Predictors of Users' Preferences for Digital Information at the Oceanographic Research Institute (ORI) Library, Durban

by

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ABSTRACT

This research was a case study that investigated predictors of users' preferences for digital information at the Oceanographic Research Institute (ORI) Library in Durban, South Africa. The objectives of the study were to determine the predictors of users' preferences for digital information, examine user attitude towards use of digital information, evaluate user competencies in the use of digital information, examine available ICT infrastructure to facilitate access to digital information and assess usage patterns of electronic resources. Technology Acceptance Model (TAM) was used to underpin the study, using the mixed method paradigm consisting of qualitative and quantitative methods. A census of the study population, consisting of 26 respondents, was taken. Data was collected using focus group discussions, semi-structured interviews, participant observations, document reviews and survey questionnaires. Quantitative data was analysed using descriptive statistics, while qualitative data was analysed thematically. The findings of the study indicated that there was increasing preference of digital information to print by scholars. Moreover, usage of digital information was high by virtue of being easy to use and useful for scholarly work. The findings revealed that scholars had developed a positive attitude towards digital information. In addition, user experience with computers and the availability of infrastructure within the organisation were found to be facilitating conditions for digital information usage behaviour. The findings showed that respondents lacked relevant skills for the effective use of digital information and the ORI Library lacked adequate computers and electronic resources to satisfy user needs. The study recommended the development of a digital repository, user training to improve use of digital information resources. Suggested areas for research included examining the use of electronic resources in marine and aquatic institutions in Africa to establish grounds for collaborations and resource sharing. A study to assess the quality of research output by scholars was also recommended, as a way of exposing the critical or non-critical use of digital sources.

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AAU	Association of African Universities
ABFR	Aquatic Biology, Aquaculture and Fisheries Resources
AGORA	Access to Global Online Research in Agriculture
ASFA	Aquatic Sciences and Fisheries Abstracts
CEO	Chief Executive Officer
CSIR	Council for Scientific and Industrial Research
CSIRIS	Council for Scientific and Industrial Research Information Services
DATAD	Database of African Theses and Dissertations
DOAJ	Directory of Open Access Journals
EURASLIC	European Association of Aquatic Sciences Libraries and Information Centres
FAO	Food and Agriculture Organisation
FFW	Fish and Fisheries Worldwide
IAMSLIC	International Association for Aquatic and Marine Science Libraries
ICES	International Council for the Exploration of the Sea
ICLARM	International Centre for Living Aquatic Resources Management
ICT	Information and Communication Technologies
IFLA	International Federation of Library Associations and Institutions
INASP	International Network for the Availability of Scientific Publications
IOC	Intergovernmental Oceanographic Commission
IT	Information Technology
KMFRI	Kenya Marine and Fisheries Institute
LAN	Local Area Network
MSc	Master of Science
NaFIRRI	National Fisheries Resources Research Institute
ODIN	Ocean Data and Information Network

ODINAFRICA	Ocean Data and Information Network in Africa
OPAC	Online Public Access Catalogue
ORI	Oceanographic Research Institute
PhD	Doctor of Philosophy
SAAMBR	South African Association for Marine Biological Research
SAIAB	South African Institute for Aquatic Biodiversity
TAM	Technology Acceptance Model
TAFIRI	Tanzania Fisheries Research Institute
TEEAL	The Essential Electronic Agricultural Library
TODB	Technical Output Database
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UKZN	University of KwaZulu-Natal
UNISA	University of South Africa
USA	United States of America
WWW	World Wide Web

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Libraries have long positioned themselves as custodians of the recorded human mind, but this role is fast changing as the functions of traditional libraries characterised by the concepts of intermediary and ownership are challenged by the new concepts of disintermediation and virtual access (Harun 2010:1). The arrival of the Internet and the World Wide Web has seen services being created to meet developing needs and to exploit the opportunities that networked access to digital information can provide. With electronic resources proliferating within all types of libraries, there is a paradigm shift from printed to digital publications, from ownership of documents to access, from intermediary to end-user model of services, from location specific libraries to virtual libraries (Dhanavandan, Esmail and Nagarajan 2012:2). Subscriptions to online content, creation of digital documents, digitisation and use of electronic information sources and services have become a common practice in libraries and information centres. As a result, the increased availability of electronic resources has transformed the way libraries create, access, store, disseminate and preserve information (Amollo 2011:7). This paradigm shift has affected the information-seeking behaviour of library users in different environments. In many institutions, scholars are turning to electronic databases of scholarly information rather than to print sources to conduct their research. Consequently, there seems to be a growing preference for digital content, which has resulted in the growth and use of digital libraries across the globe.

Presenting at the Regional Workshop on Networking for Improved Access to Fisheries and Aquaculture Information in Africa, the ORI librarian reported that use of digital content at ORI Library was emerging and gaining popularity. Scientists were using Aquatic Science and Fisheries Abstracts (ASFA) CD-ROM databases, which included Fish and Fisheries Worldwide (FFW) and Aquatic Biology, Aquaculture and Fisheries Resources (ABFR) for their information searches (FAO 2009:183). Today, demand for digital content is continually growing, to the extent that users prefer converting print documents to digital by scanning, rather than using the print version which forms the bulk of the collection. In addition, most inter-library loan requests for articles are now being supplied in electronic format and quite a

number of locally generated documents and scientists publications are available electronically. A digital repository becomes necessary to manage these documents at ORI Library. This study aims to investigate predictors of users' preferences for digital information at the Oceanographic Research Institute (ORI) Library in order to generate information to improve digital dissemination, possibly through the development of a centralised repository to enhance access.

1.2   Context of the study

Scholarly communication the world over is experiencing a paradigm shift towards digital scholarship, which is predicated on digital information. Within the marine and aquatic information environment, use of digital information has largely been pioneered by the International Association for Aquatic and Marine Science Libraries (IAMSLIC), in association with the Food and Agriculture Organisation (FAO) (Haas et al., 2009:1). IAMSLIC was formed in 1975 to bring together librarians and marine scientists to share expertise and information services (Haas et al., 2009:1). The FAO works to facilitate and secure long-term sustainable development and utilisation of the world's fisheries and aquaculture (Webster and Bartley 2006:267). In 2007, IAMSLIC and FAO launched the Aquatic Commons digital repository to facilitate the global sharing of digital publications on natural marine, estuarine/brackish and fresh water environments (Haas et al., 2009:2). The Aquatic Commons repository is developing its collection through contributions from marine and aquatic scientists and librarians and their institutions, who are depositing published and unpublished research such as scholarly material and organisational publications (Haas et al., 2009:4). The Aquatic Commons has presented itself as a digital resource sharing platform, available on the principle of equal ownership to all participating members (Collins and Gribbling 2007:1). The marine and aquatic community has viewed this open access repository as a possible way of improving the storage and retrieval of fisheries and aquaculture information (Collins and Gribbling 2007:1).

In terms of membership, countries which had obtained IAMSLIC membership, as at July 2011, included the United States of America (USA), the United Kingdom (UK), Mexico, Argentina, Germany, Turkey, France, Mexico, Nigeria, Kenya, Egypt, South Africa, Tanzania and Ghana (Ibeun 2011:4). The institutional membership in IAMSLIC included the French Research Institute for Exploration of the Sea (France), the Food and Agriculture

Organisation of the United Nations - Fisheries and Aquaculture (Italy), the Russian Federal Research Institute of Fishery and Oceanography, National Institute of Oceanography and Fisheries (Egypt), Marine Fisheries Research Division (Ghana), Kenya Marine Fisheries and Research Institute and Nigerian Institute of Oceanography and Marine Research (Ibeun 2011:4). Ibeun further highlighted a growing concern about the low level of participation from developing countries.

Apart from efforts by IAMSLIC to promote the use of digital resources, individual libraries took their own initiative to provide electronic resources to their users. Literature reviewed showed that the use of digital resources in developed countries started much earlier and is more advanced than in developing countries. The Southampton Oceanography Centre, which is part of Southampton University, for example, is designated a national electronic resource station for the United Kingdom Marine Science Community (National Oceanography Centre 2013). The library has a digitisation unit, a huge collection of e-journals, e-books and ocean and earth science databases (National Oceanography Centre 2013). The Southampton Oceanography Centre is reputed to have spearheaded the formation of the IAMSLIC digital library in 2003 and developed ePrints software for the development of the Aquatic Commons repository (Haas et al., 2009:2).

In developing countries, however, Ibeun (2011:2) observed that they trail behind developed countries, especially in the adoption and use of electronic resources. As a result, many institutions in developing countries are struggling to develop their own effective and affordable digital dissemination programmes; only a few are being able to digitise and offer access to digital information (Haas et al., 2009:5). Besides struggling to develop efficient digital dissemination programmes, the literature reviewed showed that, within the field of marine and aquatic science in the African region, many users have not developed confidence in using digital resources (Biney 2005; Salanje 2007; Nyika 2009; Ibeun 2011). Despite these studies revealing low levels of interest in the use of digital resources within the region, there seems to be a preference for digital information at the Oceanographic Research Institute Library in Durban, South Africa.

1.2.1 South African Association for Marine Biological Research (SAAMBR)

The South African Association for Marine Biological Research (SAAMBR) is a non-governmental, non-profit organisation that was established in 1951 (SAAMBR 2011:2-3). This was followed by the establishment of its three operational divisions, the Oceanographic Research Institute (ORI), Sea World Education Centre and uShaka Sea World Aquarium and Dolphinarium. The ORI is the division responsible for research activities where scientists engage in scientific investigations on marine science and resource management at national, regional and international level. uShaka Sea World Aquarium and Dolphinarium is a world-class marine park with dolphins, a variety of fish species, sharks, rays, lobsters, turtles and seals found in the Western Indian Ocean waters (SAAMBR 2011:3). Lastly, Sea World Education Centre is the division responsible for educating the public on marine conservation, bringing to them an awareness and appreciation of the marine environment (SAAMBR 2011:3). SAAMBR's mission is "to contribute to the conservation of marine and coastal biodiversity and resources, by generating and disseminating scientific information, inspiring and empowering people" (SAAMBR 2011:4).

1.2.1.1 The Oceanographic Research Institute (ORI) Library

The library falls under the Oceanographic Research Institute (ORI), which is the research division of SAAMBR. The library was officially opened at the Durban beachfront in 1959 (SAAMBR 2009:2). The library is tasked with providing essential information resources to ORI research scientists and the rest of SAAMBR employees. External researchers, students, consultants and the general public are allowed to use the library only as a reference library.

The ORI Library is primarily a marine library and it collects information from Southern Africa, East Africa and the Western Indian Ocean. It is believed to house one of the finest collections of marine biological information in the region, dating back to the 19th century and at an estimated value of R19 000 000 (SAAMBR 2011:5). The specialised collection has rich content in marine biology, reef biodiversity and ecology, estuarine and soft sediment ecology, marine protected areas, aquaculture, pollution and coastal zone management. Collection development is through journal subscriptions and book acquisitions, via exchange programmes with aquatic and marine institutions, Internet downloads, donations and inter-library loans. The collection includes journals, books, reprints, reports, maps and charts, audio-visuals and images.

Apart from the print collection, the library has a small but growing collection of electronic documents that are linked to the Online Public Access Catalogue (OPAC) called ActiveConnect. The library uses a computerised library system called Libwin to manage its collection. Through ActiveConnect, SAAMBR employees can access the library's catalogue from their offices. Recently, Libwin added a feature of linking electronic documents to ActiveConnect. Users can download linked electronic documents by clicking on the item record only if the media type shows that the document is available in electronic format. This system works within the networked SAAMBR environment. Available electronic documents include digitised ORI scientist reprints, ORI scientific papers published electronically, free electronic books and other documents downloaded from the Internet, student theses and a few outsourced articles received as electronic copies. Out of the 53 printed journal titles the library subscribes to, 21 of them offer free online access. The ORI Library benefits from online access to marine and aquatic resources through its affiliation with the University of KwaZulu-Natal (UKZN). The ORI senior scientists contribute significantly to student training as part of the ORI's functional relationship with the UKZN (SAAMBR 2008:8). ORI scientists supervise post-graduate students and undertake external examination of theses and the delivering of fisheries science courses at several universities, including the UKZN (SAAMBR 2008:8). At the time of the present study, there were seven UKZN PhD and Masters students that were based at the ORI, working under the supervision of ORI scientists.

1.3   Statement of the problem

Many institutions, particularly in developing countries, are struggling to develop viable electronic resources repositories or libraries (Haas et al., 2009:5). Within the context of aquatic and marine science institutions, a study conducted by Ibeun (2011:4) on the use of the Aquatic Commons repository showed that African countries had low participation in both input and usage of the Aquatic Commons repository. The Institute of Marine Sciences of Tanzania, for example, faced obstacles in the development of an electronic repository because scientists were unwilling to submit their work output to be uploaded into the repository (Nyika 2009:3). Similarly, in Malawi scientists were unwilling to donate their papers because they did not see any benefit to it, while others demanded payment (Salanje 2007:4). This, to a large extent, support what Biney (2005:15) observed that a majority of marine science information users in the region are struggling to accept and make use of digital resources. They believe the computer is a no-go area, let alone going online. There

seems, therefore from the literature reviewed, to exist low preferences for digital content by aquatic and marine science scholars in the region.

In contrast, and within the context of the ORI, usage statistics and the researcher's observation working at the library reveals that there is an increase in the number of users showing preference for electronic information. Open access journals, Google Scholar and the Internet are commonly used by users as sources of information. Users are opting to scan articles from journals, sections of books and reprints, instead of using the print material which forms the bulk of the collection. Increasingly now rather than before, users ask for electronic content which they can make use of in the comfort of their offices or homes. Although the library continues to grow the print collection, fewer users are interested in using hard copies and preference for electronic information is growing. This study seeks to investigate predictors of users' preferences for digital information at the ORI Library with the expectation that the results will inform on improving digital information dissemination.

1. 4 Research objectives

The present study addresses these research objectives, to:

1. Determine the predictors of users' preferences for digital information.
2. Explain user attitude towards the use of digital information.
3. Evaluate user competencies in the use of digital information.
4. Examine the ICT infrastructure in place to facilitate access to digital information.
5. Assess the patterns of usage of electronic resources.

1. 5 Research questions

The purpose of this research was to investigate predictors of users' preferences for digital information at the ORI Library. The following questions were addressed:

1. What are the predictors of users' preferences for digital information?
2. What is the attitude of users towards the use of digital information?
3. What competencies do users have in the use of digital information?
4. What ICT infrastructure is in place to facilitate access to digital information?
5. What are the usage patterns of electronic resources?

1.6   Significance of the study

Biney (2005:15) acknowledged that those in the field of marine science, in the African region, are still struggling to use digital resources. Many institutions have no adequate facilities and familiarity with digital information is lacking. A majority of them have problems with finding the relevant information because they are not skilled to perform online searches. Accordingly, insufficient research on digital library adoption dynamics is a major concern, particularly when evidence indicates that information systems in developing countries have experienced high rates of failure (Anandarajan, Igbaria and Anakwe 2002; Heeks 2002; Park et al., 2009). A lack of research on the user side of information system adoption is in part responsible for the under-utilisation of information systems implemented in developing countries (Park et al., 2009:197). This study thus investigates predictors of users' preferences for digital information at ORI Library using the Technology Acceptance Model (TAM).

Existing studies on the use of electronic aquatic and marine science resources in developing countries have focussed on issues of networking, resource sharing and open access (Collins 2007; FAO 2009; Haas et al., 2009; Agolla 2011; Ibeun 2011). Sujatha and Mudhol (2006) evaluated the major electronic resources on fisheries; Haas et al. (2009) examined how IAMSLIC, FAO and IFREMER contributed to the open access of fisheries and aquaculture research and management; Agolla (2011) investigated electronic resource sharing to enhance use of scientific literature and Ibeun (2011) examined the challenges faced by African users in searching for information on the Aquatic Commons repository. Little or no attention has been given to user acceptance of new information systems in marine and aquatic science libraries. Furthermore, no literature was found on technology acceptance in South African libraries. This study attempts to fill this void.

The world is experiencing a paradigm shift from manual to digital technologies and use of digital resources in developing countries is beginning to emerge in libraries. Conducting a study to evaluate user preferences becomes important to understand how the shift has affected the information seeking-behaviour of users. It is an opportunity to evaluate trends in the use of digital resources and see how services can be improved to meet user needs. The outcome of this study is expected to inform the ORI Library on how to improve digital information dissemination.

