and important forms and documents) is available in an online format I find that my work is made easier. Information is available anytime and this is very important because sometimes I may be working late (after hours) and in need of specific items that may be difficult to acquire should I depend on personnel who may not be at his/her desk at the time. IBIMS system also helps make work faster as easy access to documents and easy process of filling up forms online helps cut time having to do them manually. It is quicker sending documents by the click of a button than having to walk around the university looking for an address. (Lecturer D)

The above points of view show that academic staff compare the system's functionalities, and agree that online forms are superior to manual systems and paper-based forms. Lecturer G highlights the availability of online forms in allowing academic staff to manage their research finances better. For example, one part of the IBIMS in University C helps researchers by making it easier to fill out, claim and send research expenses in an electronic format. According to Lecturer G:

> While IBIMS offers great assistance yet the system still needs to be improved. For instance, in terms of research claims, researcher needs to fill up the e-claim forms. Then send it for process. Well, that takes only some 30 minutes if the connection is good. (Lecturer G)

On this theme, Lecturer I makes the point that IBIMS ensure that travel claims are processed faster, taking as little as two weeks, compared to the previous paper-based procedure:

> It makes the process faster and simpler not to mention paper less. For example my travelling claim is processed within two weeks compared to previous conventional method which up to one month. (Lecturer I)

IBIMS not only help academic staff manage research finances better, but also assist in planning research projects and contact with other universities and countries, outside Malaysia. Functionally, online connectivity through computer networking and communication devices provides the means to communicate and share research materials. Lecturer H commented that:

> This is where the IBIMS system makes it really user friendly and helpful for me when it comes to the planning stage of my research work because one of my research projects involves members who are from other institutions of higher education. Due to this, we rely a lot on online networking and information sharing and this is where the IBIMS comes in handy for me. (Lecturer H)

This section reveals that academic staff use a specific part of IBIMS in the university because this system has benefits and functionalities, especially in completing research tasks and personal activities.

7.2.2 Management of individual research tasks

In managing day-to-day research tasks, only certain types of IBIMS provide significant contributions to academics. As mentioned by Lecturer A, Sistem Kewangan Universiti (SKU, or in other words the University Financial System) and SMPU, are relevant to his research tasks: "With regard to day-to-day management of research tasks, I would say SPPU and e-cuti are not relevant, except for SKU and SMPU." However, IBIMS inevitably help academics to organise, plan and share research data and information with research team members in an online format, and through a virtual world of connectivity. This is claimed by Lecturer H:

> The IBIMS system has indeed a very high impact on the day-to-day management of my research task specifically in terms of the organizing of my research data online which is also made available via the online networking sharing system with other members of the

> faculty who are also involved in the research project. Apart from that, I used the IBIMS system extensively when making planning and organizing my research process. (Lecturer H)

IBIMS also assist academic staff to manage research outcomes better. Lecturer B and Lecturer C state that their university offers a better electronic repository system that registers, stores and accesses research publications such as journals, book chapters, monographs and conference proceedings. Lecturer B commented:

> In my case, I think the system is useful and impactful if it is maintained well. I usually use the system to manage the financial aspect of my research, and also to register publications out of the research that I have done. (Lecturer B)

According to Lecturer C:

> The outcome of research is currently assessed by the number of publications related to the research, either in journals, books, chapters in book, proceedings, etc. This can be traced via the e-Repository (e-Rep) or e-Penerbitan under the purview of the Main Library. (Lecturer C)

Furthermore IBIMS help academic staff manage research finances like the monitoring of research expenses and fund allocations:

> The main IBIMS related to research in University A is SMPU (Sistem Maklumat Penyelidikan Universiti). The main feature in this system which impacts the management of my research is the financial research management. As lead researcher, I am able to track expenses and balance of monies from the fund allocation. (Lecturer C)

IBIMS enable academic staff to utilise online forms for other research tasks and research networks such as applying for conferences, seminars, workshops and training sessions. Additionally, they also can use a specific feature of IBIMS when applying for graduate research assistance from their university's Centre for Research and Innovation Management:

> Another IBIMS is the Sistem Permohonan GRA, which enables me to forward Graduate Research Assistant application to the Centre for Research and Innovation Management (CRIM) of University A. Other IBIMSs which have impact on the day-to-day management of research are U3P (e-Mohon Persidangan) and e-SPEL (Sistem Pengurusan Latihan) in which researchers apply for approval to attend conferences, trainings, workshops, seminars, etc. (Lecturer C)

It is evident that the importance of IBIMS lies in supporting academics and other researchers to manage research-related data and information such as financial records, publications, papers, monographs, study materials, and so on.

7.2.3 Collaboration in research

Today's research and innovation culture is becoming more collaborative and collaboration means being able to sustain national and international engagement with various scholars and research institutions worldwide. With the growth of computer networks and the Internet, collaboration and connectivity between these entities is transforming local research services into international levels of research. However, how do new technologies help research institutions to provide their stakeholders (academics, researchers and students) with open access to collaborative platforms and means of communication? To answer this question we need to understand how research management systems such as IBIMS complement the research process.

To answer the above question, this study found that three academic staff members conceptualise the importance of IBIMS in providing collaborative platforms and channels to enhance their visibility and connectivity with other universities' research teams. For Lecturer A, IBIMS play a significant role as a "push and pull" factor to drive, maintain and sustain research collaboration:

> In same aspects, I would say "yes" as being a research member I am fully informed of the projects involved coupled with the other members in the team. Likewise, the system provides a channel of communication with the project leaders. However, the actual collaboration comes from the human synergy. That is where all project leaders are playing a vital role as the driving force in such research collaboration. (Lecturer A)

Lecturer H claims that IBIMS enhance research-related collaboration work in terms of online storage and online networking, sharing systems with universities' research team members:

> The IBIMS does not only save time and money in terms of collaboration online with members who are situated a distance away from me, but more importantly the features of the online collaboration aspects make the system a really useful tool for conducting research work. (Lecturer H)

However, in certain universities (University A), open access to research data and information in IBIMS is not completely available to external researchers from other institutions. Lecturer C claims that IBIMS in her university provide a collaborative context for internal researchers only, and do not enhance research between universities:

> In terms of collaboration, the IBIMSs currently in University A are solely for internal usage, i.e., researchers from other universities could not access the systems developed by University A, and vice-versa. However, the facilities provided by the IBIMS are accessible by all research team members in University A. (Lecturer C)

Due to these limitations, four academic staff cannot conceptualise how IBIMS help them to exchange ideas and communicate research skills, data, information and knowledge. Lecturer B said, "Not really and not sure how that can be done either. I think there's no such facility in University A".

Researchers go outside the system to interact and collaborate with other team members. For example, in order to facilitate research collaboration with other disciplines and

universities in a 24/7 research culture, they may give more priority to emails, mailing lists or yahoogroups. Lecturer D stated:

> The *yahoogroup* system for example, has helped me tremendously in terms of communicating between groups, be it groups at work as well as research groups. (Lecturer D)

Similarly, Lecturer G made the following statement:

> E-mails were mostly used to send info and discussion and etc were still conducted off line and when this occurs other problems may arise, for example to find time where all can meet up. (Lecturer G)

Some academics highlight the importance of traditional ways of communication such as telephone and face-to-face communication because they are still important when discussing collaborative research-related issues:

> No. We are still doing it the old ways i.e. communicate over the phone or various face to face meeting. While we network with researchers from out of state etc, yet for most part we still meet in person. (Lecturer G)

One major reason for using these methods of communication is to show that real/physical human communication is still important when trying to understand people's decision-making in the research collaboration process. Lecturer I claims that: "No really. We need to actually meet the person and understand his/her character first before we could collaborate with someone."

This study reveals that IBIMS make a significant contribution to improving and maintaining internal collaboration between researchers, with specific interactive features in the system. It also emphasises the importance of other communication channels outside the system, such as e-mail.

7.2.4 The impact on research performance

In positioning HE institutions within the global, international market, universities concentrate on providing talented human capital, establishing an international level of learning and research environment, and high quality research outcomes. This section aims to understand how researchers in MRUs respond to the impact of IBIMS on their research performance. Out of seven researchers, only three easily conceptualise the impact of IBIMS in this context. As explained by Lecturer C, IBIMS do have an important impact on her work by measuring the Key Performance Index (KPI) required by the university:

> The system IBIMS does have impact on my research performance. An example is the research outcome which is measured by the number of publications and can be retrieved from e-Rep information. This in turn determines whether I have fulfilled my Key Performance Index set by the university. (Lecturer C)

Lecturer H indicates that IBIMS provide effective data management with organized research-related information in order to increase their research performance when compared to the manual IS (paper-based methods and physical storage):

> The IBIMS system does have a high impact on my research performance. For example, when comparing my research work today which uses the IBIMS system as compared to my research work years ago which were conducted manually, obviously the results of my research related work and activities which were generated using the IBIMS system were indeed more effective and more organized as compared to the data of the research work conducted fully manually. (Lecturer H)

Similarly, Lecturer G claims that IBIMS enable researchers to share and distribute data electronically among team members. This enhances research information flow, and leads to improved research efficiency:

> So far I think the only main thing that the IBIMS is helping is just for dissemination of information. Info from the office of the DVP (R&I) was sent to the Deputy Dean (R&I) and then it was distributed to all members in the faculty. (Lecturer G)

However, some academics are unable to conceptualise the impact of IBIMS on their research work except for enhancing information storage and information retrieval. Lecturer A said:

> I don't think the research performance is impacted by IBIMS solely but the system may only facilitate for its convenience of information storage and information retrieval. (Lecturer A)

Lecturer B does not know how the system will enhance research performance, but claims that IBIMS fundamentally support researchers by providing online forms for attending conferences: "Not really. I find some forms such as application to attend conference are getting more complicated". Furthermore, this researcher did not seem to fully appreciate the impact of IBIMS in increasing research performance. As suggested by Lecturer D, individual researchers, team members and the research group are the important elements in ensuring that research is successful: "I cannot say that this has happened to me because research performance is either an individual effort or a group's." On the other hand the success of IBIMS in enhancing research performance does not necessarily work with certain research clusters or units: for example, with research in laboratories it did not influence individual research performance. This is because laboratory-based researchers focus more on the use of laboratory instruments compared to IBIMS in improving their research performance. Lecturer I said: "A bit. Because my research is a wet lab-based chemistry."

This section confirms that IBIMS do not necessarily have a significant impact and influence on researchers in terms of improving research performance, except to improve data management and information flow.

7.2.5 Individual research profile productivity

This section describes how IBIMS encourage academic staff and researchers to raise their individual research profiles so they can market their research areas and clusters, expertise, and research outcomes. This approach represents one of the fundamental strategic plans in positioning research universities to promote and compete nationally and internationally.