1.7 Scope and limitations of the study

Given that studies investigating user acceptance in digital libraries are limited, with none investigating adoption in marine and aquatic libraries, the researcher was unable to get adequate literature on the subject. To this end, the researcher had to compensate this gap by utilising related studies that employed the TAM to determine technology acceptance. Several studies, not underpinned by TAM, evaluated usage of digital resources in aquatic and marine science institutions (Thong, Hong and Tam 2002; Legris, Ingham and Collerette 2003; Collins 2007; Bertrand and Bouchard 2008; Park et al., 2009; Charnkit 2010; Shroff, Deneen and Ng 2011). Studies conducted within South Africa and the region at large, were preferred, because of their relevance.

This investigation was conducted as a case study confined to the ORI division employees. Even though it would have been ideal to include all SAAMBR employees and external library users, an in-depth study was possible with only a limited number of people.

1.8 Preliminary literature

As stated by Neumann (2000:445), "a literature review is based on the assumption that knowledge accumulates and that we learn from, and build on, what others have done". It gives an account of what has been published by accredited scholars in a particular field and explains the intellectual progression of major debates within the field. It clearly presents the historical perspective of a subject, initial development and the current situation, possibilities of new inventions, including problems and issues raised, arguments discussed, strengths and weaknesses. This enhances knowledge, sharpens understanding, stimulates new ideas and broadens researchers' perspectives on the topic.

This study reviewed theoretical literature related to the use of digital information on investigations that used the TAM to predict technology acceptance. Studies on the use of electronic resources in libraries were also evaluated. Relevant literature found in books, journals, websites, databases and theses was reviewed. Literature was reviewed with a view to identifying gaps and proposing areas that require further research. Detailed review of the literature is provided in Chapter Two.

1.9   Theory and methods

This study was underpinned by the TAM. The objective of the TAM is to provide an explanation of the determinants of computer acceptance (Davis 1989:319). The researcher chose the TAM because empirical tests of the model demonstrated that it is a valid, robust and powerful model, with high predictive ability in explaining user behaviour across a broad range of end-user computing technologies and user population (Davis, Bagozzi and Warshaw 1989; Bertrand and Bouchard 2008; Kim, Chun and Song 2009). At the same time it is both parsimonious and theoretically justified (Taylor and Todd 1995:167). The TAM's major strengths are that it provides factors which lead to information systems acceptance; reflecting the new environment of the digital age (Taylor and Todd 1995:169). Previous studies have found the TAM to have a relatively simple structure, but comparable explanatory power as more sophisticated models such as Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) (Taylor and Todd 1995:169). A detailed description of the theoretical framework will be discussed in Chapter Two.

This study used the mixed methodology design, which mixes aspects of the qualitative and quantitative paradigm at all or many methodological steps in order to address the research problem under investigation (Creswell 1994:178). The present study was conducted as a case study in which the researcher, " explored a single entity and collected detailed information by using a variety of data collection procedures during a sustained period of time" (Creswell 1994:12). These approaches were employed to ensure an in-depth analysis of the research problem. A census was conducted; data was collected from 24 ORI employees and two SAAMBR management staff. Data was collected using interviews, focus group discussions, questionnaires, observations and document reviews. Descriptive statistics were used to analyse quantitative data, while qualitative data was analysed thematically. Elaborations to these methods are given in Chapter Three.

1.10   Structure of the dissertation

Chapter One: Introduction – Introducing the topic and providing background information on the topic. An overview of SAAMBR and the ORI division is highlighted. Use of digital resources at the ORI Library is discussed. The problem is stated, research objectives and questions are covered. The chapter discusses the significance and limitations of the study.

Chapter Two: Literature Review and Theoretical Framework **-** This chapter introduces and defines the theoretical model underpinning the study. Relevant studies on the subject of technology acceptance are summarised. An overview of the use of electronic resources in aquatic and marine science institutions in Africa is presented. Glimpses of the available electronic resources relevant to the field are given. The use of electronic resources in libraries is discussed.

Chapter Three: Methodology – The research design adopted by the researcher to answer the research questions is presented. It includes the study design and data collection methods, the sampling procedure, data analysis procedures, reliability/validity and ethics.

Chapter Four: Data Analysis and Presentation – This chapter reports the findings of the study and interprets the analysed data.

Chapter Five: Discussion of Results – Presents the findings of the study and further discusses the outcome of the study.

Chapter Six: Conclusions and Recommendations **–** This chapter concludes the study, gives recommendations and identifies areas for future research.

1.11   Summary

This introductory chapter discussed the background information of the study. A brief outline of electronic resource usage in marine and aquatic institutions was highlighted, together with the use of electronic resources in libraries globally. A brief history of the organisation was given. An outline of the research problem, research questions and key objectives of the study were presented. Highlights of the literature, theory and methods relevant to this study were given. Significance of the study and delimitations of the study were discussed. Lastly, an outline of the dissertation was presented.

CHAPTER TWO

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1   Introduction

The purpose of a literature review in any research is to develop an understanding of the range of elements that are central to the research problem. Familiarising with what has been already established in the empirical literature, and learning from what others have done, helps the researcher to conceptualise, justify, implement and interpret an investigation. According to Aina (2002:189), "a literature review serves as a benchmark against which the researcher can compare and contrast the research results".

The purpose of this study was to investigate predictors of users' preferences for digital information at the ORI Library. This chapter is organised around the following research objectives:

1. Determine the predictors of users' preferences for digital information.
2. Explain user attitude towards the use of digital information.
3. Evaluate user competencies in the use of digital information.
4. Examine the ICT infrastructure in place to facilitate access to digital information.
5. Assess the relative patterns of usage of electronic resources.

Chapter two is divided into two main parts. The first discusses the theoretical model that underpins this study and addresses the above-mentioned research objectives. The second reviews empirical and descriptive literature on electronic resource use by scholars in aquatic and marine fields as well as in libraries in general. Documentation of digital information resources in marine and aquatic libraries in Africa is given.

2.2   Theoretical framework

Theoretical framework(s) play a critical role in the research process, from planning of the research, how data will be collected and how the emerging findings will be presented. Hussey and Hussey (1997:341) stated that theoretical frameworks limit the scope of a study by focusing on specific relevant theories and models from the literature which underpin a

positivistic research study. They explain how the researcher theorises or makes logical sense of the relationships among variables that have been identified as important to the problem being investigated (Kripanont 2007:83). The ultimate intention of developing a theoretical framework is to help the researcher postulate and test certain relationships, to improve the understanding of the dynamics of the situation. Thus, Neumann (2006:77) warns that researchers who proceed without a theory or model rarely conduct top quality research and frequently find themselves in a quandary while reporting their findings. In this study, a thorough understanding of the technology acceptance theories helped the researcher to analyse reasons for resistance towards, or acceptance of, technology and ultimately digital information.

2.3   Technology acceptance theories

Silva and Dias (2007:74) observed that, although having a technical view of the requirements offered by technology and understanding the use of information technology is necessary, it is equally important to search and to comprehend the behaviour of who will use it. Researchers in the area of information systems and information technology are interested in investigating the theories and models that will have power in predicting and explaining behaviour across domains. Technology acceptance is about "how people accept, adopt and use some technology. The main objectives of many technology acceptance studies are to investigate how to promote usage and also to explain what hinders the acceptance and usage of technologies" (Kripanont 2007:45). Shroff, Deneen and Ng (2011:601) added that practitioners evaluate systems to "predict acceptability, to diagnose reasons resulting in lack of acceptance and to take proper measures to improve acceptance". A technology acceptance model is relevant to this study, which seeks to establish predictors of users' preferences for digital information at the ORI Library.

Many theories and models have been developed to facilitate the understanding of factors impacting on the acceptance and usage of technologies. In literature, it is possible to identify many theories which try to predict the impact of technology on human behaviour (Silva and Dias 2007:74). The present study chose to focus on three theories which stood out as theories of technology acceptance; namely Theory of Reasoned Action (TRA), proposed by Ajzen and Fishbein (1980), Theory of Planned Behaviour (TPB), suggested by Ajzen (1985), and Technology Acceptance Model (TAM) by Davis (1989). These were among the pioneers of social behavioural models postulating that behaviour is predicted by behavioural intention.

Through the framework of the TAM, this study examined predictors that inform user preference for digital resources at the ORI Library. Taylor and Todd (1995:169) stated that a theory should be judged superior to others if it involves the fewest number of statements and assumptions; if it explains the broadest range of phenomena and if its predictions are more accurate. Yousafzai, Foxall and Pallister (2007:300) added that models or theories should be evaluated in terms of both parsimony and their contribution to understanding. Despite the specific advantages of each model, the capability of it predicting and explaining behaviour is measured by the extent to which the predictors in the theory can account for a reasonable proportion of the variance in behavioural intention and usage (Kripanont 2007:77). It is for these reasons that this study singled out the TAM as the suitable model. However, a brief description of TRA and TPB was given, so that the relevance of the TAM in addressing the objectives of the study can be justified.

2.3.1 Theory of Reasoned Action (TRA)

Emerging in the social psychology domain, Ajzen and Fishbein (1980) developed the TRA which seeks to identify the determinant factors of consciously intentional behaviour (Silva and Dias 2007:74). TRA forms the backbone of models associated with attitude-behaviour relationships. It interprets social behaviour at the level of individual decision-making. According to this theory, determinants of the intent to adopt a given behaviour are an individual's personal attitude toward performing the behaviour and the influence of social factors toward the performance of the behaviour (Ajzen and Fishbein 1980:24). The model has two core constructs of the intent to adopt a behaviour, namely, an individual's attitude toward performing a behaviour, and the subjective norm associated with a behaviour.

An individual's attitude toward a behaviour is a function of beliefs concerning the perceived consequences of performing a specific action and a personal evaluation of the consequences (Godin 1994:1391). As emphasised by Siva and Dias (2007:75), TRA considers that people behave in a rational way, evaluating what they have to lose and to win with the manifestation of their attitudes. Accordingly, "people think about their decisions and forecast the possible outcomes of their actions before they decide to perform or not perform certain behaviours" (Ajzen and Fishbein 1980:26).

Subjective norm describes the social pressure exerted on an individual to perform a behaviour. It is determined by the perceived expectations of salient referent individuals or groups and by the individual's motivation to comply with the expectations of these individuals (Godin 1994:1391). In other terms, subjective norm describes an individual's perception of what other people will think about the behaviour; will they agree or disagree with the decision to perform the behaviour and how important are these individuals to the decision-maker?

Overall, TRA proved to be helpful in understanding the decision-making process underlying exercise behaviour (Godin 1994:1392). The model has been widely researched and used to make accurate predictions of human psychological choices among alternatives in many situations, such as voting in elections and alcoholic drinks consumed (Silva and Dias 2007:75).

2.3.1.1 Relevance of TRA to this study

TRA asserts that the direct determinants of individuals' behavioural intentions are their attitude toward performing the behaviour and their subjective norm associated with the behaviour. The model predicts motivational influences on human behaviour under volitional control; showing a causal chain that links behaviour with attitude and subjective norm (Godin 1994:1391). A fundamental assumption of TRA is that individuals are rational actors who process information and that underlying reasons determine motivation to perform a behaviour. These reasons, made up of a person's behavioural, normative and control beliefs, determine his or her attitudes, subjective norms and perceived control, regardless of whether or not these beliefs are rational, logical, or correct by some objective standard (Glanz, Rimer and Viswanath 2008:80). Thus, TRA theory is relevant to this study, which sought to determine predictors of users' preferences for digital information. The aim of the present study was to identify the motivational determinants resulting in users' conscious choice for digital information. TRA provides a framework to discern those reasons and to decipher individuals' actions, "by identifying, measuring and combining beliefs relevant to individuals or groups, allowing us to understand their own reasons that motivate the behaviour of interest" (Glanz, Rimer and Viswanath 2008:76).

However, the TAM was chosen for this study because TRA is a general behavioural model that does not specify the beliefs that are operative for a particular behaviour, in this case,

technology adoption and the use of digital information (Davis, Bagozzi and Warshaw 1989:984). The success of TRA in explaining behaviour depends on the degree to which the behaviour is under volitional control. It is not clear whether TRA components are sufficient to predict behaviours in which volitional control is reduced (Glanz, Rimer and Viswanath 2008:271).

2.3.2 Theory of Planned Behaviour (TPB)

Ajzen (1985) proposed the TPB as an extension of TRA and integrated perceived behavioural control. As described by Godin (1994:1392), Ajzen (1985) observed that TRA was particularly valuable when describing behaviours that were totally under volitional control; yet most behaviours are located at some point along a continuum that extends from total control to complete lack of control. Thus, by incorporating perceived behavioural control, situations where an individual lacks control or resources necessary for carrying out targeted behaviour freely can be accounted for (Godin 1994:1392). As observed by Silva and Dias (2007:76), TPB was designed to forsee and explain human behaviour in specific contexts. TPB was designed to predict deliberate behaviour, because behaviour can be deliberative and planned.

TPB therefore suggests that an individual's willingness to perform a certain behaviour is set on by attitude toward the behaviour, the subjective norm and behavioural control. The more favourable the attitude and subjective norm, and the greater the perceived behavioural control, the stronger should be the individual's intent to perform that behaviour.

TPB also has a belief-based structure formed by the perceived presence or absence of required resources and opportunities, the anticipated obstacles and impediments and by the perceived power of a particular control factor to facilitate or inhibit performance of the behaviour (Godin 1994:1393). Three kinds of beliefs guiding human behaviour were identified:

- Behavioural beliefs – beliefs about a favourable or unfavourable attitude towards a behaviour; suggesting the likely outcomes of a behaviour and the evaluations of the outcome,

- Normative beliefs – beliefs on perceived behavioural expectations of important people like family, friend, manager or spouse. This belief results in perceived social pressure or subjective norm,

- Control belief – beliefs about the presence of factors that may facilitate performance of the behaviour and the perceived power of these effects. These beliefs give rise to perceived behavioural control (Godin 1994:1393).

An analysis by Ajzen (2006) showed that TPB was extensively used during the period 1985 to January 2004 on 610 studies published in the PsycINFO database and 222 studies published in the Medline database.

2.3.1.1 Relevance of TPB to this study

According to TPB, antecedents of intentions and actions are attitudes, subjective norms and perceived behavioural control. Considering that this theory is an extension of TRA, its relevance to this study is more or less similar, only that TPB predicts deliberate behaviour. Ajzen's (1991) inclusion of perceived control was based on the idea that behavioural performance is determined jointly by motivation and ability. The aspect of conducting a planned behaviour makes this model even more relevant to this study, in that users are showing a preference for digital resources in a library that has the bulk of its collection in print. TRA has been found to work successfully when applied to actual behaviours that are under a person's volitional control, as was the case under study.

However, TPB does not provide guidance on how to promote behavioural change. Although it is effective in explaining, measuring and predicting behaviour, it does not specify techniques that can be applied in order to change behaviour (Hobbis and Sutton 2005:15). The purpose of this study is to investigate predictors of users' preference for digital information so that a framework for improving digital dissemination can be developed.

2.3.3   The Technology Acceptance Model (TAM)

Davis (1989:319) observed that user unwillingness to accept and use available information systems is one of the important issues which can cause system failure. Davis argued that computer systems cannot improve organisational performance if they are not used and that resistance to end-user systems by managers and professionals is a widespread problem (Davis

1989:319). To better predict, explain and increase user acceptance, there was need to understand why people accept or reject computers. Adapted from TRA, the TAM was developed to provide an explanation of the determinants of computer acceptance that is, in general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified (Davis, Bagozzi and Warshaw 1989:985).

Davis (1989) proposed the TAM to examine the impact of technology on user behaviour. According to the model, users' motivation can be explained by three factors:

- Perceived ease of use,
- Perceived usefulness,
- Attitude towards use.