The findings indicate that IBIMS help individual researchers to monitor their professional development as civil servants so that they carry out what the government requires in terms of policy implementation. It is also important to develop and organize better individual staff profiling, and to optimise the use of digital information in human resource management. As suggested by Lecturer C and Lecturer I:

> All civil servants, including University A staff, have to fulfil a minimum of 42 hours of continuous professional development annually, as required by the Malaysian Public Service Department, and SPPB manages this function efficiently. The bulk of IBIMS developed by University A is purposely for individual profiling and human resource management. (Lecturer C)

> It helps me to organize my profile better and a lot easy to access. (Lecturer I)

IBIMS are able to record people's research histories and outcomes, and produce their resumes and CV. It is not only important to promote researchers' work in annual performance appraisals but also to show their current talents and future academic potential. Lecturer B said:

> It allows me to check what I have done. I can generate my CV, however, at the end of the day, the CV that can be used for promotion etc. has different format. I feel the CV generated from the system is useful as a way of checking what you have done. (Lecturer B)

Lecturer C stated:

> The first thing that crossed my mind when I was asked this question was the information in the IBIMS can be retrieved by University A for assessment in annual performance appraisal. The repercussion and impact is on the future and career of researchers/lecturers. (Lecturer C)

In the context of promoting human capital skills and knowledge, IBIMS help universities to store, publish and promote individual research clusters, areas of study and research outcomes (publications, patents, books, and so on) through online-based publicity. IBIMS help individual researchers to establish their expertise online, internationally and at minimum cost, so are effective in an increasingly competitive research environment. Lecturer H claimed:

> The IBIMS has a strong impact on my individual profile through the concept of online publicity. For example, using the IBIMS system, I am able to publish my research data online and this obviously can be viewed and accessed by other researchers, students, academicians in other parts of the world. This not only would help to promote my individual profile internationally, but more importantly it helps to publicise my expertise and my areas of interest in terms of research cluster to other researchers in other parts of the world. (Lecturer H)

However, the findings indicate that some (three) academic staff members cannot conceptualise how the system helps them to enhance their individual research profiles, except to generate CV forms:

> I feel the CV generated from the system is useful as a way of checking what you have done, however, it does not help me develop my individual profile. (Lecturer B)

> Thus far, non-applicable. (Lecturer G)

Lecturer A claims that he uses outside applications to develop his online individual profile, for example academia.edu. This is because IBIMS in his university did not provide special guidance on how to develop an online profile:

> I develop my Web profile through academia.edu and not IBIMS. The system may have the facilities but no guidance has ever been provided as to how to develop our profiles online. (Lecturer A)

This section reveals that some academic staff know how to utilise IBIMS to develop their individual profiles in order to promote research and its outcomes. On the other hand, some cannot relate the importance of IBIMS to their individual profiles.

7.2.6 Research group and institutional reputation

In global education systems, most universities use new technologies to transform advanced research-related activities and manage institutional resources. For example, IBIMS help MRUs to promote their institutional profiles, research clusters, researchers and their expertise, and research outcomes. As noted by Lecturer H:

> In terms of using the IBIMS system to promote my organization's profile as a research university, the IBIMS system is indeed very useful especially in terms of highlighting the total number of research projects undertaken by the individual researchers, by researchers according to cluster at the faculty level and by the total number of researchers which are clustered according to the university's research cluster system.

In the research university context, IBIMS promote research matters, facilitate research-based management processes and documentation, and improve research reputations in a global ranking of institutions. Lecturer D remarked:

> As a research university, the world university ranking is deemed particularly important in terms of the image of the institution locally as well as internationally. When the IBIMS system can help assist and expedite various processes of documentation, the university can better qualify to be in the ranking list. This can increase the reputation of the university as a research university. (Lecturer D)

Lecturer H commented:

> In terms of using the IBIMS system to promote my organization's profile as a research university, the IBIMS system is indeed very useful especially in terms of highlighting the total number of research projects undertaken by the individual researchers… (Lecturer H)

For this reason, research universities require information management systems to promote institutional reputations through better management of research plans, sharing of resources, data mining and research outcomes. According to two respondents:

> To become an RU, the organization/university that I am serving now should adopt the IBIMS as it really helps in terms of planning, dividing and sharing of resources, data mining, controlling, report writing, and so forth. (Lecturer A)

> I believe, as a research university, the IBIMS does assist and organize research management of University A. (Lecturer C)

Lecturer I and Lecturer A claim that IBIMS help the university to effectively organize its profile, and provide information for external people and organizations. This enhances its institutional reputation:

> It helps the university to organize its profile better and a lot easy to access once the information are needed. (Lecturer I)

> Time is the critical factor and more still this electronic system provides accuracy in all aspects, except for human emotions. (Lecturer A)

Thus IBIMS provide an effective means to promote universities and researchers currently, internationally and with an eye to the future. For example, research outcomes and researchers' expertise may help a university to obtain national and international recognition. Lecturer H said:

> Currently, the organization (university) I am attached to has set a certain target for academic staff members to achieve in terms of research projects and publications and this

> is where IBIMS can help to promote and project these numbers for international recognition. (Lecturer H)

The findings indicate that only one lecturer cannot conceptualize how IBIMS could help the university facilitate its institutional profile and reputation: “Not sure. We have been asked to keep submitting info, but I don’t see anything is done” (Lecturer B).

Therefore, this section confirms that researchers recognize IBIMS as important facilitators of institutional reputation, recognition and ranking assessment.

7.2.7 Organization’s management of research

The growth of information management systems, storage devices and Internet facilities provides a university with more effective management of research. The findings indicate that IBIMS in research universities not only facilitate effective and efficient management, but also help to support a high level of management functions such as planning, delegating, guiding and controlling of research projects. Lecturer A said:

> Definitely IBIMS has facilitated the management process more effective and efficient. It overcomes the human errors and makes the process fast. The system covers well in all four functions of management, i.e., planning, delegating, guiding, and controlling. It is especially important in controlling as to check the progress of all research projects awarded. (Lecturer A)

IBIMS are not only important for checking stages of research. They are also part of the aggregation of research management practices according to particular fields of expertise and research areas. In information retrieval, research data and information can be easily accessed by other people across the globe through advanced IT infrastructure. As noted by Lecturer H:

> The IBIMS system help impact on my organization's management of research through the clustering of research projects according to the field of study. For example, according to the Social Sciences cluster, my organization would group and cluster total number of research projects which were awarded to academic staff members who are currently attached in the Social Sciences faculty. This way, the IBIMS system helps organize the information about certain research projects so that these information can be easily retrieved and accessed by other researchers across the world. (Lecturer H)

Effective organizational management of research through IBIMS allows researchers, other staff and the Centre for Research and Innovation Management (CRIM) in MRU to access information about research grants, research clusters, research teams and research outcomes more quickly. Lecturer C said:

> I believe the IBIMS does have impact of University C's research management, particularly for CRIM. Details of research grants and outcome information may be retrieved quickly and efficiently, for example from SMPU. (Lecturer C)

IBIMS can be used to assist information flow in distributing and monitoring research findings and outcomes, research grants, and individual and organizational research performance that is consistent with the quality of research management processes. Lecturer G stated:

> They could easily distribute and monitor info. For example to ensure that all researchers submitted their reports, the DD (Research and Innovation) conducted a seminar where all researchers presented their findings. (Lecturer G)

Two academic staff members could not explain or describe the relevance of IBIMS to institutional research management at their university. One of them stated, "I can't answer that. I am sure the organization finds it useful." (Lecturer B). The other one said that he

could not explain why because he was not on the management team: "Not sure since I'm not holding any position in the management team of the university" (Lecturer I).

This section reveals that IBIMS help research universities to efficiently manage their research needs and procedures. IBIMS are also useful for specific end users such as executive officers, managers and researchers in managing research data and information.

7.2.8 Lack of IBIMS functionalities

There is no doubt that useful and effective IBIMS will sustain the quality of functionalities in facilitating individual and institutional research management. In order to do that, Lecturer A stresses that the university should focus on the importance of staff or human elements in handling standard operating procedures such as administration of research issues. He claims that we cannot rely completely on technology in managing research issues, but need to bring together the power of people (staff) to produce productive outcomes in any research intensive university:

> CRIM has left all administrative matters to IBIMS until its staff lost ideas of standard operating procedures. The staff's complacency has indeed cause a lot of problems to the researchers. Personally, besides "high tech" there must be "high touch" as well. Electronic shouldn't take away the human elements, in which "technology" should only complement the "human" efforts. (Lecturer A)

IBIMS do lack certain functionalities such as information quality (accuracy), the isolation of different interfaces (systems are not integrated), and technical problems (server reliability and connectivity). Lecturer B and Lecturer D claimed respectively:

> For me, each department requires different interface, and these interfaces are not necessarily interconnected. (Lecturer B)

> The only problem is if there is no reliable server and connections get lost; worst is when connection is lost at crucial times, i.e., before the submission of a particular report. (Lecturer D)

For example, because systems are not integrated, academic staff are unable to download their CVs from other systems (portals), especially when applying for new research grants. Lecturer G remarked:

> When applying for any research grant, researcher needs to include their CV. Every year, researchers need to key in data to the University's portal yet, that info can't be retrieved for the purpose of applying grants etc ... there is still a need to fill up the form for CV over and over again. (Lecturer G)

This structure of systems also clusters most people in the university, so that they have different levels of access control and authentication in using IBIMS. So some researchers are unable to complete research-related tasks in good time. Lecturer D said:

> However, I have experienced not being able to complete a form because I did not belong (or the particular thing requested is not in the system) in any category in the system and thus was not able complete it. (Lecturer D)

It is also time-consuming to use certain parts of IBIMS, especially where more documents are needed in digital format for specific tasks and must be processed accordingly. For example, Lecturer G indicates her frustration and dissatisfaction in working with electronic claims (e-claim) applications:

> This was really a hassle. For example I had submitted my claims months ago however since I had not submitted the relevant documents the claim was not processed. It took me only about 30 mins to submit the claim forms online yet due to the other procedure my claims were not processed. (Lecturer G)

This section reveals a lack of functionalities in IBIMS for managing research-related work. However, this is not surprising because some organizations are experiencing various kinds of challenges in their efforts to enhance their technology and how it is used.

7.2.9 Expectations of IBIMS functionalities

To ensure that the IBIMS work to their full capacity in research universities, this section highlights some academic staff members' suggestions for and expectations of IBIMS functionalities. The findings indicate the importance of having a user-friendly system and communication facilities so that more people are encouraged to use IBIMS. For example, Lecturer D stated that the university should develop IBIMS so that it has a Facebook-like system:

> However, I personally think that it would be better if the system is built in with communication facilities. Whether or not users will end up using an IBIMS *Facebook*-like system can only be known if one is built and tested. (Lecturer D)

The university also needs to focus more on user-centric systems so that it can support the interconnectedness of multiple systems, centralize and organize research information, and reduce unnecessary problems (loss of data and better identification of inaccurate data). Lecturer G said, "More focus centralized and organized. I remember when I conducted a research for Yadim, the system was so messed up they lost file, etc...".

Conversely, Lecturer C suggests that the government, specifically the MOHE, should develop a specialised research management system that can support research collaboration for scholars and researchers in all universities, research centres and other organizations in Malaysia. It is important to ensure that an interdisciplinary research culture grows because it will provide national connectivity for talented researchers, scholars, and possible Nobel Prize winners:

> Probably the Ministry of Higher Education (MOHE) could think of developing a research management system that could link collaboration of researchers from all public and private universities/higher learning institutions in Malaysia.

This section suggests that academic staff members recognise the importance of enhancing and positioning the development of IBIMS so that they effectively manage research. Furthermore, the future development of IBIMS needs to focus on certain functionalities and technical features (user-friendliness and communication functions) so that more opportunities for researchers who can use the system efficiently are provided.

7.3 Summary

This chapter reveals that IBIMS are not only important for enhancing the management and administrative functions of the university, and to complement teaching and learning capabilities. They are also significant in assisting individual academic staff and research universities in managing research input, processes and outcomes. The findings presented above are discussed in more detail in Chapter 8 to examine the relationships between IBIMS acceptance and the MRUs' need to facilitate research processes and management.

Chapter 8

Discussion of the study

8.0 Introduction

This chapter discusses several findings from Chapters 5, 6 and 7 in relation to the objectives of the study. As described in previous chapters, data were collected through the mixed methods research approach. The findings revealed employees' feelings and perceptions regarding OCS and the use of IBIMS at MRUs. Specifically, this study reveals the importance of usefulness, ease of use, interactivity features, usability and IS quality in increasing OCS with regard to IBIMS use. It also shows how the mixed method approach facilitates an understanding of employees' acceptance and adoption of IBIMS in MRUs. Qualitative data offers new insights in this area. Thus, this chapter synthesises important issues and other factors mentioned in interviews, and open-ended data concerning people's use of IBIMS in administration, teaching and research.

Without any doubt, IBIMS provide employees with many benefits and relative advantages. However, to understand specific issues and examine OCS and IBIMS acceptance, it is necessary to extend our analysis beyond technological features and empirical evidence. Each group of employees facing technology adoption has different requirements. This chapter discusses the relationship between IBIMS acceptance in the area of research management, especially in managing academic staff members' research processes. The following sections discuss the main findings to explain how the results are important to technology acceptance knowledge generally, and the use of IBIMS in research institutions specifically.

8.1 Effect of IBIMS usefulness on online communication satisfaction

The study proposed that usefulness of the system has a significant impact on individual employees' OCS when using IBIMS. In supporting hypothesis 1, the results of the data analysis show that usefulness of the systems was significantly and positively related to OCS. This finding is supported by comments elicited during interviews which indicate that a majority of employees understand the importance of the usefulness of the system in helping their OCS. The findings are in line with previous TAM studies which indicate that usefulness has a positive impact on users' satisfaction and attitudes to using systems (Amin 2007; Davis 1989; Mohd & Syed Mohamad 2005; Pynoo et al. 2012; Ramayah & Mohd Suki 2006; Ramayah et al. 2009).

The above findings confirm that employees are satisfied with online communication when systems are functioning properly. This study reveals that employees understand the importance of usefulness and OCS when utilizing IBIMS in their workplace duties. When employees recognise the importance of a particular system, they will demonstrate positive OCS, behaviour and attitudes to using IBIMS. Therefore, it seems that MRUs should regularly explain and promote the benefits of systems to individuals and organizations in order to improve employees' perceptions and acceptance of IBIMS.

This study not only provides empirical evidence for the perceived usefulness of IBIMS in gauging employees' OCS in the use of IBIMS; it also documents empirical evidence for the applicability of the TAM model to a particular context. TAM can be enhanced or incorporated with other concepts to improve its usefulness, especially to measure communication satisfaction when employing online systems. The findings add to the technology acceptance literature and knowledge in other studies which conclude that perceived usefulness of systems affects employees' attitudes and intentions to use a system

(Davis 1989; Premkumar & Bhattacherjee 2008; Rampersad, Plewa & Troshani 2012; Selamat, Jaffar & Boon 2009; Tung, Chang & Chou 2007; Wong & Teo 2009).

8.2 Effect of ease of use on online communication satisfaction

This study proposed that there is a positive relationship between ease of use of IBIMS and employees' OCS. The results of data analysis show that ease of use was positively and significantly related to employees' OCS when using IBIMS, and thus support the second hypothesis. The finding was supported by qualitative results in Chapter 6 indicating that most employees view perceived ease of use important to improved employees' perceptions of OCS and IBIMS functionality. The results reveal that the characteristics of a particular system such as ease of use are important and may enhance employees' OCS regarding IBIMS in MRUs.

One possible reason is seen in some employees' interviews claiming that the system is easy to learn, access, understand and navigate, and that it supports flexibility of interaction. As a result, ease of use has a positive impact on employees' attitudes to the system, and intention to use it. This is in line with other studies (Amin 2007; Pynoo et al. 2012; Ramayah & Mohd Suki 2006), which claim that ease of use of the system increases and subsequently enhances employees' satisfaction. This finding helps to extend previous studies that mostly focus on investigating the influence of ease of use on users' satisfaction, intention to use and actual system use (Agawal and Prasad 1999; Castaneda, Leiva & Luque 2007; Davis 1989; Legris, Ingham & Collerette 2003; Premkumar and Bhattacherjee 2008; Rampersad, Plewa & Troshani 2012). Specifically, this is a new study that provides empirical evidence of the effect of ease of use on OCS, particularly in the context of using IBIMS among administrative officers and academic staff at four MRUs.

This study confirms that employees are satisfied with their online communication, and understand the importance of ease of use of the systems to perceived OCS. When employees recognise the ease of use of a particular system, they show better satisfaction, behaviour and attitudes to the system in their workplace. In contrast, if employees perceive difficulties in using the system, there is a possibility of them abandoning IBIMS. Therefore, it seems, system developers in MRUs should focus carefully on system design, especially interface characteristics, in order to provide ease of use and increase employees' OCS. For example, system developers could improve their IBIMS with user-friendly interfaces, simple language and instructions, and easy navigation structures to increase communication satisfaction for individual employees using the systems.

8.3 Effect of interactivity features on online communication satisfaction

This study proposed that interactivity features in the system are important and positively contribute to enhancing employees' OCS when they access IBIMS. The results of the data analysis show that interactivity features have a positive impact on OCS. The findings of data analysis support the third hypothesis of this study. These interactivity features at four MRUs have key feature, described by employees: customisation features; good communication speed; prompt response to any instruction; suitable contents; functionalities; and hyperlinks. These responses emphasize the importance of the need for interactivity features that enhance human-computer interaction, make interaction possible and generate positive feelings and experiences about online work (Chen & Yen 2004; Dolen Dabholkar & Ruyter 2007; Fiore 2008; Poster 2007). This study suggests that interactivity features should be focused on by the system developer in order to increase employees' satisfaction towards use IBIMS. Sims (2000) claims that students need interactivity features in online learning systems to improve interaction. Therefore,

employees in MRU also require interactivity features in their online systems to increase participation and communication needs.

Further, this study is congruent with other analyses, especially that of Gleason and Lane (2009), who indicate that there is a positive relationship between a system's interactive features and users' satisfaction with communication events. They also claim that the integration of interactivity features, such as relevant user experiences, technological features and reactive content, significantly contribute to users' satisfaction with communication. This study is in line with Gleason (2007) and Gleason and Lane (2009) which establish that in relation to IBIMS use, interactivity features have a significant relationship with OCS. Thus, better quality interactivity features in IBIMS can enable more communication satisfaction and create positive attitudes towards, and intention to use, systems among employees in MRUs.

In previous technology acceptance studies, discussed in Chapter 3, scholars have examined several theories and models. However, this study shows that they lack data on those interactivity features related to OCS in using online systems. Furthermore, this study argues that interactivity features as described by Gleason (2008) and Gleason and Lane (2009) are important factors for understanding users' satisfaction with communication events. Interactivity features may also be external variables to enhance and extend the technology acceptance model (TAM) by Davis (1989) in examining employees' OCS and attitudes to using IBIMS. The findings reveal that interactivity features are significant as the variable to enhance the basic model (TAM) in the conceptual framework of the study. Therefore, this study also modifies the claim made in the TAM model that only usefulness and ease of use are the success factors that promote positive attitudes to systems and knowing how to navigate them.

8.4 Effect of usability on online communication satisfaction

This study proposed that usability of the system has a positive relationship with OCS when using IBIMS in the workplace. The findings of data analysis support the fourth hypothesis of this study. This study reveals that usability of the IBIMS is an important factor that can enhance employees' OCS in MRUs. Interviewees contended that simplicity and user-friendliness are two usability features that affect employees' OCS. This study also describes employees' positive reactions to IBIMS because it offers full control of their work and adequate information to do their jobs. It is shown that usability of IBIMS contributes significantly to the degree to which users easily control and navigate systems. Koohang and Ondracek (2005) claim that the usability of a system is the degree to which users easily and effectively use a system to complete tasks. They also suggest that usability is a relevant and important technique with which to understand user acceptance of a system.

Therefore, this study is in line with previous studies (Koohang & Ondracek 2005; Preece 2001), which claim that usability testing is important to investigate the success of online system features and user acceptance, and that usability is one of the key factors in providing user satisfaction with system usage. Chui et al. (2004), Robertson (2007), Thong, Hong and Tam (2004), and Wichansky (2000) also contend that usability of the system is one of the important elements in enhancing users' satisfaction with and acceptance of online systems. Thus, the study reveals that usability of the system is one of the key important variables that extend the TAM model, by examining employees' OCS with online systems such as IBIMS.

The above arguments show that this study is significant because it provides empirical evidence on the importance of usability of the system to perceived OCS in the use of IBIMS. This reveals that usability of the system may potentially benefit OCS, and offer possibilities for observing technology acceptance.

This study therefore helps to bridge the gap and extend our understanding of the effect of usability on communication satisfaction through online environments in MRUs. No previous studies have explored the importance of usability for communication satisfaction in using Internet-based systems or online applications, particularly among administrators and academics at MRUs. This study recommends that research universities or other organizations should understand the effect of usability on OCS in order to influence individual users to use IBIMS because it generally contributes to overall user satisfaction in terms of system design and development.

8.5 Effect of IS quality on online communication satisfaction

The data analysis findings indicate that the IS quality of the systems is significantly and positively related to OCS, and so supports the fifth hypothesis. This study claims that IS quality elements (i.e., information quality, system quality and service quality) can enhance employees' communication satisfaction. The interviews reveal that employees acknowledge the importance of these IS quality elements to their OCS when using IBIMS. The findings agree with those in previous studies which indicate that IS quality elements have a significant impact on users' satisfaction with and attitudes to the systems (DeLone & McLean 1992; DeLone & McLean 2003; Petter, DeLone & McLean 2008).

The possible reason for this may be due to IS quality playing a significant role in providing up-to-date and accurate information for employees (DeLone & McLean 2003). IS quality

implies an efficient and accessible system that supports end users with correct solutions, prompt service, suitable user interface and reliable content. These outcomes show that IS quality is important because it provides empirical evidence for the importance of information quality, system quality and service quality that enhance user satisfaction and positively influence system acceptance (Petter, DeLone & McLean 2008). IS quality of the system potentially benefits people's OCS, but also users' satisfaction with systems, which is supported in other studies (DeLone & McLean 2003; Lin & Lee 2006; Lin, Fan & Zhang 2009; Petter, DeLone & McLean 2008).

This study significantly helps to bridge the gap and explore the effects of IS quality on OCS in using Internet-based systems in MRUs. It is evident that the IS quality of the system must be constantly improved in terms of information quality, system quality and service quality in order to contribute to better OCS and system use (IBIMS).

Therefore, MRUs should focus carefully on IS quality elements described above in order to provide better Internet-based and Web-based systems. It is important to understand the needs of system characteristics among academics and officers to significantly increase employees' OCS in using IBIMS. For example, system developers could improve their IBIMS with information qualities such as accuracy in order to prevent employees from performing work incorrectly. Thus, it is helps to increases communication satisfaction for individual employees using the systems in MRUs.

IS quality directly effects OCS and plays an important role in satisfying employees and in enhancing their effectiveness in administration, teaching, learning, and research processes in universities. Finally, this study reveals how IS quality affects OCS, using evidence in examining the acceptance of IBIMS. At the end, this pragmatic finding enables the writer

to argue that knowledge workers (academics and officers as information users) in MRUs may accomplish their individual tasks and universities goals efficiently by using IBIMS.