The TAM suggests that perceived ease of use and perceived usefulness are important predictors that determine the user's attitude toward his or her intention to actual system use (Davis, Bagozzi and Warshaw 1989:985). Usage behaviour was identified as a direct function of behavioural intention which, in turn, is a function of attitude toward usage, reflecting either favourable or unfavourable feelings towards the technology (Yusoff et al., 2009:77). Vaidyanathan, Sabbaghi and Bargellini (2005:280) explained that the crucial point of the TAM is that adoption behaviour is determined by individual acceptance which is determined by perceived ease of use and perceived usefulness. The model further explained that perceived ease of use and perceived usefulness were hypothesised to be directly influenced by external variables which tend to vary, depending on the specific technology being studied (Davis, Bagozzi and Warshaw 1989:987). Figure 1 below illustrates the model.
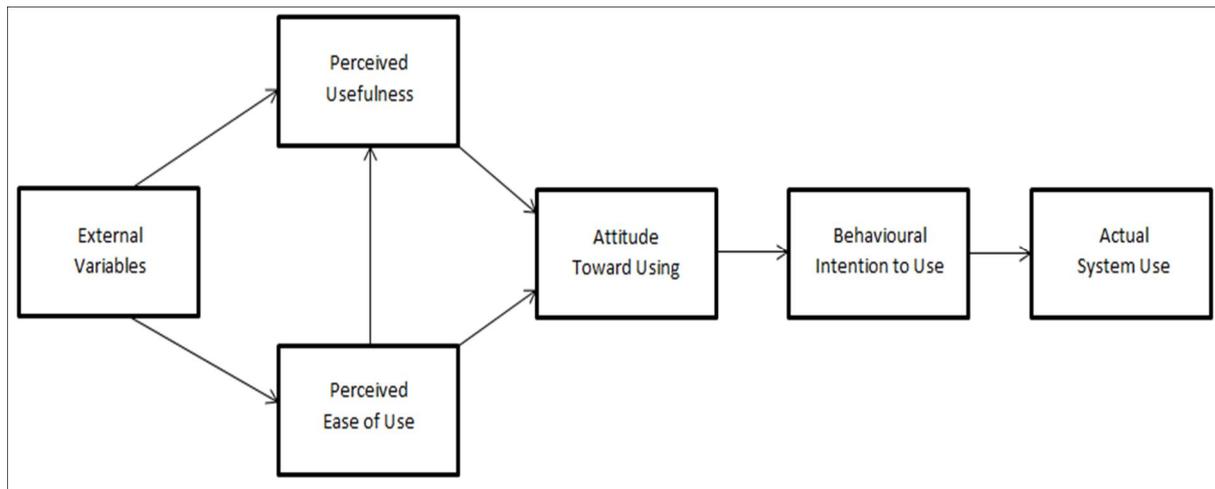
Figure 1: Technology Acceptance Model (Source: Davis, Bagozzi and Warshaw 1989:985)

2.3.3.1 Perceived usefulness

Perceived usefulness is referred to as "the user's subjective probability that using a particular technology will raise his or her job performance within an organisational setting" (Davis, Bagozzi and Warshaw 1989:985). Within the context of adopting and using new technology within a workplace, Venkatesh, Morris and Ackerman (2000:42) explained that the most essential predictor of an employee towards adopting and using a new technology is their perception of the usefulness of that particular technology. It is proposed to have a direct impact on adoption intention because users are more willing to use a technology if it can provide valuable functions, or if they believe the technology will help them achieve their work goals (Silva and Dias 2007:78).

2.3.3.2 Perceived ease of use

Perceived ease of use is defined as the extent to which an individual assumes that utilising an information system would be free of physical or mental effort (Davis, Bagozzi and Warshaw 1989:985). Considering the complexity of data processing for decision support, the perception of a system's ease of use may significantly affect the level of its adoption by prospective users. If, for example, an individual is given a piece of technology which is difficult to use, the chances are high that it will likely not be used when an alternative method exists. The difficult-to-use technologies are seen by many, as less useful under voluntary conditions, whereas easy-to-use technologies are more likely to be used than the difficult ones, regardless of how useful they are perceived to be. Davis (1993:479) thus noted that ease of use can be considered a pre-requisite for useful systems.

2.3.3.3   Attitude towards use

Attitude is an individual's positive or negative evaluation of performing a behaviour determined by an expectancy-value model of beliefs weighted by evaluations of the consequences (Fishbein and Ajzen 1975:233; Kim, Chun and Song 2009:68). According to Davis (1993:476), attitude towards using is defined as "the degree of evaluative affect that an individual associates with using target system in his or her job". Attitude guides the individual's behaviour by filtering information and by shaping his or her perceptions of the world (Chun and Song 2009:68). The TAM theorises that a user's attitude which reflects favourable or unfavourable feelings towards using an information system is determined jointly by perceived ease of use and perceived usefulness (Davis, Bagozzi and Warshaw 1989:985). The resultant attitude towards using the technology determines the behavioural intention to use or not to use technology (Masrom 2007:3). Thus a person who believes that performing a behaviour will lead to mostly positive results will have a favourable attitude, while a negative outcome will have an unfavourable attitude.

2.3.3.4 Behavioural intention

According to the TAM, intention to use e-resources is the behaviour intention construct and is a function of two concrete behaviour beliefs: perceived usefulness and perceived ease of use (Davis 1989:320). The TAM claims that intention is a proper surrogate to examine and predict a user's behaviour toward a particular technology. Results from a number of studies have shown consistent results of a significant correlation between behaviour intention and usage behaviour (Mathieson 1991; Jackson, Chow and Leitch 1997; Shroff, Deneen and Ng 2011). User behaviour is largely influenced by behavioural intention; thus behavioural intention plays an important role in predicting usage behaviour.

2.3.3.5 Actual use/usage behaviour

Actual system use quantifies an individual's real course of action in response to some mental processes. Davis (1993:480) states that "Frequency of using a system and the amount of time spent using the target system, are typical of the usage metrics". Actual usage is an important variable in technology acceptance, as it appears to be a good surrogate measure for the effective deployment of information systems resources in an organisation (Igbaria and Tan 1997:115).

2.3.3.6 External variables

The TAM theorised that perceived usefulness and perceived ease of use could be affected by external variables. External variables provide the possibility of examining the contextual factors which are often important barriers to actual system use (Park et al., 2009:198). They are those factors outside of the theoretical model that have the possibility of causing a positive or negative effect on system use. Previous studies which adopted the TAM identified two main categories of external variables, namely individual differences and system characteristics (Zmud 1979; Bostrom, Olfman and Sein 1990; Agarwal and Prasad 1999). Individual differences identified included competency, domain knowledge, self-efficacy, gender, language, age and education level. System characteristics included accessibility, visibility, interface and relevance. The present study evaluated the effect of user competency and ICT infrastructure as external variables that may affect the perceived ease of use and perceived usefulness of electronic resources by users at the ORI Library. The researcher chose these two external variables because they are basic conditions that facilitate e-resource usage.

Competency

The length of computer experience implies exposure to different types of applications and higher levels of familiarity with various software packages (Thong, Hong and Tam 2002:224). In the context of the present study, user competency in using digital information is an important measure of digital content familiarity. Although competency may not have a direct impact on usage behaviour, it helps users to learn how to work with electronic resources with ease. Usage is more predictive when individuals have prior experience with technology (Thong, Hong and Tam 2002:224).

ICT Infrastructure

ICT infrastructure includes computer hardware, software and communication networks. Basically, a computer with Internet connection and proper software installed is necessary for gaining access to electronic resources. Without this infrastructure, it is not possible to use electronic resources. Iacovou, Benbasat and Dexter (1995:469) stressed that in organisations where technology levels are high, the process of adoption is easier. This study will evaluate ICT infrastructure in place to facilitate access to electronic resources in the ORI Library.

2.3.4 The relationships between TAM's constructs

A person's perceptions concerning usefulness and ease of use of an information system are suggested to be salient beliefs that determine attitude towards the information system use and eventually lead to acceptance and use (Davis, Bagozzi and Warshaw 1989:985). Attitude was considered to be influenced by perceived usefulness and perceived ease of use. Both variables affect behavioural intention to use and behavioural intention has influence on actual system usage. The causal relationships between external variables of users' acceptance and the real use of computer technology help to comprehend user behaviour through utility knowledge and facility usefulness perceived by them (Silva and Dias 2007:78). Various studies have explored a number of relationships that exist between the TAM constructs; with perceived ease of use, perceived usefulness and actual use being the most commonly investigated by researchers (Anandarajan, Igbaria and Anakwe 2002; Pan et al., 2005; Porter and Donthu 2006; Averweg 2008; Yusoff et al., 2009; Miller and Khera 2010; Suki and Suki 2011; Shroff, Deneen and Ng 2011). However, Yousafzai, Foxall and Pallister (2007:282) acknowledged that no single study tests all relationships, but they are measured in at least one study.

2.4 Relevance of the TAM to this study

While TRA and TPB are general theories that explain general human behaviour, the TAM is specific to information system usage. The TAM was originally developed to understand the causal relationship between external variables and user acceptance of computer-based applications. The scales, perceived ease of use, perceived usefulness, attitude towards use, actual use and external variables (level of competency and ICT infrastructure) were adopted for use in the present study. Applying scales which have already been developed and empirically validated in previous research avoids the potentially time-consuming and costly effort required to develop new measurement instruments. Adams, Nelson and Todd (1992:227-228) asserted that there is a wide variety of ways in which the TAM scales can be applied. First, in application settings, the scales may be used by systems designers to obtain user feedback on different system features or design approaches, or they may be used after implementation of a system to diagnose problems in user acceptance. Second, scales may be used in organisations to make selections between contending software packages. Third, by examining ratings of different user groups for the same software, the scales might be used to determine problem areas in acceptance or deficiencies in training. Lastly, Adams, Nelson and

Todd (1992:228) pointed out that scales may also be used by researchers interested in understanding the determinants of technology adoption, factors that impact on the success of information systems and the spread of information technology.

This study adopted the TAM to understand the determinants influencing digital information acceptance. The present study was conducted as a result of an observation that users of the ORI Library were increasingly showing a preference for digital information in a library that had the bulk of its collection in print format. For this reason, the TAM was applied in this study to determine predictors of users' preferences for digital information at the ORI Library. The present study chose to apply the TAM because it is a proven framework capable of predicting acceptance of technology. The relevance of its constructs to the use of digital information was validated in the present study. The objectives of this study were centred on the TAM's constructs; perceived ease of use, perceived usefulness, attitude towards use, actual use, and external variables, level of competency and ICT infrastructure.

Objective 1 - Predictors of users' preferences for digital information
This objective was addressed by the TAM's two primary determinants of system use, namely perceived usefulness and perceived ease of use. Several studies highlighted the importance of perceived ease of use and perceived usefulness as important determinants in predicting a person's behaviour to technology acceptance (Davis 1993; Tan et al., 2005; Masrom 2007; Park et al., 2009).

Objective 2 – Users' attitude towards the use of digital information
The user attitude towards digital information was addressed by the TAM's attitude construct. A number of studies have examined how attitude can positively or negatively affect an individual's acceptance or rejection of a technology (Davis, Bagozzi and Warshaw 1989; Mathieson 1991; Chau 1996; Doll, Hendrickson and Deng 1998; Porter and Donthu 2006; Choi, Kim and Kim 2007; Madhusudhan 2010).

Objectives 3 - User competencies in the use of digital information
The TAM suggests that perceived ease of use and perceived usefulness can indirectly be affected by external variables. Level of competency was identified as an external variable that can indirectly affect technology acceptance behaviour. An individual's experience with digital resources can predict acceptance behaviour towards the resource.

Objective 4 - ICT infrastructure to facilitate access to digital information

ICT infrastructure is another TAM external variable that was identified as important in the present study, because use of electronic resources is only possible when adequate IT facilities are in place. In addition, it is a major issue worth investigating, especially within the African region where systems are still being set up in financially challenged economies.

Objective 5 - Patterns of use of electronic resources

This objective examined actual use of electronic resources. Various studies across the globe have been conducted to assess actual use of digital resources in different environments (Ali 2005; Gowda and Shivalingaiah 2009; Deng 2010; Madhusudhan 2010; Swain 2010; Egberongbe 2011; Mulla 2011). Users of this study were showing a preference for electronic resources. The purpose of this objective was to confirm or refute these observations by assessing their real-life actions. Table 1 outlines how the research questions were mapped to the TAM variables.

Table 1: Mapping research questions to the TAM variables

Research question	Key variables of the research question	Variables of the TAM correlating with the research question
What are the predictors of users' preferences for digital information?	Predictors of user preference for digital information	Perceived ease of use, perceived usefulness
What is the attitude of users towards the use of digital information?	Attitude towards use of digital information	Attitude
What competencies do users have in the use of digital information?	Competencies in use of digital information	Competency (external variable)
What ICT infrastructure is in place to facilitate access to digital information?	ICT infrastructure available	Accessibility (external variable)
What are the usage patterns of electronic resources?	Use of electronic resources	Actual use

2.5 Related studies that have applied the TAM

The TAM is generally considered the most influential and most widely employed model in the adoption and use of information technologies and has received affluent empirical support (Lee Kozar and Larsen 2003:752). It has been widely used because of its common sense nature, attractive simplicity and richness (Averweg 2011:196). The model has been applied in different fields and distinctive circumstances. Studies conducted during the years 1990 to 2000 which employed the TAM as the theoretical framework were concerned more with personal computer and application software usage such as e-mail, word processing programs and Windows operation systems (Davis, Bagozzi and Warshaw 1989; Mathieson 1991; Chau 1996; Doll, Hendrickson and Deng 1998). Current studies show a deep concern for modern technologies such as digital scholarship, digital library, Web 2.0, the World Wide Web (WWW), mobile services and e-learning (Lederer et al., 2000; Thong, Hong and Tam 2002; Nov and Ye 2008; Park et al., 2009; Chinyamurindi and Louw 2010). In this study, the TAM is used as a model which has been successfully applied in examining adoption behaviour of various information systems in various organisational contexts. In addition, the TAM's potential for simultaneously examining multiple factors is a strong advantage for studying the adoption of digital libraries because library systems encompass a wide range of technologies, services, organisational contexts, environments and potential users (Thong, Hong and Tam 2002:216).

Vaidyanathan, Sabbaghi and Bargellini (2005) conducted a survey to investigate factors that affect individual acceptance of a digital library by students at Indiana University. In their study, they acknowledged that digital libraries were increasingly becoming popular and building one was expensive and resource-intensive. For this reason, there existed a need to identify factors that could increase user acceptance of digital libraries. Using the TAM as a theoretical basis to understand individual acceptance of users, the results of their study revealed that perceived ease of use and perceived usefulness were the drivers of individual acceptance, with perceived usefulness being significantly more important in determining individual acceptance than perceived ease of use. Furthermore, external variables which include search function, screen design, navigation and system reliability had significant effects on perceived ease of use and perceived usefulness which, in turn, had a significant effect on individual user acceptance. These findings concur with those of Davis (1989:333), who found that perceived usefulness was a primary determinant while perceived ease of use

was a secondary determinant of people's intention to use an information system. However, although many studies have emphasised the importance of perceived usefulness over perceived ease of use, the conventional wisdom that perceived usefulness is the main predictor of adoption has been challenged in developing countries (Anandarajan, Igbaria and Anakwe 2002; Brown 2002; Averweg 2008; Averweg 2011; Suki and Suki 2011).

Through the framework of the TAM, Miller and Khera (2010) examined some of the features that inform user acceptance of a digital library system implementation at agricultural universities in two developing countries, Kenya and Peru. The survey looked at factors contributing to adoption of The Essential Electronic Agricultural Library (TEEAL). The study population consisted of students, researchers and faculty instructors. Data from both sites was analysed on overall measures of perceived ease of use and perceived usefulness, as well as on system and individual measures. According to the results of their study, the TAM appears to work well in describing factors that affect usage of digital libraries in developing countries, with perceived usefulness and perceived ease of use as significant predictors of perceived intent to use. The results revealed that the stability of computers, electricity and an environment not subject to disruptions showed a positive relationship with perceived ease of use. Actual usage of the TEEAL database was high. The authors concluded by advising that application of the TAM to IT implementation in developing countries must be guided more by the specificities of local circumstances than by the performance of the TAM in highly-developed countries. Similarly, Nov and Ye (2008:850) cautioned that those in charge of digital libraries should be alert when implementing changes to a system and recommended user training and support where intended users have high resistance to change.

Tella (2011) conducted a study to examine the predictors of users' acceptance of an e-library at the University of Ilorin in Nigeria. The objectives of the study were to:

- Determine predictors of e-library acceptance,
- Develop a framework for measuring e-library acceptance from the perspective of the TAM,
- Examine the predictive capability of each of the TAM variables and other variables not included in the TAM on acceptance of the e-library.

Tella (2011) highlighted the absence of tested and validated technology acceptance models under e-libraries prevalent in developing countries. Tella collected data through questionnaires that were distributed to 1 500 undergraduate users of the e-library. The findings revealed that the acceptance constructs, ease of use, perceived usefulness, actual use and computer self-efficacy, significantly correlated with e-library acceptance. As with competency and ease of use, similar results were obtained from a study conducted by Tayler and Hastings (2011) to determine if virtual patrons were satisfied with the resources and services being provided by the university's online library. The findings revealed that students who rated themselves as more competent with computer-related tasks were found to be significantly more satisfied with the library's online resources than those with limited competency. Thus level of computer competency, which is a strong element of the TAM's ease of use concept, influenced student satisfaction with the library's online services.