8.6 Effect of IS quality in facilitating collaboration on online communication satisfaction

The results of data analysis do not support the sixth hypothesis developed in this thesis. IS quality dimensions facilitating online collaboration do not have a significant effect on employees' OCS. In contrast, the descriptive results indicate that employees in MRUs only moderately agree on the importance of IS quality as a support and to facilitate online collaboration in daily tasks. There is a low level of agreement on the importance of IS quality in facilitating online collaboration, and specifically in providing communication satisfaction in using IBIMS. It may be that some employees in MRUs cannot conceptualize how IS quality helps employees to facilitate online collaboration in order to increase OCS, and to complete daily tasks in MRUs. This study is significant to an understanding of the maturity of IT uptake among employees in MRUs in order to improve collaboration works.

On the other hand, the in-depth interview findings show different perceptions of IS quality in facilitating collaboration, and how it helps to increase OCS among respondents in MRUs. The findings indicate that employees are satisfied with IBIMS use in their jobs when they are involved in collaboration and communication with other people. The in-depth interviews reveal that half the employees can recognize the importance of IBIMS as platforms with which to collaborate and communicate within universities, especially with students and workplace peers. This argument is in line with Vreede, Mgaya and Qureshi (2003), who claim that Internet-based applications can be used as online collaboration platforms to enhance and support organizations' and their employees' collaborative

activities. They argue that the advantages of IBIMS lie in positively enhancing online collaboration and communication in universities.

Even though the objective of this study did not focus primarily on this hypothesis (the relationship between IS quality in facilitating collaboration in order to gain OCS), however, the finding indicates the different understandings and perceptions from two methodological perspectives: a survey with questionnaire and interviews. This study highlights the importance of incorporating a qualitative approach to deeply understand employees' experience in using IBIMS, specifically in collaborative works. This is in line with Markus and Lee (2000) and Vreede, Mgaya and Qureshi (2003) who suggest a mixed method approach to measure the use of technologies. There is a lack of closed-ended question in the survey approach to represent how academics and officers conceptualize the use of IBIMS in facilitating online collaboration in universities or within MRUs. It shows that the qualitative approach may help researchers to significantly understand and clarify more details about employees' feelings and opinions about technology acceptance and usage (Johnson et. al 2007), and add more information in supporting quantitative results. Thus, this study is significant in gaining more insight and deep information about the phenomena of IS/IT usage in MRUs, especially, through the mixed method approach, as suggested by Venkatesh, Brown and Bala (forthcoming 2012-2013, p. 29).

8.7 Effect of online communication satisfaction on attitude towards and intention to use IBIMS

The descriptive data analysis (mean) results show that employees are satisfied with OCS when using IBIMS for online communication. The results of the regression analysis indicate that OCS is significantly and positively related to attitude to use of and intention to use IBIMS. These findings provide significant evidence for supporting the seventh and

eighth hypotheses in this study. Users' OCS through IBIMS is positively influenced by and related to the level of technology acceptance and usage. The qualitative data analysis indicates that some employees obtain OCS when using IBIMS. They also perceive that communication satisfaction is one of the motivations that influence them to use the systems in their jobs. They perceive OCS through IBIMS because some aspects of the systems help them to improve communication and interaction, enhance their online activities and tasks, and have easy access to data and information from remote locations at any time.

This study argues that CSQ as described by Downs and Hazen (1977) can be used to examine communication satisfaction (see also Hecht 1978; Mount and Back 1999; Sparks 1994). Chang (2010) argues that the CSQ is absolutely consistent and determines end users' OCS through new media and technologies such as online and web-based systems. Thus, this study recommends that future research can employ CSQ to measure OCS as an external factor that enhances and builds on the TAM model (Davis 1989). Previous studies claim that TAM has been one of the established models for explaining technology acceptance and usage with two factors, "usefulness" and "ease of use" (Chen, Li and Li 2011; Davis, Bagozzi and Warshaw 1989; Park, Son and Kim 2012). However, the findings confirm that OCS can be used to extend the TAM model to develop a suitable research framework in measuring technology acceptance and usage. This is because satisfaction is important to create individual users' intentions to use the systems (Al-Busaidi and Al-Shihi 2012). It is significant to influence employees to use IBIMS in MRUs, and to achieve the university's objectives.

This study also argues that the usefulness and ease of use of the systems significantly improve OCS and so influence users' attitudes to and intentions to use systems. OCS plays

an important role to enhance and improve the effects of IBIMS use in MRUs; specifically, to influence academics and officers to use IBIMS. Even though most previous communication satisfaction studies and CSQ have been used in examining traditional communications channels in several organizations, these contexts can still be used to investigate online satisfaction through new media such as IBIMS. This is in line with Chang (2010) who suggests that user satisfaction should be studied from several Web-based applications and communication satisfaction perspectives.

This study shows the power of enhancement of CSQ. The writer modified all the items from CSQ in order to specifically create suitable measurement tools in investigating OCS among employees at MRUs. Finally, the study highlights how OCS become important in these areas, especially in understanding end-users' communication satisfaction online, and how it contributes significantly to our understanding of individuals users' acceptance and adoption of new technologies in the workplace. Satisfaction appears to be the key motivation in developing a positive attitude to, and intention to use, technologies such as IBIMS and other Web-based systems (Park, Son and Kim 2012; Wang 2012). Consequently, this study provides empirical and theoretical evidence which strengthens the relationship between communication satisfaction and technology acceptance and usage among employees in MRUs. This study argues that a high score for OCS has a greater effect on employees' attitudes towards IBIMS in MRUs. Thus, universities should actively conduct several OCS audits in order to undertand employees' feelings and satisfaction in relation to IBIMS usage.

8.8 Relationship between attitude towards use and intention to use IBIMS

This study indicates that there is a positive agreement among employees concerning attitudes towards use and intention to use IBIMS. The findings show that the

implementation of IBIMS in MRUs is a good idea. A majority of employees intend and expect to continue utilizing IBIMS. They claim that IBIMS are effective and provide efficient functions that help them with their jobs. Results of the data analysis support the hypothesis of a simple Linear Regression showing that attitude towards use was positively and significantly related to intention to use IBIMS. Findings from the in-depth interviews indicate that most employees enjoy using IBIMS for daily tasks. In other words this study confirms that attitude toward use does influence employees' intentions to use IBIMS in MRUs.

This study is in line with the previous studies by Davis (1989), Castaneda, Leiva and Luque (2007), Chang and Chou (2007), and Pynoo et al. (2012) who found that attitude towards use affects end users' intention to access systems. Kim, Lee and Law (2007) indicate that there is a positive relationship in this context. This study reveals that employees' acceptance of new IT/IS such as IBIMS in MRUs is strongly affected by their attitudes and intentions to use systems. Oye, Iahad and Ab. Rahim (2012) also claim that users' attitudes will affect behavioural intention and actual behaviour of technology use. In contrast, it shows the importance of behavioural intention to positively influence academics and officers to access IBIMS. This is supported by Neill and Richard (2012), who indicate that behavioural intention significantly influences users to access the Internet portal. In addition, Lim and Ting (2012) also agree that attitudes to use have a positive relationship with intention to use the system, specifically online shopping.

This study helps to extend the literature by providing empirical evidence for the relationship between attitude towards use and intention to use IBIMS in Malaysia's HE sector, specifically in MRUs. This is in line with Premkumar and Bhattachherjee (2008) who indicate that there is a significant relationship between end users' attitudes towards

and intentions to use a specific system. Therefore, an extended TAM measurement tool is suitable to use in different cultural contexts, especially when examining technology acceptance, adoption and usage. This study also enhances our understanding of end users' acceptance of technology in a real educational environment in a developing country in South East Asia.

8.9 Other factors affecting employees' use of IBIMS

The above sections reveal that technological factors such as usefulness, ease of use, interactivity features, usability and IS quality are significantly linked to employees' OCS. In fact the quantitative findings indicate that employees' attitudes to technology are generally positive. However, the qualitative data analysis highlights additional unexpected feelings, opinions and experiences. The qualitative data helps to synthesise the other factors that affect employees' feelings when using IBIMS. Several additional factors are discussed here in relation to experiences, feelings and opinions.

Four key factors significantly contribute to the use of IBIMS in MRUs: benefit of the systems; technological features; social and human factors; and organizational initiatives. These factors should be integrated in order to encourage employees to use IBIMS, and at the same time help them achieve OCS. From the benefits perspective, employees in MRUs are happy using IBIMS because they offer several advantages to them and to their organization. For example, the systems are easy to use, easy to access and information can be retrieved in digital format. These strong features play important roles in providing and facilitating better quality service to stakeholders in universities through an online environment. From the perspective of management, systems are easy to maintain and make it easy to manage staff, and student records. The systems also provide platforms for data management, especially to record and share all relevant data and information. The systems

are able to retain records and help employees search for up-to-date and relevant information in their daily work. Additionally, the systems improve speed and time efficiency by providing immediate feedback and fast responses. One executive claims that the systems help them (staff) complete their tasks more quickly compared to a manual paper-based system. These factors improve workplace efficiency and communication satisfaction. Furthermore IBIMS play a significant role in consolidating communication processes between employees and top management. Employees take this opportunity to use IBIMS to collaborate and interact with others. These kinds of benefits enable them to engage in online transactions, collaboration and communication from remote places at any time. For example, researchers/academics can update details of research with other researchers through the system.

This type of system develops new governance platforms that increase transparency in the university workplace. IBIMS provide a more transparent working environment than conventional methods when processing more data, information, applications or documentation. At the same time, these systems can act as a form of surveillance or monitoring of staff activities. For example, senior management can access and share information about staff attendance, teaching and learning evaluation, claims payments and progress of research projects.

It is shown that IBIMS not only enhance employees' workplace efficiency, but reduce paper usage as part of the move towards "green organizations" and a paperless environment. Additionally, organizations are able to minimise the use of physical space by reducing the need for a paper-based filing system and hardcopy documents.

Furthermore, from a technological or technical point of view, this study indicates the importance of information system quality. The importance of content in the systems, such as relevant content, links and navigation will increase the user friendliness and simplicity of IBIMS. It indicates that the quality of systems' content and interfaces can improve employees' communication satisfaction. Employees are also concerned about the reliability of the systems in their universities. Primarily, employees measure reliability of the system by their capability to stay online and connected to the system. The consistency of the system or up time is their key indicator of stability and reliability of the system in order to support 24/7 accessibility.

These factors indicate the need for universities and system administrators to provide open access systems from anywhere at any time to employees. Trust and belief in safety and systems' security influence employees' attitudes to using IBIMS, especially in their daily transactions. It reveals that safety, and trust in the systems may have a significant impact on technology usage in the online environment. This finding shows that IBIMS need to be secured against already-existing intruders, such as hackers and unauthorised users.

Some lecturers are looking ahead, and beyond the managerial executives, regarding the benefits of the systems. For example, some stress the importance of interactivity features because they enhance and improve the use of IBIMS. Two employees also claim the importance of integrated systems within universities in order to improve accessibility and navigational capabilities. The systems need to be better integrated with existing systems. For example, employees should find it easy to use more than one system at a time without logging in too many times in different systems. In order to meet their employees' needs, universities and IBIMS developers need to provide the above technological features to encourage employees at MRUs to use systems more effectively.

Some employees indicate that motivation and support from friends and peers influence them to learn and use the system at work. Employees are happy to use IBIMS in their universities. They are satisfied, enjoy using and prefer to use IBIMS for administrative purposes, teaching and learning, research and publication. Most indicate that IBIMS increases their computer experience and knowledge. In other words, these kinds of systems help them to update their knowledge by exposing them to different types of online applications. Employees' demands, and the need to use the latest technology, are factors that shape OCS. To satisfy employees' expectations and needs, universities should provide several initiatives such as ICT training to increase employees' computer and online skills, and in turn increase their confidence in using new applications. For example, in other organizations such as schools, Ministry of Education Malaysia developed several training programs to provide general skills and knowledge specifically to teachers in using computers and the Internet in teaching and learning.