Park et al. (2009) conducted a study to evaluate user acceptance of a digital library system in developing countries using the TAM. A survey was conducted using 16 institutions in Africa, Asia and Latin America. The results confirmed that perceived ease of use has a significant impact on perceived usefulness, while perceived usefulness had a direct effect on behavioural intention. The study also found that external variables like competency in computer use, domain knowledge and English literacy had a direct effect on the perceived ease of use, which directly affects perceived usefulness and behavioural intention to use. These effects of external variables are parallel with the TAM's proposition which emphasises the effects of individual differences on perceived ease of use and perceived usefulness. Park et al. (2009) further examined ICT infrastructure using visibility and accessibility constructs. Visibility was defined as the degree to which a system is observable or apparent in an organisation and accessibility as the degree of convenience with which users access an information system (Park et al., 2009:199). The study revealed that ICT infrastructure, education and skill were access barriers to digital library systems. Accessibility was stressed as an important determinant of perceived ease of use. The difficulty in access has been one prominent disadvantage for users in developing countries because of its less developed telecommunications network compared to the developed countries where these information systems originate.

Within the South African context, Brown (2002) carried out a survey with university students to investigate individual and technological factors affecting perceived ease of use of web-based learning technology, called WebCT. A secondary aim of this study was to confirm the nature of relationships between perceived ease of use, perceived usefulness and actual usage of a system in the context of a developing country. The study hypothesised that web technology characteristics that present ease of finding and ease of understanding have a positive effect on perceived ease of use of web-based learning technologies, while individual perceptions can positively or negatively affect perceived ease of use of the system. Quantitative data was gathered from 78 first-year students using questionnaires. The findings were that both individual and technological factors influenced perceived ease of use, adding that, in the context of a developing country, ease of understanding is confirmed as being significant because the language of instruction is not in the mother tongue for most students. Consequently, the results revealed that perceived usefulness was not noteworthy in influencing usage, while perceived ease of use took on increased importance as it influenced both usage and perceived usefulness.

Chinyamurindi and Louw (2010) conducted a cross-sectional survey to explore technology acceptance along gender lines in selected South African companies, because persistent gender imbalance in the workplace had been noted to exist chiefly in the science, engineering and technology sectors, areas that have an important bearing on South Africa's global competitiveness. The objective of the study was to investigate trainees' acceptance of electronic coursework as an instruction and learning technique in various industries in the South African context. The study explored how gender imbalance manifests in terms of trainee acceptance of electronic coursework. The findings showed significant gender differences for computer self-efficacy (which includes competency), perceived usefulness, perceived ease of use and behavioural intention. These differences indicated that women rated computer self-efficacy, perceived usefulness, perceived ease of use and behavioural intention to use e-learning slightly higher than men. This meant that women were more likely to favour and accept the use of technology-based training (especially e-learning) than their male counterparts.

A case study was conducted by Ako-Nai (2005) to investigate factors likely to affect user acceptance, usage and adoption of the Executive Information System (EIS) by Unilever

South Africa in Durban. An EIS is a computerised information system designed to provide managers in organisations access to internal and external information that is relevant to management activities and decision-making (Averweg 2008:44). The implementation of an information system in any organisation is considered a high-risk project, because huge financial resources are attached to it. To avoid failure of this system and to ensure its successful acceptance, usage and adoption by its users, this study sought to identify possible factors relating to users' attitudes towards the system that are likely to influence, positively or negatively, its users' acceptance, usage and adoption of the system. Based on the TAM, data was gathered using questionnaires and semi-structured interviews of users from the Unilever EIS user group. The study employed a triangulation methodology approach to analyse data. The key findings of the study were that perceived ease of use factors and perceived usefulness factors, respectively, with the former having a heavier impact than the latter, impact on the users' future attitudes towards system use. The study explained that factors that contributed to the perceived ease of use included measures of user training, motivation and computer self-efficacy (comfortability and control of computer use). Factors that contributed to the perceived usefulness included measures of timeliness, accuracy, relevance of information, speed of strategic decision-making, support of analytical thought process and user satisfaction. The study recommended an improvement on user-perceived usefulness of the EIS because it is a critical tool used to appraise the business on a short-term basis and it enables a comparison between current performance against set targets and historical figures of the business.

From these and other studies reviewed within the South African context, technology acceptance in libraries is still to be established. No studies used the TAM to predict the use of electronic resources specifically in marine and aquatic science libraries. The present study therefore attempts to fill this void in the literature.

2.6 Empirical literature on electronic resource usage

As users are encouraged to trust electronic resources, the need to evaluate the use of electronic resources has increasingly drawn the attention of many researchers, worldwide (Swain 2010:580). Several studies have been conducted mainly in institutions of higher learning and research organisations, to address the use of electronic resources (Ibrahim 2004; Deng 2010; Swain 2010; Egberongbe 2011; Kumar and Singh 2011; Mulla 2011; Ahmed

2013). As developing countries trail behind developed countries in technology adoption, current levels of use of electronic resources greatly differ. While most developing countries are working on improving acceptance of digital resources, developed nations are concerned with improving usability, accessibility and availability of the resource.

To evaluate the effect of competency on the use of electronic resources in the USA, Hsieh-Yee (1993) investigated the effects of search experience and subject knowledge on the search tactics of novice and experienced searchers using the ERIC database. Novice researchers were identified in the study as non-professional searchers with little or no search experience and who have not received any training or attended any workshops provided by librarians or system vendors, while professional searchers were defined as individuals with at least one year of search experience who have received online search training provided by system vendors (Hsieh-Yee 1993:163). The purpose of the study was to establish differences that existed between novice and experienced searchers on familiar and unfamiliar topics. Using graduate students of the University of Wisconsin as novices and selected professionals searchers of the community, results showed significant differences that proved that experience did affect search behaviour. Experienced searchers were found to be more careful and alert and used more synonyms and more combinations of search terms when searching unfamiliar topics than novice searchers. While experienced searchers relied on the thesaurus for term suggestions when searching unfamiliar subjects, novices relied more on their own terms. Results also revealed that no matter which topic was searched, whether familiar or unfamiliar, novice searchers displayed no difference in their use of search tactics, whereas experienced searchers used their own terms on familiar topics. As Hsieh-Yee's (1993) study displays the importance of competency in manipulating electronic resources, libraries should get to a point where the acquisition of information skills is seen as one of the key learning objectives for every university student, so that no student leaves university without being fully equipped to cope with the information intensive world, the information society, as an end-use (Brophy 1993:55).

In a recent report on findings of user behaviour, studies conducted between 2005 and 2009 in the USA and the UK, Connaway and Dickey (2010) analysed and synthesised 12 selected studies conducted in universities to better understand the information-seeking behaviour of

users. The analysis revealed a gradual increase in electronic resource usage and appreciation of the resource by users during the years. However, some common findings were that:

- Regardless of age or level of competency, academic discipline or context of the information need, speed and convenience were important to users,
- Desktop access to scholarly content was appreciated. Remote access was most preferred for convenience,
- Use of electronic journals was increasing, but access to journal backfiles was problematic. Google was often used to locate and access electronic journal content,
- More digital and enhanced content was required to assist in evaluating resources,
- There was evidence of a range of tools for scholarly research and users were generally confident in their own ability to use information discovery tools,
- Users valued human resources in their information seeking but formal training in electronic searching was received with mixed feelings.

Key findings of the analysis showed that user behaviour had drastically changed, as studies conducted in 2009 showed that users preferred seamless access to electronic resources, calling libraries to improve access to open-source materials, journal backfiles and repositories (Connaway and Dickey 2010:47). Results revealed that users lacked information literacy skills and they were not keeping pace with digital literacy.

Deng (2010) investigated usage patterns of electronic resources in a university in Australia as a way of identifying the patterns and emerging trends in accessing and using digital resources in higher education environments. An online survey supported by a comprehensive literature review was conducted to understand user perceptions, competence levels and usage behaviour of electronic resources. Overall, the use of electronic resources was a common practice, as the majority of respondents showed preference for, and a positive attitude towards the use of electronic resources. This was revealed by the large proportion of users, high frequency of use, high percentages of users rating the electronic resources as useful and the way that electronic resources were integrated into work and study (Deng 2010:96). Results also revealed users' positive attitudes, as they highlighted availability, accessibility and time saving features of electronic resources, as well as the absence of physical space limitations. Educational background, position of user and age group suggested how users perceived electronic resources. Findings also revealed that users experienced some frustration during searching, navigating and finding relevant sources, accessing and downloading

electronic resources. Despite facing many problems in retrieving and using electronic information, scholars perceived that their work became easier with technology (Tahir and Shafique 2010:134).

In India, Kumar and Singh (2011) conducted a study to determine the usefulness of electronic resources to the scientists of the National Physical Laboratory. Using a mixed method paradigm, data was analysed to expose scientists' level of satisfaction with the available electronic resources and outline challenges they faced in their fields. The findings revealed a positive attitude among scientists towards electronic resources; with the majority of them showing high levels of satisfaction with the resource. Flexibility, portability, searching facility, storage and easy access of electronic resources were said to be beneficial in terms of time and space (Kumar and Singh 2011:39). The results showed that respondents had problems of insufficient electronic resources, improper orientation, lack of awareness and lack of management for the resource. The study suggested the development of an integrated library system which is essential when offering library automated services. The study recommended the need for research libraries to develop high technological structures with solid collections of high-quality electronic resource services, as well as to organise teaching and learning programmes on electronic resource usage.

Ibrahim (2004) investigated the use and user perceptions of electronic resources in the United Emirates University. The objectives of the study were to assess frequency of use of electronic resources, examine user satisfaction and identify any barriers that hindered the use of electronic resources. The major findings were that, although respondents had a positive attitude towards digital information, fewer than 50% of the respondents used electronic resources. Low usage was a result of a lack of English proficiency, which is the medium for most electronic resources. Respondents conducted teaching and research in the Arabic language and the language barrier prevented them from using electronic resources. The students consequently lacked an awareness of the quality of the information available. Similar results were obtained by Swain (2010), in a study conducted to evaluate students' keenness to use electronic resources. Findings were that students lacked knowledge of the relevant databases to their course curricula. Ibrahim (2004) discovered that users had fairly good computer skills, but the researcher recommended organised training programmes to familiarise students with the electronic resources provided by the library. Chirra and

Madhusudhan (2010) recommended training, arguing that use of e-journals had become a vital part of information for research work in universities, such that there is need for user orientation for efficient searching. Tammaro (2008) found that although university users appreciated online training tutorials, help from library staff and information literacy courses with an actual teacher was essential.

Egberongbe (2011) examined the use and impact of electronic resources at the University of Lagos in Nigeria. The main purpose of the study was to investigate awareness, level of use, the impact of electronic resources and problems faced by researchers using electronic resources. It was found that the majority of users were unfamiliar with electronic resources. The level of usage was not worth the investment made by the university in acquiring the resources. Findings revealed that search engines were most popular as sources of information, followed by electronic journals. Usage was mainly for research, study and for keeping in touch with developments in their areas of interest. The results showed that the majority of the users had not received any training on the use of electronic resources. Levels of IT skills varied but were generally low. Users showed dissatisfaction with IT infrastructure, both in the library and the university at large. Similar results were found in a study by Ali (2005) in India, where users faced problems while searching and accessing electronic resources. These problems were lack of knowledge and awareness of the resource, lack of trained staff and inadequate terminals. Ahmed (2013) found that university users complained of inadequate subscriptions to electronic resources, limited access to back issues, inability to access from home and poor IT infrastructure. These constraints negatively affect the willingness of users to engage with electronic resources and, consequently, lower user satisfaction with the resource.

Finlayson (2010) evaluated the patterns of use of web-based library electronic resources among students at the University of KwaZulu-Natal in South Africa. Results revealed that students used the electronic resources at varying rates, with high usage during semesters and low usage during vacation periods. Usage of electronic journals and databases was common, with only a few users using e-books for their research work. A majority of the users accessed these resources on campus, while 22% enjoyed remote access. The findings revealed that users were concerned with limited access to online databases but were reluctant to read e-books on the computer screen. Literacy levels were reported to be low.

From the literature reviewed on the use of digital resources, including the empirical studies discussed above, the present researcher rarely found studies guided by a theoretical framework. A theoretical framework is important to help the researcher focus on relevant theories and studies, so that the dynamics of the situation and the relationships among variables can be understood. At the same time, gaps in the literature can be easily identified. Researchers who carry out studies without the guidance of a theoretical framework struggle to produce quality work (Neumann 2006:77). The present study was enlightened by the TAM to understand why users were showing a preference for digital resources at the ORI Library.

Most studies conducted on the use of electronic resources were done in universities. The present study sought to fill a gap by improving the availability of literature on small corporate organisations in South Africa and the African region at large.

2.7   Electronic resource use in marine institutions in Africa

The ORI is one of the few marine institutions in Africa housing a comprehensive collection of marine and aquatic information sources. Good as it may be, no library can be self-sustained; exchange of resources is inevitable. To this end, a discussion of other African institutions was important to elucidate how digital resource usage has progressed, particularly in this special field. Collaborations can easily be pursued once usage and availability of digital resources within these institutions has been established.

There are a number of institutions in Africa that specialise in marine and aquatic research. They include:

- Kenya Marine and Fisheries Research Institute (KMFRI),
- National Fisheries Resources Research Institute (NaFIRRI), Uganda,
- Tanzania Fisheries Research Institute (TAFIRI),
- National Fisheries Resources Research Institute, Uganda,
- Fisheries Society of Nigeria,
- National Institute of Freshwater Fisheries Research, Nigeria,
- University of Sierra Leone Fourah Bay College Institute of Marine and Oceanography,
- National Aquaculture Centre - Library and Information Centre, Malawi,
- Central Fisheries Research Institute, Zambia.

No literature was found that investigated user acceptance of digital information within marine and aquatic institutions. However, establishing current trends in the use of electronic resources in these institutions expose, among other things, digital information dissemination programmes that can be adopted, ICT infrastructure necessary to facilitate access to digital information, capacity building needs and relevant digital resources available. A number of these institutions have developed viable e-resource programmes for their libraries. KMFRI and NaFIRRI will be discussed as examples of such organisations.

2.7.1 Kenya Marine and Fisheries Research Institute (KMFRI)

KMFRI was established in 1979 to conduct research and make management recommendations essential for the national exploitation of aquatic resources in the marine and freshwater sector (Agolla 2011:1). KMFRI's main objective is to undertake research into marine and freshwater fisheries, aquatic sciences, biological, chemical and physical oceanography, limnology, pollution, aquaculture, natural products and marine geology (Agolla 2011:1).

To support these research activities, KMFRI library was established to provide quality, user-focussed library services and develop library resources that support aquatic research and promote the sustainable use of marine and freshwater resources (Agolla 2011:1). The library has an institutional repository built on open-source software DSpace, in which KMFRI's research output is archived and accessed by researchers (Agolla 2011:1). The system contains both metadata and links to full-text documents. Apart from the repository, KMFRI has access to e-resources through agreements and consortiums with the IAMSLIC, International Network for the Availability of Scientific Publications (INASP), Access to Global Online Research in Agriculture (AGORA), Online Access to Research in the Environment (OARE), Directory of Open Access Journals (DOAJ), Health InterNetwork Access to Research Initiative (HINARI), United Nations (UN) and other international bodies. The library has access to a wide range of online journals, e-repositories and databases such as Aquatic Sciences and Fisheries Abstracts (ASFA), in which the library acts as the national input centre (Agolla 2011:1). KMFRI also offers the following online literature services:

- AFRILIB – a union catalogue of Africa's co-operating institutions,
- AFRIPUB – a catalogue of scientific journals, articles and monographs published by African ocean scientists,

- AFRICURRENT – a current awareness tool based on users' profiles of specific interests,
- AFRIDIR – a directory of marine and freshwater professionals in Africa.

In a study conducted by Agolla (2011) to examine the impact of the use of e-resources by KMFRI library users, it was found that the use of e-resources was common among researchers and they depended on e-resources to get the required and relevant information. The study revealed that e-journals had become a basic need for the researchers' everyday life, as they were easy to access. The findings showed that there were concerns about the stability of the Internet connection, the need to sift through information to find legitimate sources and the need to train researchers in the use of e-resources. The results also revealed that some researchers were not happy with the IT infrastructure available to access electronic resources. However, the use of electronic resources among researchers was common.