To improve computer literacy and self-efficacy among employees, university management should encourage individual staff members to help others through train-the-trainer programs. Social and human factors also have a significant impact on employees' OCS with IBIMS. In other words, workplace training schemes help to increase individual perceptions of and attitudes to the use of IBIMS in MRUs.

Organizational initiatives also play a major role in understanding the success factors of IBIMS implementation. This study indicates that employees are concerned with the efforts of their organization and system developers to introduce and promote use of IBIMS, and to enhance employees' communication satisfaction. For example, system developers from an Information Technology Department help their university by providing and managing

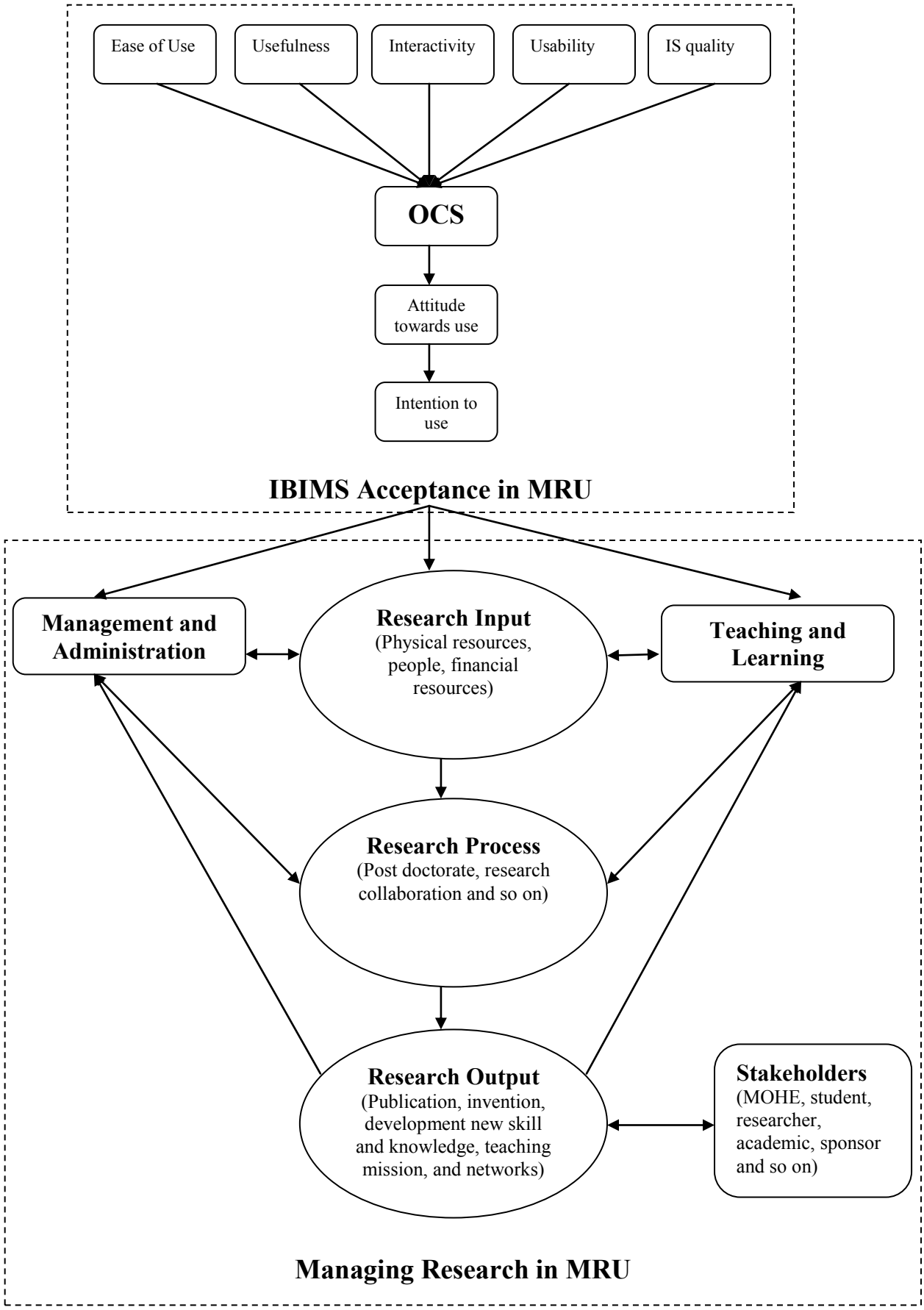
general technical resources and systems' informational needs. There are mandatory requirements to use the online system, and employees can be assisted by help desk staff, technical support, promotional activities, and training. Employees' satisfaction and positive attitudes are enhanced when the university provides the necessary information and training resources. For example, one of the best approaches is through a "road show" that explains the benefits and relative advantages of the systems in universities. Thus in order to maintain and sustain use of IBIMS in research universities, it may be necessary to re-educate, reinforce and re-engineer (re-3e) all staff, including management, academics, and administrators, on the issue of technological changes in the workplace.

8.10 IBIMS acceptance and usage in managing research-related activities

A research university can benefit from understanding the effect of IBIMS acceptance on individual researchers (academics) and the university in managing research processes. IBIMS are important in enhancing the potential of MRUs' core business, especially in management, administration, teaching, learning, and publications. In order to understand more about acceptance and use of IBIMS in managing research (see Figure 8.1), such as research input (resources), research processes (research tasks) and research outputs (research outcomes), this section discusses the relationship between IBIMS usage and research management needs.

Academics use IBIMS because they have benefits and functionalities that help them complete research tasks and personal activities. For example, it is evident that academic staff and other researchers use IBIMS to manage research-related data and information, such as financial records, publications, papers, monographs, study materials, and so on.

Figure 8.1: The integration of IBIMS with research management.



Furthermore, IBIMS help academics to improve and maintain their internal collaborative work with other researchers using specific characteristics and interactive features in the system.

Researchers need multiple modes and channels of communication to increase and enhance research collaboration. This study reveals that academics emphasise the importance of other modes of communication such as e-mail to interact and collaborate with others around the globe. IBIMS does not necessarily have a significant impact on research performance, except to improve data management and information flow. For example, academics understand how they can utilise IBIMS in order to create and develop their individual profiles, especially in promoting themselves, research clusters and research outcomes. However, some cannot relate the importance of IBIMS to enhancing their individual profiles and research performance. The question is: why do some academics in MRUs not realise the importance of new technologies in building individual profiles, and helping to improve research performance?

The answer to this question lies in the level of information technology change and academics' limited knowledge about the advantages of the system when accessing IBIMS to update their research profiles and research performance. Some academics are too busy with core business such as teaching and learning, administrative duties, research and publications, attending conferences, and community work. It is time-consuming for these professionals to understand much about the features and advantages of IBIMS.

On the other hand, IBIMS are important in facilitating institutional reputation, recognition and ranking assessment. Specifically, IBIMS help research universities to manage (store, share and distribute) efficiently data and information about research input (physical

resources, financial resources, human resources) and research output (publications, inventions, new skills and knowledge, teaching mission, awards). It is evident that IBIMS build the job satisfaction, performance and productivity of executive officers and researchers responsible for research management.

8.11 Limitations in functionality

There are certain functionalities lacking in IBIMS for managing research, such as information quality (accuracy), the isolation of different systems (not integrated), and technical problems (server reliability and connectivity). This study indicates the significance of technological features in IBIMS, in order to identify one of the key success factors to employees being satisfied with the systems. For example, this study indicates that seven academics are not happy with some of the information and content in the IBIMS. Lecturer C claims, "I can't upload the notes, so I was wondering why that happens. The problem is…there's a limitation to the number of characters for the file name". In line with that, some of the content in the system does not help them to solve their problems in daily jobs.

The study also indicates eight of the executives mention that sometimes information in the system is not up-to-date and/or accurate. These weaknesses create negative feelings and frustration among them towards the use of IBIMS. For example, Executive I claims that "when the data not up dated regularly, it is very frustrating". Thus, technological features should consist of accurate and up-to-date information, simplicity of use, better content, user friendly and quality of interface design, reliability of links and ease of use of navigation aids. Azmi and Bee (2010) in their study emphasize the importance of simplicity and ease of use to influence a user's perception in using online systems. With further reference to this, content and information require simple words, sentences, instructions and descriptions, and a minimum of technical errors and up-to-date.

Next, to improve the accessibility and navigational capabilities of IBIMS, the systems need to be well integrated through the intranet and extranet technologies. This enables employees in MRUs to use more than one system with the same username and password. It helps organization to enhance their employees' flexibility in accessing more than one system to do their work. In the study, one of the academics highlights that the systems are not fully integrated to support employees' needs. For example, in the interview, Lecturer J states that "Sometimes but we have to wait for a few days, but we have to understand different systems, they're not integrated, fully integrated". Thus, MRUs need to develop integrated IBIMS that assist employees in changing attitudes and improving their sense of satisfaction when using and accessing more than one online system at the same time. In line with that Mohamed, Hussin and Hussein (2009) claims the organization needs to enhance the interoperability to access IBIMS by their stakeholders through integrated online systems.

This study also indicates that each MRU should provide their employees with reliable connectivity to the Internet, especially to improve the capability to stay online and connected to IBIMS. Due to the technical problems, a majority of academics are frustrated with the down-time of the system or Internet. This issue contributes significant effect to employees to use a particular system in completing daily tasks in MRUs. For example, Lecturer E claims that "some of the systems are not working and helping through" her works. This reveals that the consistency of the system (uptime) is the success factor in providing greater systems accessibility. On other words, the system should be accessible in terms of its intranet and extranet environment for 24 hours to ensure employee's ability to access information immediately (Mohamed, Hussin & Hussein 2009).

To overcome these issues that employees face, the university should provide informational packages about how to effectively use IBIMS when researching and documenting their work. At a research university, future development of IBIMS needs to focus on users' needs, systems' functionalities and features (user-friendliness and communication features) in order to provide an up-to-date virtual platform that enhances individual research profiles and organizational reputation. More detail about employees' experiences of IBIMS in MRUs, specifically in understanding key success factors and barriers of the systems can be found in published work from the thesis (Mohamad Salleh 2013).

8.12 Employees' needs to perceive online communication satisfaction and IBIMS usage

This study reveals that to understand what comprises employees' communication satisfaction concerning use of IBIMS several indicators apply in MRUs. According to the findings (Chapters 5 - 7) and the above discussion, the following indicators will meet employees' needs in having OCS when they utilize IBIMS:

- Usefulness in completing tasks and needs
- Ease of use when accessing content and information in completing tasks
- Interactivity features such as the relevance of content and information, links and navigation
- Usability of the system: this includes it being easy to use and easy to learn so that the functionalities improve employee effectiveness, efficiencies and satisfaction
- Quality features such as information quality, system quality and service quality
- Benefits of the system to individuals and the organization
- Positive technological features of the systems to support technicalities and capabilities of the IBIMS

- Social and human factors such as fellow workers and senior management in motivating employees to use IBIMS
- Organizational initiatives that enhance employees' technical skills and knowledge
- Employees in MRU stress the importance of IBIMS in administrative activities, teaching and learning, and research management processes.
- In order to enhance the use of IBIMS among academic staff or researchers, the university should provide a system that enhances managing the research process and research outcomes, improves individual profiles and increases research performance.

8.13 Summary

This study reveals that ease of use, usefulness, interactivity features, usability and IS quality are significantly related to OCS, and also argues for the importance of OCS in influencing employees' attitude to using IBIMS. Technological factors, social and human factors and organisational initiatives will increase the use of IBIMS in MRUs. We cannot deny the importance of IBIMS to administrative staff, researchers and academics in managing individual research tasks, collaborative activities and achieving better individual and organizational reputations. Furthermore, this study confirms the relationship between variables in a theoretical framework and hypotheses in Chapter 3. It also offers new key factors in technology acceptance to understand better technology use in administration, teaching, learning, and research in MRUs. Finally, this study reveals the importance of the mixed method approach, and of qualitative data to enhance our understanding, not only of technological issues, but of employees' feelings and experiences.

Chapter 9

Conclusions and Future Implications

9.0 Introduction

This chapter presents the main findings and some implications of the study. It also describes problems faced in conducting the study, its limitations and possible future directions for research. The chapter concludes with a brief summary. The purpose of this study was to understand and explain the influence of OCS on MRU employees' attitudes and intentions to use IBIMS. Specifically, this study examined the effect of perceived usefulness, ease of use, interactivity features, usability and IS quality in order to enhance employees' OCS through IBIMS.

This study implemented a mixed method research approach using quantitative and qualitative strategies to explore employees' OCS with IBIMS systems. This method comprised an interview survey and in-depth interviews to collect data from two groups of employees (academics and administrative staff) in four pioneer MRUs: UM, USM, UKM and UPM. The opened-ended questionnaire helped to understand IBIMS in managing research, particularly by academics or researchers. The approach revealed the relationship between specific variables (as stated above) and OCS when people use IBIMS. This study highlighted the ability of the qualitative approach to support and contribute significant findings to understanding more deeply how employees use IBIMS in their daily research, teaching, administrative and managerial work.

9.1 Main findings of the study

The following important relationships were revealed in this study:

1. Ease of use of the IBIMS in each research university does influence and affect employees' OCS.
2. Usefulness of the IBIMS to support employees' tasks in MRUs does influence and affect OCS.
3. Interactivity features do influence employees' OCS in MRUs.
4. In terms of online collaboration elements:
    a. Usability of the IBIMS influences employees' OCS in MRUs.
    b. IS quality (information quality, system quality and service quality) influences employees' OCS in MRUs.
5. OCS influences people's attitudes to using IBIMS at MRUs.
6. OCS influences employees' intention to use IBIMS at MRUs.

In contrast, the qualitative results also revealed:

7. While technological issues are important to enhancing users' OCS, and do influence people to use IBIMS, several human factors and organizational initiatives are also critical.
8. Particularly in research universities, IBIMS allows academics or researchers to manage their research processes, especially in terms of input (e.g., people, financial), research procedure (e.g., collaboration) and research output/outcome (e.g., publication, invention).
9. The maturity of technology changes and knowledge about the relative advantages of IBIMS for university employees is one of the "push and pull" factors

determining the successful application of IBIMS functionalities in the research management process.

The detailed findings discussed in previous chapters (Chapter 5, Chapter 6 and Chapter 7) indicate that the research questions, research objectives, hypotheses and relationships have been achieved. Thus, the main findings above provide significant knowledge in order to understand the success factors that shape OCS concerning IBIMS in MRUs.

9.2 Implications of the study

This study has numerous implications and makes contributions to theory and practice in supporting MRUs and employees when they adopt IBIMS. There are certain external factors that explain end users' attitudes and intentions to use IBIMS. The importance of OCS is evident and this study reveals that individual users' communication satisfaction can be enhanced through the ability to make improvements in the usefulness of the system, ease of use of the system, enhanced usability, the quality of information systems and more interactivity features. The study contributes to the conceptual and theoretical extension of technology acceptance, adoption and usage by building on the knowledge and methodologies of other scholars on this subject.

This study shows that the research model adopted and conceptual development can be used to examine end users' OCS in using any type of new media and Web 2.0, such as social networking systems (Facebook and Twitter). It is important to adapt this model to examine OCS to evaluate the new media technologies in other universities and public or private organizations. No previous study on technology acceptance in Malaysia focused on IBIMS among academics and administrative staff, to examine and make predictions about OCS when using IBIMS in research universities. This study suggests significant implications for

certain employee groups who accept and utilise the system in managing data and information.

In addition, the qualitative findings contribute specific details on OCS in using IBIMS. It shows that OCS is a positive satisfaction about communication and interaction among users of online systems, Web-based systems, and Internet-based systems. Satisfaction is obtained through benefits received and needs being met, especially positive perceptions of the technological features of the systems, perceived social and human good, and contributions to organizational initiatives. These factors are not only significant to enhance OCS, but may influence end users' attitudes and behavioural intentions in using any type of IT, IS and new media.

On the other hand, this study helps the top management of universities to make effective and correct decisions in implementing and adopting new technologies managing administration, teaching, learning and research. In line with that, this study describes important practical implications and strategic guidelines for MRUs, other public/private HE institutions and system developers in developing and implementing IBIMS in their organizations. For example, system developers should encourage and invite end users to contribute to software/system developments in order to understand the social and human needs of the systems.

Technology acceptance studies have commonly used several models such as TAM and the IS Success Model. Most of the studies have been done in the U.S. This study reveals that the TAM and IS Success Model can be incorporated with interactivity and usability features to measure OCS, and employees' attitude towards the use of IBIMS. It provides

significant measurements of technology acceptance from the perspectives of a different culture and region with developing national information economy agendas.

This study enhances the theoretical foundation and adds to the collection of empirical evidence in explaining the importance of communication satisfaction in the use of IBIMS in educational institutions in Malaysia. It provides significant contributions to both theoretical and practical perspectives in order to understand different groups of users: especially how academics and administration staff perceive OCS in relation to the achievement of high usage of IBIMS in their daily activities. This study also contributes new literature to understanding "how" and "to what extent" the above indicators (usefulness, ease of use, interactivity features, usability and IS quality) are important in supporting online communication and increasing employees' satisfaction with IBIMS use.

9.3 Problems faced in conducting this study

The researcher faced several challenges and problems in gathering quantitative and qualitative data. In gathering quantitative data the main challenges were to obtain a high response rate from respondents to the survey questionnaires. The researcher preferred to use a paper-based questionnaire and personally distribute it to respondents. Some respondents also preferred to meet the researcher before completing the survey questionnaires rather than answer online surveys. The researcher needed extra funds to travel to four MRUs to conduct the quantitative study. Other problems encountered were time constraints on the participants answering the questionnaire. In order to improve the response rates, the researcher explained the purpose of the study and gave relevant information in the form of an information package, including an information sheet and ethical approval letter.

9.4 Limitations of the study

As with previous empirical studies, this study has limitations. The empirical data was collected in four MRUs. The findings may vary different between universities and countries, depending on relative advantages, system implementation and cultural differences. In addition, the data was collected from professional and management employees (administrators), and academics (lecturers and researchers). Future research is required to further examine and confirm the findings of the study with different employee groups such as implementation personnel (Grade 40 and below).

Another limitation is that the data was collected to evaluate general Internet-based systems and was not specific to any particular system for all research universities. The reason for this is that no standard system is used by all research universities. This study grouped all the Internet-based systems in all research universities into a single category, referred to as an IBIMS. It is possible the findings may vary from one system to another. Therefore, future research is required to examine and confirm the findings with specific or particular systems which are used by all employees in research universities.

9.5 Future research directions

This study suggests interesting line of enquiry that future research studies could examine. One possible area of research is to conduct a long-term qualitative study to measure how individual employees use IBIMS in the universities. Further study is required to extend and validate the findings. There is a need for a comparative longitudinal study that compares other research universities around the world with those in Malaysia. It is important to create valuable further insights into IBIMS use in HE institutions, and a more global approach may validate the model developed for this topic.

Today, most employees and researchers utilise social media in order to enhance their daily activities such as promoting their research reputations. Due to the world-wide usage of social media applications as communication and collaboration platforms, another possible area of research is conducting a study to understand how social media usage in the research universities has shaped the research community of practice, and particularly focus on specific applications outside the university system. Future investigations could test the framework and hypotheses in using social network systems such as Facebook and Twitter. These approaches can help researchers to identify the importance of OCS in using social media and other types of communication tools in managing administrative and research tasks.

Further study also should focuses on several approaches to understanding employees' needs in software development processes. For example, system analysts/developers could use various measurement tools and methods such as surveys with questionnaires, focus groups and in-depth interviews, and opened-ended questionnaires. These methods should help system developers in conducting feasibility studies, specifically at the early stages of the software development life cycle. The purpose of these approaches is to investigate IBIMS content and functionalities with reference to employees' OCS and expectations in MRUs. Results from these empirical methods contribute significant empirical findings in order to develop practical guidelines and SOP for software development in organizations, especially on software technological features and their content. Therefore, it is incumbent on universities to understand the impact of technology on human needs when developing different types of systems for different groups of users.

9.6 Summary

This study reveals several significant findings and insights into the continuing process of understanding OCS, IBIMS acceptance, and usage in MRUs. It provides solid and reliable validation of the relationship between variables in a framework, and investigated end users' and/or employees' OCS, attitudes towards the use of, and intention to use, IBIMS in MRUs. This study addresses the importance of a qualitative approach in understanding more deeply the importance of technological judgement, human needs and organizational initiatives. This approach expands the contexts in gathering data on technology acceptance and IT/IS areas. In the other words, it contributes several important findings: (a) on the importance of in-depth data to support and triangulate the quantitative results; (b) on the provision of additional information to help us understand other factors that influence OCS and acceptance of IBIMS in research universities; (c) on the importance of OCS from end users' perspectives; (d) on the importance of benefits of the systems, social and human factors, and organisational initiatives; and (e) on the needs of IBIMS for research management processes.

The researcher hopes that this study not only contributes to the corpus of studies on media and communication, and the acceptance of technology and its use, but also provides new insights into understanding how ICT works and the implementation of Internet-based systems in HE institutions. The researcher firmly asserts that to improve and enhance employees' OCS and use of IBIMS, the focus should be on technological features, social and human factors, and organisational initiatives.

This study also provides significant information about the maturation of MRUs with regard to IBIMS uptake by their staff. The results of all three stages of the research show that as well as significant communication satisfaction, employees identified areas of

improvement. This study argues that the maturity of MRUs in using IBIMS can be improved from *several perspectives*, specifically by enhancing technology features (user interface, ease of use, system up-time and so on), support from other people in organization, promotion and publicity of the systems, and provide skills and training. This identification of areas for development may help the government accelerate the maturity of IT uptake in the next stage of RU development in Malaysia.

Finally, this study contributes new information and knowledge from organisational and national perspectives, especially to understand the mature new technologies and their acceptance and usage in MRUs and a developing country. The study offers a significant insight into the role of IBIMS in improving employees' day-to-day administrative work, teaching, learning, research management, research collaboration, individual researchers' profiles, university profiles and reputation. In conclusion, this study reveals the importance of IBIMS in transforming the governance of MRUs in order to achieve the national agendas in HE, specifically in enhancing economic growth, establishing high ranking research-based universities, producing competent human capital, and human resources for a knowledge-based society in 2020.