2.7.2 National Fisheries Resources Research Institute (NaFIRRI), Uganda

NaFIRRI was established in 1947, with the mandate to conduct basic and applied research of national and strategic importance in the water environment, capture fisheries, aquaculture, socio-economics and marketing, information communication and management and emerging issues in the fisheries sector (Endra 2011:1). In the same year, an information centre was set-up to provide information to research scientists at NaFIRRI and the greater East African Region. The purpose of the information centre was to provide access to relevant information so that the institution could produce quality research products (Endra 2011:1). The information centre covers the following subjects: fish biology, ecology, invertebrates, fisheries management, environment, socio-economics, fishes, water quality, aquaculture, agriculture (crops and soils), research information on lakes such as Victoria, Albert, Edward, George, Kyoga, Nabugabo, Tanganyika, Rukwa, Chad, Malawi, the River Nile, the Zambezi River and many other satellite lakes in Uganda (Endra 2011:1). It also contains project reports and consultancy reports carried out by the institute in the area of fisheries, water environment, aquaculture and fisheries.

In 2009, NaFIRRI Information Centre established a locally designed network called Electronic Board to enable researchers scientists, technicians and support staff to have access to information from the comfort of their offices (Endra 2011:1). The Electronic Board was

developed based on a Local Area Network (LAN) to allow easy dissemination of electronic internal information and internal communication flow within the Institute (Endra 2011:2). The E-Board has bibliographic databases, publications from the section comprising digitised papers (reprints), reports, work plans and project technical reports. It has an internal interaction window for notices; memos; news; development programmes; activity schedules, future plans, budget estimates and reports/presentation and other documented materials (Endra 2011:2). In addition, NaFIRRI Information Centre joined the international network of fisheries information centres, IAMSLIC, where it now has global access to literature related to fisheries and aquaculture. It was one of the eight agencies in Africa that contributed to the development of the Aquatic Commons repository (Ibeun 2011:7).

To facilitate effective use of available digital resources, electronic resource training and database training was conducted for NaFIRRI research scientists and technicians with support from INASP and the LVFO/IFMP project, respectively (Endra 2011:5). No studies were conducted to establish the effectiveness of e-resource training programmes conducted and no evaluations were made on usage of the e-Board by research scientists and technicians. Like most institutions in the region, NaFIRRI is faced with challenges of inadequate computers to access electronic information (Endra 2011:5).

2.8   Electronic resource use in marine institutions in South Africa

In South Africa, apart from the ORI, libraries with marine and aquatic collections include the Margaret Smith Library of the South African Institute for Aquatic Biodiversity (SAIAB), Gilchrist Library of Marine and Coastal Management (MCM), The Council for Scientific and Industrial Research (CSIR), and libraries of universities, which include the University of Cape Town, Rhodes University, Nelson Mandela Metropolitan University, the University of KwaZulu-Natal, the University of Zululand, Walter Sisulu University and the University of Port Elizabeth.

2.8.1   Margaret Smith Library of SAIAB

SAIAB is believed to be one of the leading aquatic research institutes in southern Africa, housing South Africa's largest fish collection and a range of fisheries and biodiversity resources. SAIAB's research activities are hosted by the Margaret Smith Library, which holds one of the largest multi-media collections of fish publications (Shaw 2007:1). Use of

electronic resources at this library is facilitated through its shared resource with the Rhodes University Library. It has access to databases such as AJOL, AGORA and INASP, as well as ScienceDirect, Springerlink and Academic Search Premier (via EbscoHost), which provides full text access to more than 4 500 publications. Digital collections were being developed through digitisation. For example, a selection of photographs and manuscript material relating to South African freedom struggles have been digitised (Shaw 2007:3). In 2007, SAIAB developed a web-based information portal to promote and broaden open access to its electronic resources. The portal has a link to the library and it provides direct online access to a fish collection database, image collection, biodiversity informatics and online taxonomic keys (Shaw 2007:3).

2.8.2   Gilchrist Library of MCM

Gilchrist Library has a comprehensive collection of natural marine resources to support scientific research. Developments in the use of electronic resources could not be established at the time of this study. However, the co-operation between Gilchrist Library and university libraries allows for access to electronic resources through inter-library lending facilities. Most universities subscribe to online databases to gain access to electronic resources and they have developed institutional repositories to allow users access to their research output. In addition, the development of the Database of African Theses and Dissertations (DATAD), by the Association of African Universities (AAU), has increased and widened dissemination of research content by African universities. Apart from Gilchrist Library, other libraries also benefit through universities.

2.8.3   CSIR Information Services (CSIRIS)

The CSIR is one of the leading scientific and technology research, development and implementation organisations in Africa. It has branches in Durban, Stellenbosch and Pretoria. The CSIRIS is an important information repository that allows CSIR researchers to conduct world-class, innovative research through the provision of specialised information services that include seamless access to both electronic and print resources (CSIR 2013). The library subscribes to science databases, which include ScienceDirect, Wiley Interscience, Web of Science, EBSCO, Scopus and Springerlink. These databases contain thousands of electronic journals in all aspects of science that users have access to. CSIRIS developed an institutional repository using DSpace, called the Technical Output Database (TODB). The database

indexes a wide range of CSIR documents such as contract reports, journal publications, memos and proposals. The TODB is searchable from the library homepage by researchers. This repository is highly secured; access is only available to CSIR staff. Library staff regularly conducts training programmes with users on their electronic products. There is close co-operation between the ORI and the CSIR Durban branch in terms of resource sharing. From the present researcher's experience working at the ORI Library, the ORI Library has benefited a great deal in accessing electronic resources through the CSIRIS.

2.9 Marine and aquatic science repositories

The purpose of the present study was to investigate predictors of users' preferences for digital information, so that the results can be used to inform on improving digital dissemination at the ORI Library. Within the field of aquatic and marine science, two popular repositories have been developed namely, the Aquatic Commons repository and the OdinPbAfrica open access repository. These, if adopted, can improve digital dissemination at the ORI Library. These repositories form the backbone of digital resource usage and they offer free access to participating institutions and individuals. Considering that library budgets are always tight, this option would be recommended to increase and widen access.

2.9.1   The Aquatic Commons Repository

The Aquatic Commons is an open access repository developed in 2007 by the IAMSLIC (Collins 2007:14). Based in the USA, the open access model was developed to facilitate global sharing of research on natural marine, estuarine/brackish and freshwater environments (Collins 2007:14). Collins and Gribling (2007:1) observed that fisheries and aquaculture literature does not easily find its way into commercial libraries, particularly information related to the management of fisheries and aquaculture, as this information is normally published as grey literature and is often difficult to obtain. Thus the Aquatic Commons allows the capturing, dissemination and preservation of marine and aquatic information. Literature, which includes research papers (pre- and post-prints), conference and workshop papers, posters, power point presentations, theses and dissertations, unpublished reports, monographs, working papers, technical reports, books and book chapters and images, can be deposited in the repository by participating members across the globe (Haas et al., 2009:2). The documents are reviewed by editors and the content of appropriate items is added to the repository, while non-appropriate items are rejected. Use of the repository includes uploading

and downloading full-text documents and bibliographic information by individual researchers and scholars, agencies, societies and institutions.

Based on the concept of equal ownership and resource sharing, Collins (2007:14) identifies the specific aims of the Aquatic Commons. They are to:

- Allow the sharing of information and knowledge on the science and management of aquatic environments,
- Provide free and open access to information,
- Ensure equal participation and coverage of the literature from developing and developed countries,
- Empower managers and resource users to publish their findings,
- Enable the use and validation of research results,
- Avoid costly and wasteful duplication of effort,
- Ensure the preservation of information and its availability for future generations.

The Aquatic Commons has an official metadata harvester, Avano, which integrates metadata into larger aggregate services such as the Aquatic Sciences and Fisheries Abstracts database (ASFA). Avano provides access to resources linked to all marine sciences, as well as resources linked to fresh water resources (Haas et al., 2009:8-9).

As there is a paucity of studies to evaluate the use of e-resources in aquatic and marine science libraries, the present study addressed some of the evaluations made on the use of the Aquatic Commons repository of the IAMSLIC. Use of the Aquatic Commons within the African region has not been very pleasing. Ibeun (2011:4-5) evaluated how, in terms of input and usage, the African countries contributed to the development of the Aquatic Commons. The results showed that, between June 2010 and July 2011, Africa contributed only 596 (9.8%) documents to developing the repository, with contributions from Malawi, Nigeria, Uganda, Tanzania and Sierra Leone. Worldwide contributions added up to 3 867 full-text documents, from 82 agencies, with major submissions from developed countries like USA. The number of downloads and usage made by members worldwide from the repository amounted to 233 781. Developed countries like the USA, France, the UK, Canada, Germany and Turkey, and other countries like Malaysia, Philippines, Argentina and India, recorded

high usage statistics of 228 751. Africa downloaded 19 321 full-text documents from seven countries, namely Nigeria, Kenya, Egypt, Ghana, Ethiopia, South Africa and Tanzania.

According to Ibeun (2011:4), a general analysis of both input to, and usage of, the Aquatic Commons repository revealed that Africa, which forms part of the developing countries, has low levels of participation. The report suggested that the low level of participation by Africa was a result of ineptitude of users, a lack of awareness of the project, there were no mechanisms to offer feedback to participating agencies and language of the repository. Poor working environments, extremely limited library budgets, inadequate infrastructure and access to the Internet are some of the impediments to e-resource usage in the region. Problems encountered in accessing information on geographic areas were also evaluated and results showed that a subject categorisation had been used to describe uploaded documents and for this reason, precision was never achieved while searching the repository (Ibeun 2011:7).

2.9.2 OdinPubAfrica (OceanDocs) Open Access Repository

OdinPubAfrica is an open access repository developed by Ocean Data and Information Network in Africa (ODINAFRICA) to archive African scientific output, both published and unpublished (Nyika 2009:1). ODINAFRICA is a data and information project network established in 2003 to enable marine and aquatic institutes in Africa to share resources and improve access to scientific literature by marine and freshwater professionals (Nyika 2009:2). To this effect, the OdinPubAfrica repository was developed. Nyika (2009:2) identified the goals of OdinPubAfrica open access repository as:

- To facilitate publishing of research findings by African scientists in marine science and oceanography, thereby promoting African research and increasing access by African scientists to the international research forum,
- To make scientific publications in the field of marine science and oceanography in Africa more easily and freely accessible,
- To enhance internal scientific communication,
- To develop an OAI-compliant repository providing access to full-text publications created by scientists affiliated to African institutes.

The success of OdinPubAfrica repository development raised the interest of other regions outside Africa such as Latin America, Eastern Europe and island states in the Pacific in joining the repository project. As a result, in 2006, OdinPubAfrica was extended and renamed OceanDocs to include other interested Ocean Data and Information Network (ODIN) groups (Nyika 2009:3). OceanDocs is supported by the Intergovernmental Oceanographic Commission (IOC), specifically to collect, preserve and facilitate access to all research output from members of their Ocean Data and Information Networks (ODINS).

OceanDocs is one of a number of complementary thematic digital marine and aquatic repositories, including the Aquatic Commons, which is supported by IAMSLIC (Haas et al., 2009:4). The records of both repositories are harvested by Avano; the one-point access to oceanographic and aquatic literature which puts together records from marine and aquatic repositories around the world.

2.10 Summary of the literature review

The purpose of this chapter was to review empirical and descriptive literature on user acceptance of digital resources in marine and aquatic sciences. The TAM was identified as the most suitable model to predict technology acceptance, because it has been widely used in information technology and information systems technology acceptance research. The research objectives of the study covered by the TAM's constructs were perceived usefulness, perceived ease of use, attitude, actual use and external variables, competence levels and ICT infrastructure. From the literature reviewed, there were limited studies of user preferences for digital information in marine and aquatic sciences, especially in the African context. Related literature from across the globe was reviewed to address this gap. Electronic resources and their usage in aquatic and marine science institutions in Africa were reviewed. Studies that examined use of digital resources in libraries were discussed. This study makes a contribution in applying the TAM to investigate predictors of digital information preferences by scholars in marine and aquatic fields from a developing country such as South Africa. The documentation of some of the leading electronic resources in marine and aquatic sciences in Africa would help promote access to research in this area.

3.1   Introduction

Crotty (1998:3) defines research methodology as "the plan of action, procedure or design lying behind the choice and use of certain methods, and connecting the choice and use of methods to the desired outcomes". Mouton (1996:37) summarised the processes and distinguished three dimensional levels of research namely, methodological paradigms, research methods and research techniques.

- Methodological paradigms refer to quantitative, qualitative or mixed methods,
- Research methods refer to the research process which involves sampling, data collection and analysis,
- Research techniques outline how specific tasks are executed - how the population is sampled; how data is collected and analysed (Mouton 1996:37).

Collins et al. (2000:122) explained that the methodology is designed to provide answers to the research questions, deciding on the type of research that is suitable, the persons or situations from which data will be collected, the type of data needed and how data will be collected and analysed. This chapter gives an overview of the research methodology adopted to answer the research questions of this study. In particular, the chapter discusses methodological paradigms, research methods, the population, data collection and analysis procedures.

3.2   Methodological paradigm

This study adopted the mixed method paradigms, which Tashakkori and Teddlie (2003:711) defined as "a type of research design in which qualitative and quantitative approaches are used in types of questions, research methods, data collection and analysis procedures and/or inferences". According to Johnson and Onwuegbuzie (2004:16), the mixed method paradigm reflects the belief system of researchers that research methods should be determined by the problems the researcher has to investigate or the questions to be answered and the best methods to do so, and not by first deciding about whether the research is qualitative or quantitative. Johnson and Onwuegbuzie (2004:16) added that because the methods chosen

should be those best able to answer the questions, researchers often combine typically quantitative and qualitative research techniques so that the resulting mixture or combination is likely to result in complementary strengths and non-overlapping weaknesses. The assumption here is that any bias inherent in any particular data collection or analysis method would be neutralised when used in combination with other approaches (Creswell 1994:174).

Mixed method paradigm with pragmatism refers to:

> "A deconstructive paradigm that debunks concepts such as 'truths' and 'reality' and focuses instead on 'what works' as the truth regarding the research questions under investigation. Pragmatism rejects the either/or choices associated with the paradigm wars. Advocates for the use of mixed methods in research acknowledge that the values of the researcher play a large role in interpretation of results" (Tashakkori and Teddlie 2003:713)

Creswell (2003) and Tashakkori and Teddlie (2009) view a pragmatic paradigm as an intuitive appeal - permission to study areas that are of interest, embracing methods that are appropriate and using findings in a positive manner, in harmony with the value system held by the researcher.

Creswell and Clark (2011:176-177) stated that, in mixed methods studies, the basic distinction between qualitative and quantitative data is that qualitative data is obtained using open-ended questions in which the researcher does not use predetermined categories or scales to collect data. Respondents provide information based on questions that do not restrict them, while quantitative data is collected using close-ended questions based on predetermined response scales or categories. In the present study, both qualitative and quantitative data was collected, using interviews, focus group discussions, questionnaires, observations and document reviews. This study used quantitative and qualitative methods, in combination, to give both the broader, larger-scale picture, and a more detailed understanding of the research problem.

Mixed methods were considered appropriate for this study because the researcher was aware that little documentation on the subject matter was available in South Africa and the region at large. It was important to adopt both qualitative and quantitative methods, so that collected

data would complement and substantiate each other in bringing more concrete results. This approach was preferred after the realisation that previous studies that used the TAM to measure technology acceptance were being criticised for being based on self-reported use data and not actual use data (Chuttur 2009:16). Chuttur (2009:16) cautioned that self-reported use data is a subjective measure and is thus unreliable in measuring the actual use of a system. It is for this reason that this study employed interviews, focus group discussions, observations, document reviews and questionnaires to gather both qualitative and quantitative data within each method whenever possible, to improve the authenticity of the results as well as allowing an in-depth analysis of the problem under study.

The questionnaire (see Appendix B) gathered mainly quantitative data to measure user preferences, user attitude towards the use of digital information, users' levels of competencies and infrastructure facilities available to access digital resources. Interviews were aimed at collecting mainly qualitative data from management on how important and feasible it was to develop digital collections at the ORI Library. Aspects such as budgets, capacity building plans, general views on digital scholarship and prospects for a digital collection development were discussed (see Appendix D). Focus group discussions gathered both quantitative and qualitative data on user preferences between print and electronic, electronic resources used and for what purposes, the skills and competencies users possessed and adequacy of ICT infrastructure, among other things (see Appendix C). Quantitative and qualitative data was derived from observations made by the researcher on library visits by respondents, scanning of documents; ICT infrastructure available and the use of the library computers (see Appendix E). Document reviews were conducted to learn more about the organisation, Internet policy, library usage statistics and library digital content available (see Appendix F).

3.3 Case study research design

A case study design was adopted. A case study is defined as a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real-life context, capturing the knowledge and documenting the experiences of practice (Robson 2002:178). Yin (1984:13) added that a case study is bounded by time and activity and collects detailed information using a variety of data collection procedures during a sustained period of time. The term 'case' associates the case study with a location, such as an organisation, and the emphasis tends to be on an intensive and detailed analysis of that single

case. The focus is on individual instances rather than a broad spectrum and the aim is to illuminate the general by looking at the particular (Denscombe 1998:30).

Bryman (2012:74) explains that case studies are frequent sites for the employment of both qualitative and quantitative methods, arguing that, in some instances, when an investigation is based exclusively upon quantitative methods, it can be difficult to determine whether or not it is better described as a case study or a cross-sectional research design. The same can be said for qualitative research.

The case study approach was appropriate for this study because the researcher's aim was to provide an in-depth description of the case in order to achieve a comprehensive understanding of the events under study (Babbie and Mouton 2001:49). It was also considered appropriate because of its ability to deal with practice-based problems, where experiences of the research respondents are important and the context of the action is critical. Its cost-effectiveness and intensiveness is more appropriate in investigating innovations, their adoption and impacts. It is a strategy that was chosen because of its ability to explain why certain outcomes may happen rather than just to find out what those outcomes are (Denscombe 1998:31). This managed to draw the researcher closer to understanding complex issues, while expanding knowledge and experience of phenomena already known.

In practice, a case study may be selected for the pragmatic reason of convenience. If there are a number of equally suitable alternative cases, then it is reasonable to select the one that involves, for example, the least difficulties in gaining access, the least travel or the least expense. An important reason a case might be selected is that a unique, once-off opportunity presents itself and the researcher does not want to miss the opportunity. It is for this and other reasons, therefore, that the researcher chose the case study method to investigate predictors of users' preferences for digital information at the ORI Library at this particular time and within this division of SAAMBR.

Case study methods have been used in information systems studies and have proved appropriate for investigating innovation adoption (Kripanont 2007; Masrom 2007; Park et al., 2009; Shroff, Deneen and Ng 2011). Farhoomand (1992:97) showed how, from 1977 to 1985, the case study was one of the most popular research methods in 636 papers surveyed from journals focussing on, or related to, information systems. However, opponents of the

case study argue that, due to the smaller number of participants involved or limited number of cases, giving it a 'microscopic view', reliability and generalisability of findings is hard. Gerring (2007:3) pointed out that focus on a single phenomenon can lead to a perception that it is an informal and undisciplined research design, with weak empirical leverage and subjective conclusions. Pettigrew (1985:66) rejected these views and reasoned that case studies are useful in developing and refining generalisable concepts and that multiple case studies can lead to generalisations in terms of propositions. Yin (2003:10) added that case studies are used for analytical generalisations where the researcher's aim is to generalise a particular set of results to some broader theoretical propositions. Takona (2002:62) pointed out that case studies have been used by researchers as a research method with success in carefully planned and crafted studies of real-life situations, issues and problems. Case studies assume that things may not be as they seem; the truth can only be laid bare after an in-depth inquiry. As a result, they provide rich and interesting results to researchers and educationists, which often stimulate further research. Gerring (2007:93) commented on a case study and advised that an "in-depth knowledge of an individual is more helpful than knowledge of a larger group".

3.4   Population

The population refers to the people who have the answers to the research questions. Polit and Hungler (1999:37) define a population as the aggregate or totality of all cases or members that conform to some designated set of specifications. Mouton (1996:134) adds that these cases or objects are characterised by having some commonalities that the researcher is interested in. Instead of identifying the population as objects, elements, events or individuals, it is essential to precisely identify 'what' or 'who' is being studied, because it is the major entity which the study analyses. This is referred to as the unit of analysis of a study. In social science research, units of analysis are mostly human beings; it could be individuals, groups, organisations, or social interactions. The population includes the elements of the unit of analysis. The unit of analysis of this study was ORI Library users.

The target population of the study included ORI employees. The ORI is the division which deals with research and the library exists to provide information to the researchers; hence the library was named after, and falls under this division. With regard to the ORI employees, the respondents were limited to scientific staff which included 12 Scientists, five Research

Assistants and seven PhD and MSc students from the University of KwaZulu-Natal who were conducting their research studies under the supervision of ORI scientists. SAAMBR's Chief Executive Officer (CEO) and the Director of the ORI were included in this study. As decision-makers, their input in this study was essential in determining the feasibility of improving digital information dissemination programmes in the organisation. The librarian (who is the researcher in this study) provided experiential knowledge of the library. The total number of respondents was 26, excluding the librarian.

With a total number of 24 respondents from the ORI division and two SAAMBR management respondents, a census of the entire population was appropriate. A census is a form of survey that enumerates all members of a population and data is collected in relation to all units. Gray (2009:220) asserted that a census provides essential data for planners and is useful in knowing the trends in consumer behaviour, such as demand for services. In this case, trends in user behaviour of showing a preference for digital information services will be revealed. The main advantage of using a census is its aspect of high representation, because it involves everyone, which gives high precision in the standardisation of results. Case studies aim at in-depth understanding of the phenomenon under study and for this reason; large samples are not the norm. The 26 respondents were therefore deemed sufficient with a case study design.

3.5   Data collection methods

Proponents of the case study design favour qualitative data collection methods, such as interviews (individual and focus groups), direct observation, analysis of artefacts, solicited and unsolicited documents, cultural records, visual materials and personal experience, because these methods are viewed as particularly helpful in exploring cases in a qualitative naturalistic, holistic, ethnographic, phenomenological and biographic fashion (Denzin and Lincoln 2003:37; David and Sutton 2011:248). Since this study employed the mixed method approach, both qualitative and quantitative data collection methods were used to generate multiple evidence needed for an in-depth study. Birley and Moreland (1998:40) cautioned that data collection should not just be a process of collection, but also a process of creation and of using information in unique ways related to the purposes of the study. With this in mind, this study collected data using interviews, focus group discussions, participant observation, document reviews and questionnaires.

In his theoretical model, Davis (1989) used the questionnaire as the measuring instrument to investigate technology acceptance. Several studies that have adopted the TAM to investigate technology acceptance also often used the questionnaire as the main data collection instrument (Taylor and Todd 1995; Thong, Hong and Tam 2002; Vaidyanathan, Sabbaghi and 2005; Averweg 2008; Tella 2011; Tyler and Hastings 2011). Use of the questionnaire as the only data collection instrument was considered inadequate, considering that this was a case study employing a mixed method approach and with only 26 respondents. At the same time, it was important for this study to use the questionnaire so that comparisons could be made with previous studies. The use of a combination of data collection strategies ensured reliability and validity of results. This approach ensured depth of data collected, as required in case studies. Table 2 summarises data collection methods applied on each research question and data analysis strategies.

Table 2: Mapping the research questions to sources of data and data analysis strategies

S/No	Research question	Sources of data	Data analysis strategies
1	What are the predictors of users' preferences for digital information?	Questionnaire, Focus group discussions	Descriptive statistics, Thematic analysis
2	What is the attitude of users towards the use of digital information?	Questionnaire, Focus group discussions	Descriptive statistics, Thematic analysis
3	What competencies do users have in the use of digital information?	Questionnaire, Focus group discussions, Observations	Descriptive statistics, Thematic analysis
4	What ICT infrastructure is in place to facilitate access to digital information?	Questionnaire, Interviews', Observations	Descriptive statistics, Thematic analysis
5	What are the patterns of usage of digital resources?	Focus group discussions, Questionnaire, Document reviews, Observations	Descriptive statistics, Thematic analysis, Content analysis

3.5.1 Focus group interviews

Carey (1994:226) defined focus group research as a way of collecting qualitative data using a semi-structured interview schedule, moderated by a group leader, held in an informal setting, with the purpose of collecting information on a designated topic. Emphasis is on the interchange of views, opinions and experiences between persons conversing about a theme of mutual interest (Kvale 1996:14). In this case, the librarian is interested as a service provider and the participant as a consumer.

Focus groups allow participants the freedom to answer questions and the researcher more freedom in the way he or she asks questions. The questions are phrased in such a way that participants can answer relatively freely in line with the questions asked and different types of questions can be used such as open and closed questions (Fontana and Frey 2000:652).

Focus group interviews were conducted in this study mainly to validate and complement the quantitative data gathered using questionnaires and also to generate qualitative data. Questions relating to preference between print and online, user competence in using electronic information, ICT infrastructure availability and usage patterns were asked (see Appendix C, questions 1 to 9). Respondents were conveniently grouped according to their job levels, that is, 12 Scientists, seven PhD and MSc students and five Research Assistants. Collins et al. (2000:177) suggested that in focus group interviews, a group should consist of six to 12 people. Scientists were split into two groups of six respondents each, to increase chances of participation from every individual. However, at the time of data collection, three Scientists were not available and only one focus group discussion was conducted with the Scientists. Students formed one group and Research Assistants another group. The researcher thought that by interviewing employees of the same level in one group, a sense of belonging to a group could increase the participants' sense of cohesiveness and could help them feel safe to share information (Peters 1993; Vaughn, Schumm and Sinagub 1996). That way, chances of gathering reliable data are high. Although differences existed among these groups, emanating from their positions within the organisation and the number of years they had worked for SAAMBR, it was not the purpose of this study to evaluate these differences but to collectively bring their views and ideas together to establish user preferences for digital information.

The focus group discussions were guided by a semi-structured interview schedule (see Appendix C). The discussions were centred on gathering data on why respondents preferred digital information, what digital content sources they had used and for what purposes. Frequency of use and adequacy of digital resources was discussed. ICT infrastructure available to facilitate access to digital information, skills and competencies respondents had in the use of digital resources and training requirements to effectively use digital resources were also discussed. The discussions further aired participants' views and opinions on the development of a digital repository at the ORI Library.

Focus groups are an economical, fast and efficient method for obtaining qualitative data from multiple participants, thereby potentially increasing the overall number of participants in a given qualitative study. The interactions that occur among the participants can yield important data and can create the possibility of more spontaneous responses (Morgan 1996:131). Focus group environments are socially oriented; they provide a setting where participants can discuss other problems and possible solutions can be found from others who may have encountered similar problems. Since focus group interviews are conducted as a group discussion, there is a great need for control in the interview. Some participants can be more outspoken and dominate the discussion which may result in an unfair representation of data. In such a scenario, the interviewer has a task of encouraging all group members to participate. In addition, some interviewees act or perform and in the process some truths or useful information is left out (Terre Blanche, Durrheim and Painter 2006:309). Although this was a possibility, the researcher's experience in working with this group of people and her knowledge about them helped in identifying biased information. Grouping the respondents in their various job levels helped create an even atmosphere or one of equality and calm.

3.5.2 Semi-structured interviews

The researcher engaged in a one-on-one interaction with the SAAMBR CEO and the Director of the ORI, on 22 and 24 July 2013, respectively. The interviews were conducted in their offices. A semi-structured interview protocol was designed to gather data to clarify on the possibility of the development of a digital repository from a management's perspective (see Appendix D). Questions generated for these interviews were open-ended, allowing the generation of considerable information, which may lead to reconceptualisation of the issues under study (Teddlie and Tashakkori 2009:229). Patton (2002:348, 350) noted that open-

ended questions allow respondents to express their own understanding in their own terms, yet the level of awareness can influence the emotional state of the interviewee. To avoid such situations, the researcher maintained her own knowledge about the subject and gave the interviewees an uninterrupted platform to share their knowledge.

3.5.3   Participant observation

Denzin and Lincoln (1998:79) observed that, for as long as people are interested in studying the social and natural world around them, observation remains the bedrock source of human knowledge. Denzin and Lincoln (1998:79) discussed qualitative observation as:

> "Fundamentally naturalistic in essence; it occurs in the natural context…, among the actors who would naturally be participating in the interaction, and follows the natural stream of everyday life".

Sometimes participant observation arises from an on-going working situation, as was the case in this study. The researcher was prompted to conduct this study after she observed that use of digital information was on the rise among users of the ORI Library. As the librarian, she noticed that users were scanning articles more often than before, with some requesting the librarian to scan documents for them. Requests for digital documents were also on the rise, including for material that was available in the library as hard copies. During the study, the researcher continued to observe usage patterns of digital resources, scanning of existing library print material, requests made for digital documents, ICT infrastructure available, use of library computers and frequency of library visits (see Appendix E). Data gathered during observations was documented for analysis.

Observational research has been criticised for lacking reliability, citing that the absence of statistical analysis to confirm the significance of observed patterns cannot ensure that the findings are real (Denzin and Lincoln 1998:88). To ensure reliability in this study, observation data was used to complement and substantiate data gathered through interviews, document reviews and questionnaires. Observing real situations such as users frequenting the library, scanning articles, borrowing books, using digital information available, using computers and recording ICT infrastructure available were real actions that ensured the reliability of the data.

3.5.4 Document analysis

Document analysis is a systematic procedure for reviewing and evaluating documents, both printed and electronic, in order to elicit meaning, gain understanding and develop empirical knowledge (Bowen 2009:27). Documents include letters, newspapers, diaries, event programmes, minutes of meetings, organisational reports, organisational policies, books, brochures, advertisements, press releases and proposals. Yin (2003:87) advised that, "For case studies, the most important use of documents is to corroborate and augment evidence from other sources". Yin (2003:87) further observed that documents are most often used in conjunction with interviews and observations, to develop a better understanding of the phenomenon of interest and the context in which that phenomenon is occurring. Documents analysed in this study included the *SAAMBR Bulletin* to learn more about the organisation, Internet policy, library usage statistics, e-mails sent by users requesting digital information, the library catalogue to identify digital media content and organisational Internet policy. This study intended to analyse the ORI Library's collection development policy in light of the increasing use of electronic resources by users. However, the library did not have such a policy.

The advantage of document analysis is that it is less time-consuming; it requires data selection instead of data collection. In addition, documents provide a wide coverage of information which is not subject to distortion (Bowen 2009:31). Document analysis is a cost-effective method, because the information has already been produced and is not affected by the research process. However, documents may have some limitations in terms of the accuracy and completeness of the data, because they were produced for some purpose other than research and were created independently of the research agenda (Bowen 2009:31). Although this may be true, documents analysed in this study were mainly those directly linked to electronic resource usage such as the organisation's Internet policy, digital information usage statistics and reviewing of library OPAC.

3.5.5 Questionnaire

Questionnaires are an effective and popular research method of gathering information. They have been used frequently in library and information studies, especially for surveying user needs and evaluating services. Questionnaires are a technique of data collection in which respondents are asked to give answers to the same set of questions and statements in a

predetermined order, in the absence of the researcher. They are administered to respondents, allowing them time to answer questions at their own convenience. Respondents have the opportunity to look for information to answer certain questions. Questionnaires are relatively easy and quick to administer and can provide a combination of quantitative and qualitative data, where a combination of closed and open-ended questions are used. However, questionnaires have their limitations. Open-ended questions can generate large amounts of data that can take a long time to process and analyse. To avoid such a problem, the use of open-ended questions in this study was limited; the questionnaire had closed questions with predetermined responses (see Appendix B).

The questionnaire was meant for the ORI Library users, with the exception of management. It was devised to gather mainly quantitative data on technology acceptance, with its theoretical basis rooted in the TAM (see Appendix B). All the research objectives were addressed in the questionnaire. The measurement items in this study, particularly the core constructs, perceived ease of use and perceived usefulness, attitude towards use and actual use were adopted directly from Davis' (1989) TAM model, but were modified to suit the 'digital information' context.

The questionnaire was divided into sections, to clearly cover each objective separately. A number of questions were used to measure each variable. Davis and Venkatesh (1996:21) pointed out that using multiple questions to measure each variable would not superficially inflate the observed level of construct reliability and validity. The first section of the questionnaire comprised demographic data on the participants. The second section gathered data on predictors of technology acceptance. As highlighted by Davis (1989), measures for predicting use rest on two determinants of the TAM model, namely perceived ease of use and perceived usefulness. Six questions of each determinant were asked. A five-point Likert scale, ranging from strongly agree, agree, neutral, disagree and strongly disagree was used to answer the questions in this section. The third section sought data on user attitude towards the use of digital information. Respondents were asked to rate five statements using the Likert scale as in section two. Section four gathered data on actual usage and here four questions were asked. Section five had five questions and gathered data on levels of competency. Section six gathered data on available ICT infrastructure; here, four questions were asked.