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Appendix 1

Human Ethics Approval from the University of Adelaide's Human Research Ethics Committee (First)

THE UNIVERSITY OF ADELAIDE
AUSTRALIA

RESEARCH BRANCH
RESEARCH ETHICS AND COMPLIANCE UNIT

SABINE SCHREIBER
SECRETARY
HUMAN RESEARCH ETHICS COMMITTEE
THE UNIVERSITY OF ADELAIDE
SA 5005
AUSTRALIA
TELEPHONE +61 8 8303 6028
FACSIMILE +61 8 8303 7325
email: sabine.schreiber@adelaide.edu.au
CRICOS Provider Number 00123M

25 November 2009

Dr RI Cover
Discipline of Media

Dear Dr Cover

PROJECT NO: H-174-2009 *Communication satisfaction in using internet-based information management systems among employees at research universities in Malaysia*

I write to advise you that I have approved the above project on behalf of the the Human Research Ethics Committee. Please refer to the enclosed endorsement sheet for further details and conditions that may be applicable to this approval.

Approval is current for one year. The expiry date for this project is: 30 November 2010

Where possible, participants taking part in the study should be given a copy of the Information Sheet and the signed Consent Form to retain.

Please note that any changes to the project which might affect its continued ethical acceptability will invalidate the project's approval. In such cases an amended protocol must be submitted to the Committee for further approval. It is a condition of approval that you immediately report anything which might warrant review of ethical approval including (a) serious or unexpected adverse effects on participants (b) proposed changes in the protocol; and (c) unforeseen events that might affect continued ethical acceptability of the project. It is also a condition of approval that you inform the Committee, giving reasons, if the project is discontinued before the expected date of completion.

A reporting form is available from the Committee's website. This may be used to renew ethical approval or report on project status including completion.

Yours sincerely ,

pp Professor Garrett Cullity
Convenor
Human Research Ethics Committee

Appendix 2

Human Ethics Approval from the University of Adelaide's Human Research Ethics Committee (Second)

THE UNIVERSITY
OF ADELAIDE
AUSTRALIA

RESEARCH BRANCH
RESEARCH ETHICS AND COMPLIANCE UNIT

SABINE SCHREIBER
SECRETARY
HUMAN RESEARCH ETHICS COMMITTEE
THE UNIVERSITY OF ADELAIDE
SA 5005
AUSTRALIA
TELEPHONE +61 8 8303 6028
FACSIMILE +61 8 8303 7325
email: sabine.schreiber@adelaide.edu.au
CRICOS Provider Number 00123M

2 November 2010

Associate Professor OM Griffiths
Discipline of Media

Dear Associate Professor Griffiths

PROJECT NO: H-174-2009 *Communication satisfaction in using internet-based information management systems among employees at research universities in Malaysia*

Thank you for your report on the above project. I write to advise you that I have endorsed renewal of ethical approval for the study on behalf of the Human Research Ethics Committee.

The expiry date for this project is: 30 November 2011

Where possible, participants taking part in the study should be given a copy of the Information Sheet and the signed Consent Form to retain.

Please note that any changes to the project which might affect its continued ethical acceptability will invalidate the project's approval. In such cases an amended protocol must be submitted to the Committee for further approval. It is a condition of approval that you immediately report anything which might warrant review of ethical approval including (a) serious or unexpected adverse effects on participants (b) proposed changes in the protocol; and (c) unforeseen events that might affect continued ethical acceptability of the project. It is also a condition of approval that you inform the Committee, giving reasons, if the project is discontinued before the expected date of completion.

A reporting form is available from the Committee's website. This may be used to renew ethical approval or report on project status including completion.

Yours sincerely

for Professor Garrett Cullity
Convenor
Human Research Ethics Committee

Appendix 3

List of Items in Questionnaire

Section 1: Usefulness and Ease of Use

Usefulness

No	Items	Scale				
1	Using IBIMS in my job would enable me to accomplish tasks more quickly.	5	4	3	2	1
2	Using IBIMS would improve my job performance.	5	4	3	2	1
3	Using IBIMS in my job would increase my productivity.	5	4	3	2	1
4	Using IBIMS would enhance my effectiveness on the job.	5	4	3	2	1
5	Using IBIMS would make it easier to do my job.	5	4	3	2	1
6	Overall, IBIMS is useful in my job.	5	4	3	2	1

Ease of Use

No	Items	Scale				
7	Learning to operate/use IBIMS is easy for me.	5	4	3	2	1
8	I believe it is easy to get IBIMS to do what I want it to do.	5	4	3	2	1
9	My interaction (e.g. choosing buttons and using a navigational menu) with IBIMS is clear and understandable.	5	4	3	2	1
10	I would find IBIMS to be flexible to interact with (e.g., to choose any instructions on screen) with.	5	4	3	2	1
11	It would be easy for me to become skillful at using IBIMS.	5	4	3	2	1
12	Overall I believe IBIMS is easy to use.	5	4	3	2	1

Section 2: Interactivity Features

No	Items	Scale				
13	IBIMS provides significant user control (e.g.. links for navigation) to undertake my tasks.	5	4	3	2	1
14	IBIMS provides a good communication speed in responding to my requests/instructions.	5	4	3	2	1
15	IBIMS provides customization features for my individual user interface to do my tasks.	5	4	3	2	1
16	Overall, technological features influence me to use IBIMS.	5	4	3	2	1
17	IBIMS provides the ability for me to participate/interact with the contents	5	4	3	2	1
18	IBIMS provides a link to the outside world and for me to interact with other content.	5	4	3	2	1
19	IBIMS provides a good response and timely feedback to my requests/instructions.	5	4	3	2	1
20	Overall, user experiences influence me to use IBIMS.	5	4	3	2	1
21	I can access content related to my tasks using IBIMS.	5	4	3	2	1
22	IBIMS provides relevant content to undertake my tasks.	5	4	3	2	1
23	I believe that IBIMS provides very good content and functionalities to help my tasks/work.	5	4	3	2	1

24	Overall, content influences me to use IBIMS.	5	4	3	2	1

Section 3: Usability and IS quality

Usability

No	Items	Scale				
25	The IBIMS was simple to use.	5	4	3	2	1
26	I felt at ease using the IBIMS.	5	4	3	2	1
27	The IBIMS was user-friendly.	5	4	3	2	1
28	I felt in control while using the IBIMS.	5	4	3	2	1
29	The information I accessed from the IBIMS was uncluttered and readable.	5	4	3	2	1
30	The accessed information from the IBIMS was adequate.	5	4	3	2	1
31	I was able to move around throughout the IBIMS with ease.	5	4	3	2	1
32	I quickly understood the features and functions available in the IBIMS.	5	4	3	2	1
33	The information I asked for from IBIMS loaded in a reasonable time.	5	4	3	2	1
34	The information I got from the IBIMS was relevant to my tasks/jobs.	5	4	3	2	1
35	The consistency of terms, words, and actions used throughout the IBIMS was evident.	5	4	3	2	1
36	Text boldfacing, italicizing, and underlining were present in IBIMS to grab my attention.	5	4	3	2	1
37	Overall, usability of IBIMS is important for me to collaborate in organisations.	5	4	3	2	1

IS Quality

No	Items	Scale				
38	The operation (use) of IBIMS is reliable.	5	4	3	2	1
39	The IBIMS allows information to be readily accessible to me.	5	4	3	2	1
40	It takes too long for IBIMS to respond to my requests	5	4	3	2	1
41	I find IBIMS is flexible and user friendly to use in my tasks/works.	5	4	3	2	1
42	I find IBIMS easy to use to solve my tasks/work.	5	4	3	2	1
43	Overall, system quality is important for me to collaborate in organisations using IBIMS.	5	4	3	2	1
44	The information provided by IBIMS is accurate.	5	4	3	2	1
45	IBIMS provides relevant information for my job	5	4	3	2	1
46	The information from IBIMS is up-to-date enough for my purpose.	5	4	3	2	1
47	The information content in IBIMS meets my needs.	5	4	3	2	1
48	IBIMS provides me with a complete set of information.	5	4	3	2	1

49	Overall, information quality is important for me to collaborate in organisations using IBIMS.	5	4	3	2	1
50	IBIMS has visually appealing materials.	5	4	3	2	1
51	The user interface of IBIMS has a well-organized appearance.	5	4	3	2	1
52	IBIMS provides the right solution to my request.	5	4	3	2	1
53	IBIMS does not give me individual attention in solving my tasks.	5	4	3	2	1
54	IBIMS gives me prompt service.	5	4	3	2	1
55	Overall, service quality is important for me to collaborate in organisations using IBIMS.	5	4	3	2	1

Section 4: Communication Satisfaction

No	Items	Scale				
56	I am satisfied with the data and information I receive about company policies and goals using IBIMS.	5	4	3	2	1
57	I am satisfied with the data and information I receive about departmental policies and goals using IBIMS.	5	4	3	2	1
58	I am satisfied with the data and information I receive about the requirements of my task/job using IBIMS.	5	4	3	2	1
59	I am satisfied with the data and information I receive about changes in the organisation using IBIMS.	5	4	3	2	1
60	I am satisfied with the data and information I receive on how problems in my task/job are being handled in IBIMS	5	4	3	2	1
61	I am satisfied with the data and information I receive about employee benefits and pay using IBIMS	5	4	3	2	1
62	I am satisfied with on-time data and information I receive to do my task/job using IBIMS	5	4	3	2	1
63	I am comfortable exchanging confidential information in our organisation using IBIMS.	5	4	3	2	1
64	I am satisfied the communication processes with employees in other positions and departments is accurate and free-flowing using IBIMS.	5	4	3	2	1
65	I am satisfied to communicate from remote locations using IBIMS to access data and information.	5	4	3	2	1
66	I am satisfied with IBIMS because it does not cause a communication overload.	5	4	3	2	1
67	Overall, I am satisfied with my communication using IBIMS	5	4	3	2	1

Section 5: Attitude Towards Use, Intention to Use and Actual Usage

Attitude Towards Use

No	Items	Scale				
68	Using IBIMS is a good idea.	5	4	3	2	1
69	Using IBIMS is advisable.	5	4	3	2	1
70	I enjoy using IBIMS.	5	4	3	2	1
71	I am satisfied in using IBIMS.	5	4	3	2	1
72	I consider it a good online system.	5	4	3	2	1
73	I am happy with IBIMS as an online system.	5	4	3	2	1

Intention to Use and Actual Usage

No	Items	Scale				
74	If I gain access to the IBIMS, I intend to use it.	5	4	3	2	1
75	If I gain access to the IBIMS, I expect that I will use it.	5	4	3	2	1
76	My intention is to continue visiting and using IBIMS.	5	4	3	2	1
77	I want to continue using IBIMS rather than stop using it.	5	4	3	2	1
78	I use IBIMS so that my work is swift and efficient.	5	4	3	2	1
79	My peers encourage me to use IBIMS.	5	4	3	2	1
80	I use IBIMS because it is required by my workplace/organization.	5	4	3	2	1
81	I use IBIMS because it is required by manager/head of department.	5	4	3	2	1
82	I use IBIMS because it is required by senior management of the organization.	5	4	3	2	1

Section 6: Demographics

83. Age:

- [ ] Less than 20 years
- [ ] 20 – 29 years
- [ ] 30 – 39 years
- [ ] 40 – 49 years
- [ ] 50 – 59 years
- [ ] More than 60 years

84. Ethnicity:

- [ ] Malay
- [ ] Chinese
- [ ] Indian
- [ ] Bumiputera Sabah dan Sarawak
- [ ] Others:_____