3.5.5.1 Peer review and pre-testing of the questionnaire

Babbie and Mouton (2001:244) observed that no matter how carefully designed a data collection instrument is, there is always a possibility of error. To minimise these errors, reviewing and pre-testing of instruments is essential to identify possible problems and correct them before the actual data collection started. A peer review is an evaluation of quality and effectiveness of instruments done by people in the same field; in this case, Information Studies. Pre-testing is the administration of data collection tools to a small group of potential respondents for the purpose of identifying weaknesses with the tools (Powell 1997:105). Poor instructions, inappropriate terminology, structure and order of questions, spelling mistakes, ambiguous and unclear questions and difficult questions are some of the problems identified after pre-tests in previous studies (Saunders, Lewis and Thornhill 2000:306).

In this study, the questionnaire was reviewed and pre-tested. The questionnaire was reviewed by three PhD students and one lecturer in the Information Studies Programme at the University of KwaZulu-Natal (UKZN). A pre-test of the questionnaire was conducted in June 2013 on 10 researchers at CSIR, Durban. These respondents were chosen because they had similar characteristics to the respondents in this study. Findings of the pre-test revealed that use of digital resources at CSIR was well established and users often received training in information retrieval to gain the necessary skills needed to effectively use digital resources. Adequate ICT infrastructure was available and users had access to a wide range of digital content. After the pre-test, a few amendments were made to the questionnaire. The term "digital information" was in some parts of the questionnaire replaced with the term "electronic resources" because the respondents had indicated they were more familiar with the words electronic resources. Statements addressing "perceived ease of use", "perceived usefulness" and "attitude towards use" were said to be sounding repetitive. To this end, when conducting the actual data gathering, the researcher explained to the respondents that the questions were adopted directly from the theoretical framework that was guiding the study and therefore could not be changed. Respondents were encouraged to respond to each question even though the questions looked similar.

3.6   Administration of instruments

Initially, four sessions of focus group interviews were planned, but only three were conducted as some respondents were not available during the time of discussions. Before conducting focus group interviews, the researcher approached respondents of each group and suggested a

day that was suitable for them to have the interview. Respondents were advised that participation in these interviews was voluntary. All interview sessions were conducted during lunch time between 12:30 and 13:30, for a period of 30 to 45 minutes. The focus group discussions were tape-recorded. In the two interview sessions with management, the researcher recorded data by writing down their responses. Each interview was conducted for a period of between 30 minutes to one hour.

Observations made by the researcher for a period of six months were documented. The researcher observed library visits by respondents, scanning of documents, assistance given to users on digital information use, digital information available, borrowing of books and use of the library computers. According to Denzin and Lincoln (1998:87), observational data gathering continues until researchers achieve theoretical saturation, that is, when the generic features of their new findings consistently replicate earlier ones.

In document analysis, relevant documents were selected for evaluation and analysis. Documents reviewed in this study included SAAMBR Bulletins to gain an overview of the organisation, library usage statistics to evaluate patterns of use of electronic resources, the library catalogue to determine digital resources available for use, Internet Policy to understand terms of use and e-mail requests for digital content to evaluate usage. Bowen (2009:33) cautioned that, although documents can be a rich source of data, researchers should look at documents with a critical eye and be cautious in using them. Bowen (2009:33) added that documents should not be treated as necessarily precise, accurate, or complete, but should establish the meaning of the document and its contribution to the issues being explored.

The questionnaires were distributed by visiting each office and handing the questionnaire to each respondent. Considering that the study had only 24 questionnaire respondents, the researcher took time to explain to each respondent the purpose of the study and what the researcher intended to achieve. At the time of distribution, three respondents were away and questionnaires were e-mailed to them. All questionnaires were completed and returned within two weeks; giving a 100% response rate. It was important for the researcher to have as many completed questionnaires as possible to allow for an in-depth study.

3.7   Reliability and validity of the instruments

Reliability is the degree to which a test consistently measures what it sets out to measure, while at the same time yielding the same results (Babbie and Mouton 2007:646). Reliability is the quality of the measurement method that suggests that the same data would have been collected each time in repeated observations of the same phenomenon (Babbie and Mouton 2007:646). This means that the greater the consistency in the results, the greater the reliability of the measuring procedure (Bless 2000:126). Validity is a term describing a measure that accurately reflects the concept it is intended to measure (Babbie and Mouton 2007:648).

To enhance validity and reliability in this study, the questionnaire was first reviewed to ensure that it was up to standard and that it provided adequate coverage of the research questions guiding the study. A pre-test was carried out to eliminate any possible errors that could hinder gathering of adequate and reliable data. Adopting questions from the TAM was another way of trying to achieve reliability. However, Neumann (2000:157) points out that perfect reliability and validity are virtually impossible to achieve.

3.8   Data analysis

Yin (2003:109) describes data analysis as "examining, categorising, tabulating, testing or otherwise recombining both quantitative and qualitative evidence to address the initial propositions of a study". Mixed methods data analysis involves the processes in which quantitative and qualitative data analysis strategies are combined, connected or integrated in a study (Teddlie and Tashakkori 2009:263). According to Creswell and Clark (2011:203), in mixed methods data analysis is done separately where quantitative data is analysed using quantitative methods and qualitative data is analysed using qualitative methods. Thereafter, both sets of information are analysed using techniques that mix the quantitative and qualitative data and results. Teddlie and Tashakkori (2009:250) advised that readers need to be acquainted with quantitative and qualitative data analysis strategies before they can understand how the analysis techniques are combined in mixed methods.

Quantitative data was analysed using quantitative techniques. Data was checked for completeness, consistency and reliability. This process is known as data cleaning. Thereafter, data was sorted and coded. Coding is the process of structuring data into an analytical form (Birley and Moreland 1998:58). With only 24 questionnaires (excluding two management

respondents), data was analysed manually. Descriptive statistics were used to analyse data. Responses were assigned numeric values and summarised, with the intention of discovering trends and patterns to help understand and communicate the results (Teddlie and Tashakkori 2009:256). Collins et al. (2000:211) pointed out that descriptive statistics allow patterns of data to reveal themselves more obviously.

Qualitative data include text, written words, phrases, or symbols describing or representing people's actions and events in social life (Neuman 2006:457). The present study collected qualitative data from interviews, focus group discussions, documents and observations. Tape-recorded data and documented data were transcribed. Data was coded, thereby reducing large mountains of raw data into small, manageable piles (Neuman 2006:460). This was achieved by organising data systematically in a standard format that allowed the researcher to draw conclusions about the characteristics and meaning of recorded data (Babbie and Mouton 2001:383). This method of analysis is called thematic. The themes were derived from theoretical variables identified in the study. Neuman (2006:467) observed that strategies for the analysis of qualitative data are more diverse, less standardised and less explicitly outlined by researchers. This is because not all data can be categorised.

3.9   Ethical considerations

Ethics are principles of conduct that are considered correct by a given profession or group (Bailey 1994:420). Collecting objective and accurate data in a socially responsible way is basic to scientific research. Social scientists are required to follow certain standards of behaviour in collecting data. The researcher was granted permission by SAAMBR management to conduct the present study. Consent was sought from respondents before they became involved in the study (see Appendix A). Participants were made aware of their responsibility in the study and were made aware that they were free to withdraw at any time if they wished to do so. Methods of data collection used in this study were in no way harmful to the participants. The study complied with the ethical protocol of the University of KwaZulu-Natal Ethics Research Committee. The analysis and reporting of the results ensured identities of respondents remained anonymous. In this regard, no names were used to represent real respondents.

3.10   Summary of the methodology

Chapter three discussed the methodology that was used to establish predictors of technology acceptance which assisted in determining user preferences for digital content at the ORI Library. The research population and justification of the choice were discussed. The chapter discussed data collection methods, pre-test details and the administration of instruments. A brief discussion on how the study ensured reliability and validity of data was given. An overview of data analysis was provided.   Finally, ethical issues relating to this study were discussed.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1   Introduction

The purpose of this study was to investigate predictors of users' preferences for digital information at the ORI Library. The following research objectives were addressed, to:

1. Determine the predictors of users' preferences for digital information.
2. Explain user attitude towards the use of digital information.
3. Evaluate user competencies in the use of digital information.
4. Examine the ICT infrastructure in place to facilitate access to digital information.
5. Assess the patterns of usage of electronic resources.

The study was underpinned by the TAM. A mixed method approach was used, with case study design. The population of this study consisted of SAAMBR management, ORI employees and UKZN PhD and MSc students that were attached to the ORI division during the time of the study. Data was collected from 12 Scientists, seven PhD and MSc students and five Research Assistants. Two SAAMBR management employees were included in the study. Data was collected through interviews, focus group discussions, observations, questionnaires and document analysis. Qualitative data was analysed using thematic analysis while, quantitative data was analysed manually to generate descriptive statistics.

The results presented in Chapter Four are organised thematically, based on theoretical framework key variables (see Table 1) and around the research objectives. The chapter covers biographical data, predictors of users' preferences for digital content, attitude towards use, user competencies in the use of computers, ICT infrastructure available and usage patterns of electronic resources. The aim of this study was to eventually develop a framework to inform on improving digital information dissemination at the ORI Library, possibly through the development of a centralised storage repository of digital information to enhance access, usability and the preservation of digital content within the organisation. For this reason, prospects for the development of a centralised digital repository were discussed based on the findings of the study.

4.2   Biographical data

This first section of the questionnaire asked for background information on the respondents (see Appendix B, questions 1 to 3). Demographic information was necessary to determine whether or not perceived ease of use, perceived usefulness and attitude towards use correlate with gender, age or job title of respondents. Overall, 24 respondents completed the survey questionnaire, giving a response rate of 100%. Respondents were composed of 13 (54%) male and 11 (46%) female. Ten (42%) were between the ages of 20 and 30 years, five (21%) were in the age group 30 to 40, five (21%) in the age group 40 to 50 and four (17%) were over 50 years old. With respect to the participants' position within the organisation, 12 (50%) were Scientists, five (21%) were Research Assistants and seven (29%) were PhD and MSc students. The proportion of males to females was almost equal, with the majority of the respondents aged between 20 and 30 years and the highest number of respondents being Scientists.

4.3   Predictors of users' preferences for digital information

Davis' model states that perceived usefulness and perceived ease of use are the two factors that govern the adoption and use of information systems (Davis 1989:320). The analysis of the results adopted this approach to predict users' preference for digital information at the ORI Library. Thus, perceived ease of use and perceived usefulness were the major determinants that could influence an individual's acceptance of digital information.

4.3.1   Perceived ease of use

Thong, Hong and Tam (2002:217) stated that the easier it is for a user to interact with a system, the more likely he or she will find it useful and intend to use it. Six items were used to measure the amount of mental energy required to use digital resources and the degree of difficulty involved in understanding the technology (see Appendix B, questions 4 to 9). The questions were directly adopted from the TAM (Davis 1989), but were modified to apply to this study. The findings are presented in Table 3.

Table 3: Perceived ease of use of digital information (N=24)

Statement	Strongly agree		Agree		Neutral		Disagree		Strongly disagree	
	Count	%	Count	%	Count	%	Count	%	Count	%
Learning to use digital information would be easy for me	16	67	7	29	1	4	-	-	-	-
I would find it easy to get digital information to do what l want to do	11	46	10	42	2	8	1	4	-	-
My interaction with digital information would be clear and understandable	10	42	12	50	2	8	-	-	-	-
I would find digital information flexible to interact with	13	54	7	29	4	17	-	-	-	-
It would be easy for me to become skilful at using digital information	15	63	7	29	2	8	-	-	-	-
I would find digital information easy to use	13	54	9	38	2	8	-	-	-	-

The results reflect that, on average, 13 (54%) of the respondents would perceive such use as easy while nine (36%) of the respondents agreed that they would perceive digital information to be easy. Two (8%) of the respondents were neutral to the statement; they could neither agree nor disagree that using digital information would be easy for them. This means that a majority of 22 (92%) (Strongly agree + Agree) of respondents perceived digital information to be easy to use while, only two (8%) were neutral on the perceived ease of use of digital information.

Ease of use of digital resources was also addressed in the focus group discussions (see Appendix C, questions 6 and 7). Question 6 asked respondents to state the reasons that influenced them to use digital resources. Responses to this question reflected both ease of use and usefulness of digital information. With regards to ease of use, a common response across all discussion groups was that digital resources were easy to use. In a discussion with the students, one respondent stated that:

l find it easy to search through digital information because l can search using keywords and all the relevant content is displayed instantly and this allows me to quickly access needed information.

In a separate discussion with the Scientists, one said:

I'm attracted by the flexibility of searching a wider range of sources. l have a lot to choose from, be it books or journals. As a research scientist my job is to do research, to investigate with the aim of making new discoveries; this can only be managed by consulting other sources. Digital resources have made it much easier for us to get access to a variety of sources.

Question 7 further asked respondents to state their levels of competence as a way of measuring ease of use of digital resources (see Appendix C). This question was used in conjunction with questions 28 to 30 of the survey questionnaire to measure level of competency in the use of digital information. In this instance, we understand that exposure to an activity for longer periods results in gaining experience and competence, such that less effort is required to perform the same activity. Consequently, if respondents were competent in using computers, they would find it easy to use digital information. In all the discussions, respondents concurred that they did not have any special skills, but they had been exposed to computers for a long time, such that their interaction with digital resources was good. One respondent stated that:

l have been using computers the rest of my life and l don't struggle to get what l want; in fact, most databases are user friendly, you will always find your way through, some online resources are self-explanatory and have helping hints.

In general, the results reflect that the majority of the respondents perceived digital information to be easy to use. With regards to correlations between perceived ease of use and the demographics of the respondents, analysis of results reflected that there was a stronger belief on the ease of use of digital resources among respondents aged between 20 and 40 years than it was with the older respondents. Two (8%) respondents between the ages of 40 and 50 years did not agree that digital information was easy to use, but were neutral, reflecting that they had mixed feelings towards ease of use of digital resources. One responded, who was over 50 years of age clearly disagreed with the statement, 'I would find it easy to get digital information to do what l want it to do'. Therefore, there is a correlation

between perceived ease of digital resources and the age of respondents. A relationship with either gender or job level of respondents was not apparent.

4.3.2 Perceived usefulness

Users' intention to use an information system is expected to be greatly affected by their perceived usefulness of the system (Park et al., 2009:198). Thus, in the workplace, employees perceive digital information to be useful if it helps them achieve their work goals. Using the Likert scale, questions 10 to 15 of the survey questionnaire (see Appendix B), required the respondents to rate the usefulness of digital information in relation to their jobs. Table 4 below summarises the findings.

Table 4: User's perception on usefulness of digital information (N=24)

Statement	Strongly agree		Agree		Neutral		Disagree		Strongly disagree	
	Count	%	Count	%	Count	%	Count	%	Count	%
Using digital information would improve my work performance	8	34	8	33	6	25	2	8	-	-
Using digital information would enable me to accomplish tasks more quickly	11	46	7	29	6	25	-	-	-	-
Using digital information would enhance my effectiveness on the job	9	38	8	33	6	25	1	4	-	-
Using digital information in my job would increase my productivity	8	33	9	38	7	29	-	-	-	-
Using digital information would make it easier to do my job	8	33	10	42	5	21	1	4	-	-
I would find digital information useful in my job	11	46	12	50	1	4	-	-	-	-

The responses, on average, reflect that nine (38%) of the respondents strongly agreed that they perceived digital information to be useful, nine (38%) agreed; five (21%) were neutral and one (3%) disagreed on the perceived usefulness of digital information. This means that,

overall, 18 (76%) respondents (38% strongly agree + 38% agree) perceived digital information to be useful. Five (21%) of the respondents neither agreed nor disagreed on the perceived usefulness of digital information and only one (3%) respondent disagreed on the perceived usefulness of digital information.

Three questions were asked to measure usefulness of digital information in the focus group discussions. The first question required the respondents to state the effect of digital resources on the nature of their work (see Appendix C, question 3). The students agreed that digital information was much more abundant, up-to-date and allowed access to a lot more relevant information within a short space of time, compared to print. In a discussion with the Research Assistants, there was general consensus that digital information made them more productive. One noted:

> The fact that l have access to the information that l want on my PC saves me a great deal; l don't need to leave my desk. That automatically speeds up my workflow because all the time of running around is channelled towards work.

Another Research Assistant emphasised the usefulness of digital resources, pointing out that:

> While the older papers are still relevant, it is good to be following the new developments and trends of digital scholarship. Our peers and colleagues are way ahead of us in terms of using digital resources, that gap should quickly be closed, we should try keep pace otherwise we will never catch-up.

In a discussion with Scientists, there was mixed feelings towards the usefulness of digital resources, although the majority felt it was an important resource. One respondent supported the usefulness of digital resources, saying:

> The aspect of being able to work remotely makes digital information quite useful. I can easily work from anywhere, during my field trips, when l am travelling or at home. I can carry around lots of information on a laptop, l do not have to wait to get back to the office or the library for access, l can retrieve my information anywhere, anytime.