85. Sex:

- [ ] Male
- [ ] Female

86. Position:

- [ ] Executive (Management and Professional)
- [ ] Lecturer (lecturer, senior lecturer, assoc. prof. and professor)
- [ ] Other:_____

87. Monthly Income:

- [ ] Less than RM2000
- [ ] RM2001 - RM4000
- [ ] RM4001 – RM6000
- [ ] RM6001 – RM10000
- [ ] More than RM10, 001

88. Education level:

- [ ] SPM
- [ ] STPM
- [ ] Technical/Vocational
- [ ] Diploma
- [ ] Bachelor Degree
- [ ] Masters
- [ ] PhD

89. Experience in using computer:

- [ ] Less than 2 year
- [ ] 3 - 4 years
- [ ] 5 – 6 years
- [ ] More than 7 years

90. Experience in using Internet:

☐	Less than 2 year
☐	3 - 4 years
☐	5 – 6 years
☐	More than 7 years

91. Perception of computer and internet skills:

Items	Not well skilled	Satisfactory	Strong	Never used
91 (a). Microsoft Office (e.g., Word and Excel)	1	2	3	4
91 (b). Multimedia software (e.g., Macromedia Flash)	1	2	3	4
91 (c). Adobe Acrobat reader	1	2	3	4
91 (d). Graphic design software (e.g., Adobe Photoshop)	1	2	3	4
91 (e). Browser (e.g., Internet explorer and Mozilla Firefox)	1	2	3	4
91 (f). E-mail (e.g., Yahoo mail or Gmail)	1	2	3	4
91 (g). Social networking system (e.g., Facebook)	1	2	3	4
91 (h). Programming language (e.g., Visual Basic, C, html)	1	2	3	4

Appendix 4

Supplementary Open-Ended Questionnaire

Information Sheet
Supplementary Open-Ended Questionnaire

Project Title:
Communication Satisfaction in Using Internet-Based Information Management Systems Among Employees at Research Universities in Malaysia

Ethics No.: H-174-2009

Dear Prof./Assoc. Prof./Dr./Sir/Madam,

Thank you for participating in my earlier data collections for the project named above for which you gave earlier consent.

The purpose for this supplementary survey is for use in the project on communications satisfaction in using Internet-based information management systems (IBIMS) among employees at Research Universities in Malaysia such as staff portal: University of Malaya (e.g UMPortal, UMRCIS, UMMIS), University Science Malaysia (e.g SMU-S, e-cuti, e-Tuntutan) University Putra Malaysia (e.g Naik Pangkat Online, E-IHRAMS, SPPOLINE) and National University of Malaysia (e.g SPPU, e-cuti, SKU).

The overall purpose of the research project is to focus on the importance of IBIMS among employees in the research university in Malaysia.

This supplementary open-ended questionnaire asks further questions related to your use of IBIMS in university for research performance and in building up your university's research profile.

By your further participation, you are contributing to a greater understanding of ways which will improve research profile and productivity.

There is no obligation to participate, and no names will be used in any of the reports or publications that come out of this project.

Your participation in this part of the project is much appreciated.

If you have any questions or follow-up, please contact:

Assoc. Prof. Dr. Mary Griffiths, The University of Adelaide
mary.griffiths@adelaide.edu.au
+61 8 8313 4838 (PRINCIPAL SUPERVISOR)

Mohd Azul Mohamad Salleh, Postgraduate Student, Discipline of Media, The University of Adelaide mohd.mohamadsalleh@adelaide.edu.au (RESEARCHER)

Supplementary Open-Ended Questionnaire

Instructions: Please answer the following questions by using this template in MS Word. You are encouraged to write as much as you like. Then, save this document, and send it to me via: mohd.mohamadsalleh@adelaide.edu.au.

Question 1: Please describe in detail the ways that the IBIMS system impacts on the day-to-day **management of your research tasks**? *Please give examples in answering this question.*
Answer:

Question 2: Thinking about collaboration in research, has IBIMS impacted on your capacity to **collaborate with other researchers**? *Please give examples in answering this question.*
Answer:

Question 3: Does the IBIMS system impacts on your **research performance** in any way? How? *Please give examples in answering this question.*
Answer:

Question 4: How does the IBIMS system impact on developing your **individual profile**? *Please give examples in answering this question.*
Answer:

Question 5: How does the IBIMS system impact the development of your **organization's profile as a research university**? *Please give examples in answering this question.*
Answer:

Question 6: How does the IBIMS system impact on your **organization's management of research**? *Please give examples in answering this question.*
Answer:

Appendix 5

Letter of Support to Conduct Research in Malaysian Research Universities from Ministry of Higher Education, Malaysia

JABATAN PENGAJIAN TINGGI
DEPARTMENT OF HIGHER EDUCATION
KEMENTERIAN PENGAJIAN TINGGI MALAYSIA
MINISTRY OF HIGHER EDUCATION MALAYSIA
Tingkat/*Level* 1-3, Blok/*Block* E9, Parcel E, Presint 1
Pusat Pentadbiran Kerajaan Persekutuan
Federal Government Administrative Centre
62505 PUTRAJAYA MALAYSIA

Tel/*Tel* :(603) 8883 5999
Faks/*Fax* :(603) 8889 4260 (L1)
(603) 8889 4258 (L2)
(603) 8889 4119 (L3)
Laman Web/*Website* :http://www.mohe.gov.my

JPT(UKP)1000/01/014Jld.5

11th December 2009

To Whom It May Concern,

Letter of Support on Behalf of Researcher MOHD AZUL MOHAMAD SALLEH

I am writing this letter in support of the research to be undertaken by Mr. Mohd Azul Mohamad Salleh, a post-doctorate scholar at the School of Humanities, **University of Adelaide**.

Mr. Mohd Azul Mohamad Salleh is a **Malaysian government-sponsored scholar**. He is currently engaged in a research project entitled **"Communication Satisfaction in Using Internet-Based Information Management System (IBIMS) among Employees at Research Universities in Malaysia"**. This study is under the supervision of Associate Professor Mary Griffiths and Dr. Rob Cover.

The scholar aims to investigate the acceptance and usage of IBIMS among employees at research universities in Malaysia. The study seeks to understand the relationship and affect between usefulness, ease of use, online collaboration and interactivity with communication satisfaction and intention to use it as online communication and management tools in the contemporary workplace.

On behalf of the scholar, we respectfully request your cooperation in assisting him to conduct his research.

Thank you.

Yours sincerely,

(PROFESSOR IR. DR. RADIN UMAR RADIN SOHADI)
Director-General, Department of Higher Education,
Ministry of Higher Education, Malaysia

Appendix 6

Information Sheet and Cover Page (Questionnaire)

Survey Questionaire

Project Title:

Communication Satisfaction in Using Internet-Based Information Management Systems Among Employees at Research Universities in Malaysia

Information

The purpose for this survey is for use in a project on communications satisfaction in using Internet-based information management systems (IBIMS) among employees at Research University in Malaysia such as staff portal: University of Malaya (e.g UMPortal, UMRCIS, UMMIS), University Science Malaysia (e.g SMU-S, e-cuti, e-Tuntutan) University Putra Malaysia (e.g Naik Pangkat Online, E-IHRAMS, SPPOLINE) and National University of Malaysia (e.g SPPU, e-cuti, SKU).

The purpose of the project is the relationships and affects of usefulness, ease of use, online collaboration and interactivity with the communication satisfaction to predict the acceptance factors towards the use of IBIMS among employees in the research university.

The survey will open with a series of questions related to your use of IBIMS in university, and will collect some information about your experience.

By participating in the survey you are contributing to a greater understanding of ways in which to improve the knowledge gap and literature in study user's acceptance to online systems.

The survey will be used questionnaire, but no names will be used in any of the reports or publications that come out of this project. You do not need to give your name while answering the questionnaire.

You also have the right to leave the survey at any time and/or to indicate that statements you have made are not to be used in the project.

Your participation in this project is much appreciated.

If you have any questions or follow-up, please contact the undersigned.

Assoc. Prof. Dr. Mary Griffiths, The University of Adelaide
mary.griffiths@adelaide.edu.au
(08) 8303 4838

Dr Rob Cover, Discipline of Media, The University of Adelaide
rob.cover@adelaide.edu.au
(08) 8303 8358

Mohd Azul Mohamad Salleh, Postgraduate, Discipline of Media, The University of Adelaide mohd.mohamadsalleh@adelaide.edu.au
(08) 8303 8358 (Adelaide) / 6019 – 328 1991 (Malaysia)

Appendix 7

Consent Letter/Form

THE UNIVERSITY OF ADELAIDE HUMAN RESEARCH ETHICS COMMITTEE

STANDARD CONSENT FORM
FOR PEOPLE WHO ARE PARTICIPANTS IN A RESEARCH PROJECT

1. I, …… *(please print name)*

   consent to take part in the research project entitled:

   Communication satisfaction in using Internet-Based Information Management systems among employees at Research Universities in Malaysia

2. I acknowledge that I have read the attached Information Sheet.
3. I have had the project, so far as it affects me, fully explained to my satisfaction by the research worker. My consent is given freely.
4. Although I understand that the purpose of this research project is to improve knowledge and understanding of the use of online management systems in university organisations, it has also been explained that my involvement may not be of any benefit to me.
5. I have been given the opportunity to have a member of my family, a friend or colleague present while the project was explained to me.
6. I have been informed that, while information gained during the study may be published, I will not be identified and my personal results will not be divulged.
7. I understand that I am free to withdraw from the project at any time and that this will not affect medical advice in the management of my health, now or in the future.
8. I am aware that I should retain a copy of this Consent Form, when completed, and the attached Information Sheet.

……...
(signature) *(date)*

WITNESS

I have described to …….. *(name of subject)*

the nature of the research to be carried out. In my opinion she/he understood the explanation.

Status in Project**:** …….

Name: ……..….

……...
(signature) *(date)*

Appendix 7

Contact for Information on Project and Independent Complaints Procedure

THE UNIVERSITY OF ADELAIDE
HUMAN RESEARCH ETHICS COMMITTEE

Document for people who are participants in a research project

CONTACTS FOR INFORMATION ON PROJECT AND INDEPENDENT COMPLAINTS PROCEDURE

The Human Research Ethics Committee is obliged to monitor approved research projects. In conjunction with other forms of monitoring it is necessary to provide an independent and confidential reporting mechanism to assure quality assurance of the institutional ethics committee system. This is done by providing research participants with an additional avenue for raising concerns regarding the conduct of any research in which they are involved.

The following study has been reviewed and approved by the University of Adelaide Human Research Ethics Committee:

Project title: **"Communication satisfaction in using Internet-based information management systems among employees at research universities in Malaysia"**

1. If you have questions or problems associated with the practical aspects of your participation in the project, or wish to raise a concern or complaint about the project, then you should consult the project co-ordinator:

   Name: Assoc. Prof. Dr. Mary Griffiths, Media, The University of Adelaide.
   Telephone: 08 830 34838
   Email: mary.griffiths@adelaide.edu.au

   Name: Dr Rob Cover, Media, The University of Adelaide.
   Telephone: 08 830 38358
   Email: rob.cover@adelaide.edu.au

   Name: Mohd Azul Mohamad Salleh, Media, The University of Adelaide.
   Telephone: 08 830 38358
   Email: mohd.mohamadsalleh@adelaide.edu.au

2. If you wish to discuss with an independent person matters related to
   - making a complaint, or
   - raising concerns on the conduct of the project, or
   - the University policy on research involving human participants, or
   - your rights as a participant

contact the Human Research Ethics Committee's Secretary on phone (08) 8303 6028