Another valuable point mentioned was that "...having access to the latest methodologies online improves my quality of work."

Conversely, three Scientists strongly challenged the usefulness of digital resources, citing the rampant misuse and plagiarism of digital content by scholars. One respondent stressed that:

> I have repeatedly noticed authors and students taking digital shortcuts by scanning documents via search engines and doing copy and paste. Often the reference is not the correct one – but simply Googled with a keyword or two. This compromises the quality of work and makes a mockery of information management.

The three Scientists felt that critical review of literature and use of authentic sources was slowly being ignored by many scholars who are taking the easy root of 'browsing' e-resources. They reasoned that use of digital information was more harmful to organisations that did not have adequate subscriptions to online databases, stating that users were resorting to free content available online, some of which is not authentic.

The second question requested the respondents to state how they had benefited from using digital information (see question 5, Appendix C). In all the discussion groups, a variety of benefits were identified by respondents, including those respondents who were challenging the usefulness of digital information. Respondents identified, among other benefits, the ability to access current information, to readily share information with colleagues and to work faster. One Research Assistant shared an interesting point:

> Digital resources make it very quick to see whether a certain article is useful or not by reading the abstract or previewing information without necessarily having to locate the whole item.

One student was happy that, "...now more time is spent on writing and synthesising and less time sifting through books and articles." In a discussion with the Scientists, they pointed out that digital resources allowed access to information that was otherwise difficult to get hold of in other media and, more so, that was not available in the library. From the researcher's observations and experience as a librarian, this was true because often times a user, for example, would request an article or a book chapter that is only available in the USA at the Smithsonian Library. Getting the hard copy sent would be a considerable risk by the supplying library and would take time; but with the advent of e-resources the material can be made available faster and easier by scanning and sending it via e-mail.

While discussing reasons that influenced the use of digital resources (see Appendix C, question 6), the researcher noted that responses given to address this question revealed both ease of use and usefulness of digital information. A number of respondents highlighted the benefits they had discussed earlier. A few points were further raised, which included increased productivity, availability and accessibility of vast amounts of digital resources which allowed them to carry out their duties much faster and more efficiently.

On average, the majority of the respondents perceived digital information to be useful, with a few not supporting or denying the perceived usefulness of digital information. At the same time, the findings reflect a correlation between age and perceived usefulness of digital resources. Of the four (16%) respondents above 50 years, three (12%) strongly challenged the usefulness of digital resources. These respondents were Scientists, who represent a generation of people who used print material for most of their lives and their appreciation of digital resources is low. Thus the findings reflect a noticeable correlation between perceived usefulness of digital resources with age and job levels of respondents. Although the figures reflecting these findings are small, it has to be kept in mind that this is a case study with only 26 respondents and an in-depth analysis of all findings is crucial.

4.4   Attitude towards use

Users' attitude towards the use of digital information was assessed with five questions, using the Likert scale (see Appendix B, questions 16 to 21). The questions were adopted from the TAM model, but modified to suit this study.

With regards to attitude towards digital information, Table 5 reflects, that on average, 12 (50%) of the respondents strongly agreed to have a positive attitude towards digital information, nine (38%) agreed to have a positive attitude towards digital information, two (8%) were neutral and only one (4%) of the respondents indicated a negative attitude towards digital information. With an overall total of 21 or 88% (50% 'strongly agree' and 38% 'agree') of the respondents having a positive attitude towards digital information, the results reflect that there is generally a positive attitude towards digital resources use at the ORI Library. It is interesting to note that all students 'strongly agreed' on all questions concerning perceived attitude towards use. A significant figure of 10 (42%) of the respondents were

neutral to the statement 'I prefer digital information to print'; with three (12%) of the respondents disagreeing with this statement. A summary of the results is presented in Table 5.

Table 5: Users' attitude towards the use of digital information (N=24)

Statement	Strongly agree		Agree		Neutral		Disagree		Strongly disagree	
	Count	%	Count	%	Count	%	Count	%	Count	%
Using digital information is a good idea	14	58	10	42	-	-	-	-	-	-
It is wise to decide on using digital information	14	58	9	38	1	4	-	-	-	-
Using digital information is favourable for me	13	54	9	38	1	4	1	4	--	
I really find it beneficial to use digital information	12	50	10	42	2	8	-	-	-	-
I am positive towards use of digital information	15	62	9	38	-	-	-	-	-	-
I prefer digital information to print	6	25	5	21	10	42	3	12	-	-

In the focus group discussions, a similar question was asked in which respondents were required to identify their preferences between print and digital resources (see Appendix C, question 1). Although the majority indicated they preferred digital information, there were a couple of Scientists and Research Assistants who indicated they had no preference. One Scientist stated that, "These two should not be compared against each other as each has its own strengths; but they should be used to suit a specific need". In the same tone, one Research Assistant pointed out that "They complement each other; the strength of digital information can enhance access to and use of non-digital sources in a library". However, the majority of these two groups concurred that half of each would work better for them. At the same time, there were two Scientist who clearly indicated a preference for print resources, simply because the respondents found it easier to read, comment on, highlight and make notes on paper than it was on the computer. Gowda and Shivalingaiah (2009:187) concluded

that users' choices are dependent on the nature of resources available in their library. Where comprehensive collections of print are available, users tend to rely on them and where IT facilities and services are available, users will show a preference for electronic resources.

To further evaluate the attitude of respondents towards digital information, they were asked to state if they would be willing to encourage their colleagues to use digital information (see question 11, Appendix C). The respondents concurred they would definitely encourage their colleagues to use the digital information, with one stating that "They do not need encouragement, they are already using them". Explaining why they would encourage their colleagues, respondents identified the advantages of digital content, which were discussed earlier in this chapter, and added that digital information was environmentally friendly, it saved paper, increased efficiency and reach, information could be stored and accessed indefinitely and that it was the way the world was going so there was a need to follow suit. Overall results reflect a positive attitude towards digital information. At the same time, the results show that a significant number of respondents were not willing to choose between digital and print resources, but to use them complementarily. The results reflect a correlation between attitude and age. All students aged between 20 and 30 years strongly indicated a positive attitude towards digital resources, irrespective of their gender. At the same time, three respondents over 50 years had a negative attitude towards digital content, but this does not conclude that they saw digital information in a negative way. A considerable number of respondents aged between 30 and 50 years could not indicate whether or not they had a positive or negative attitude towards digital information. They formed the majority, who felt both sources were important.

4.5   Competency in using computers

Competency is an important external variable when studying technology acceptance because generally, people rely on knowledge gained from previous experiences to inform their behavioural intentions for the future (Park et al., 2009:198). Questions 28 to 31 of the survey questionnaire (see Appendix B) requested respondents to indicate their competency in the use of computers. Competency was measured by the number of years of experience the respondents had of using a computer, levels of computer literacy, training done and training needed for effective utilisation of digital resources.

4.5.1   Years of using a computer

Question 28 requested respondents to state the number of years they had been exposed to the computer. They had to select from years ranging between 1 and 10 years and over 10 years. Figure 2 summarises the findings.

Percentage of respondents

8-9 years
8%

Over 10 years
92%
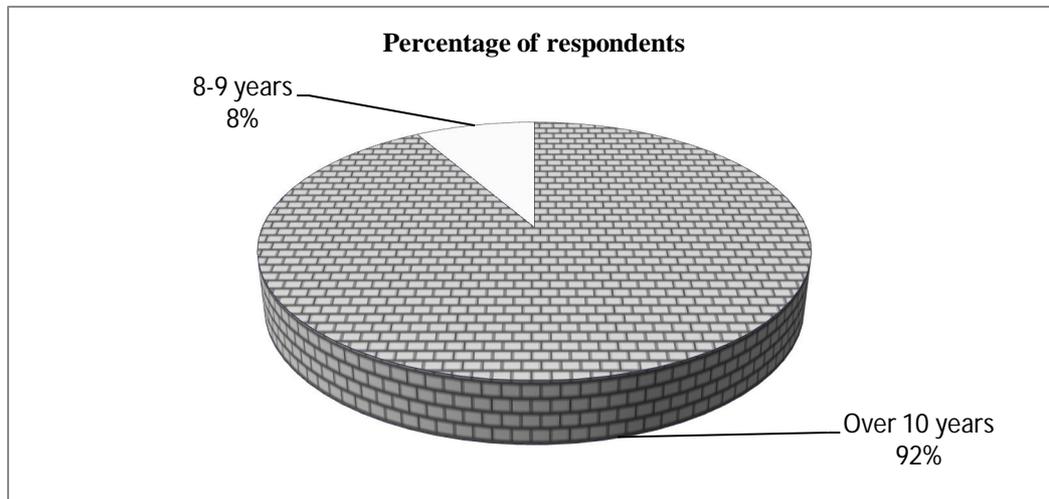
Figure 2: Years of using a computer (N=24)

Figure 2 shows that out of the 24 responses, 22 (92%) of the respondents indicated that they had been using computers for more than 10 years, with only two (8%) of the respondents having used computers for between 8 and 9 years. None of the respondents used computers for less than eight years. These findings reveal that all respondents have been using the computer for a long time.

4.5.2   Computer literacy

Respondents' ability to use computers was measured in question 29 of the questionnaire. Respondents were required to rate their computer literacy from very good to very poor. The results are presented in Figure 3.
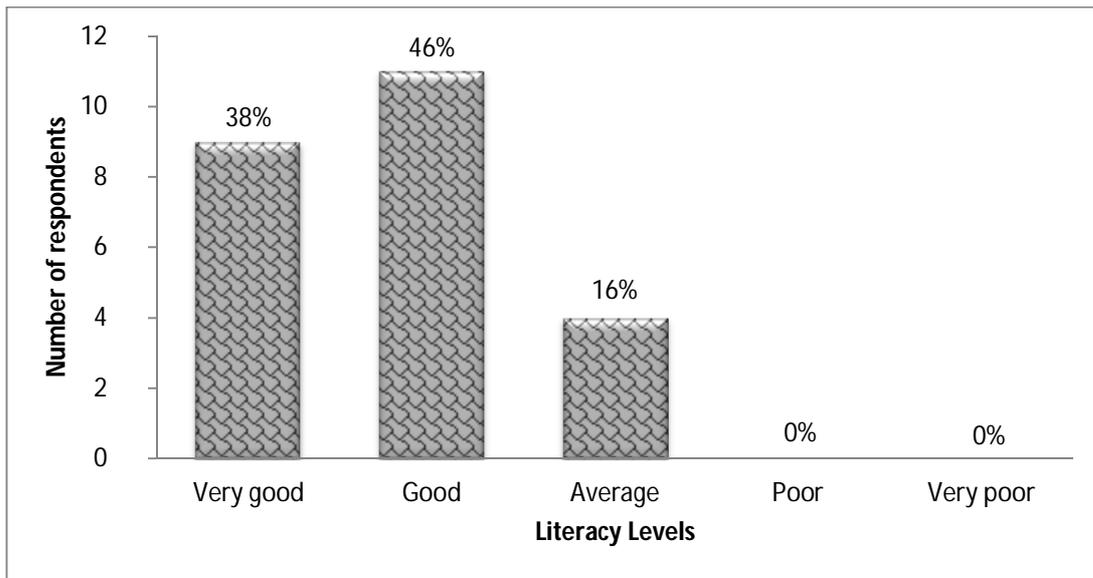
Figure 3: Computer literacy (N=24)

Nine (38%) of the respondents indicated that their computer literacy was very good, while 11 (46%) indicated it was good and four (16%) had average computer literacy. None of the respondents reported themselves as having poor literacy levels. A majority of the respondents reported themselves to be computer literate, 20 (84%) indicated their computer literacy was good and four (16%) were average.

4.5.3   Computer training

Question 30 asked respondents to state if they had received training on the use of computers. Nine (38%) of the respondents indicated they had done training, while 15 (62%) of the respondents indicated they had never received any training on how to use computers. When asked if they would want to receive training on the use of digital resources (see question 31, Appendix C), 16 (66%) of the respondents indicated they did not need training, while eight (34%) indicated they wanted training. Interesting to note here is that although 15 (62%) of the respondents acknowledged that they had never had training, an even larger number of respondents, 16 (66%), indicated they did not need training. Figure 4 summarises these findings.
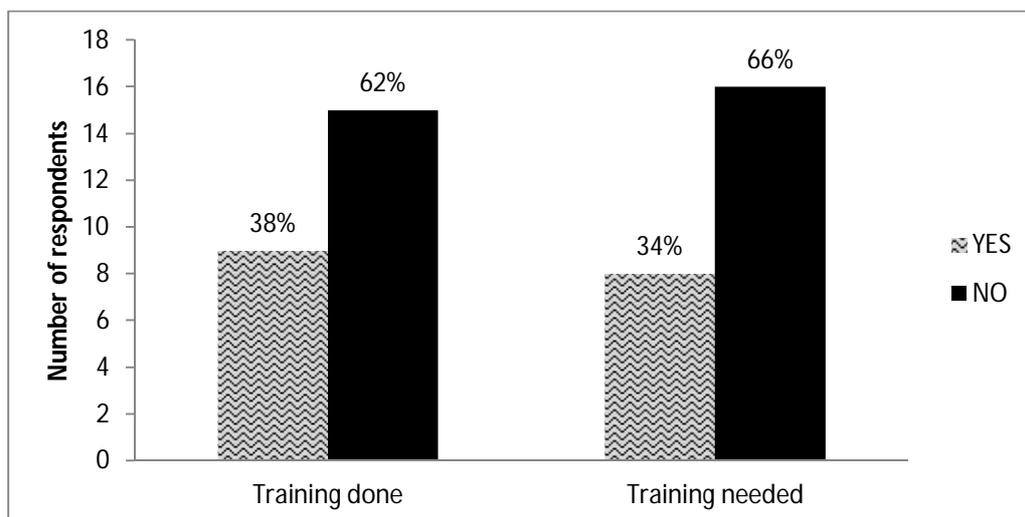
Figure 4: Computer training (N=24)

In the focus group discussions, respondents were asked to identify the skills and competencies they possessed to effectively use digital resources (see Appendix C, question 7). The common response was that they did not necessarily have any special skills, but had basic computer skills and had developed competency as a result of exposure. One respondent said:

> I have enough skills to search and retrieve information that l require. I also believe l can call others to assist as they are trained and dedicated to the task. I see no point in every person being 100% trained.

With regards to training, only one respondent acknowledged having received training at a university. As they had not received any training on the use of digital resources, respondents were asked if they would want training (see Appendix C, question 8), to which the majority agreed they were comfortable with the skills they had. They explained that most online resources were self-explanatory, user friendly and they often got help from the librarian. A few who indicated that they needed training were asked to state their training needs. It was agreed that a computer course on how to effectively and efficiently access available online resources would be ideal. One respondent indicated a need for training on which databases were relevant, which databases were available and how to access them.

Although the results show that respondents were generally experienced in using computers, the researcher observed that respondents often requested the librarian to search, retrieve and download articles on their behalf, even though they had direct access to the articles. There

were situations when respondents confirmed they had searched for articles online but could not get access, yet the librarian would get the same content free online. Conducting training programmes to ensure effective use would be essential in such situations. Interviews with management revealed that there were no capacity building plans or proposed training programmes concerning the use of digital resources within the organisation.

4.6 ICT infrastructure available

The FAO (2009:2) stressed that in fisheries, well-developed ICT infrastructure and access to relevant information are essential for people to participate in the different socio-economic and political activities of the global information society. ICT infrastructure was used to refer to the facilities and services that existed to support digital information access at the ORI Library. Desktop computers, laptops, printers, scanners, Local Area Network (LAN) and the Internet were identified and discussed in the present study. Question 32 of the questionnaire asked the respondents to indicate the ICT infrastructure available to them at work (see Appendix B). Seventeen (70%) of the respondents stated they had a desktop, 14 (58%) had laptops, 21 (88%) had access to the printer, scanner, LAN and the Internet. The researcher observed that there were a number of respondents who had both a desktop in the office and a laptop to carry around, since their work involved much fieldwork and travelling.

Question 33 of the questionnaire required the respondents to state if the ICT infrastructure was adequate, and if not, specify what was missing (see Appendix B). Seventeen (70%) of the respondents indicated it was adequate and seven (30%) did not respond to this question.

Similar results were obtained from the focus group discussions, where the majority of the respondents agreed that they had adequate infrastructure (see Appendix C, question 9). However, the researcher observed that, although employees had adequate facilities available in their offices, a number of them often showed a need for more computers in the library. The researcher observed that in situations where users could not find the needed information on the shelves, the next step would be searching on the computer. With only three computers available, which in most cases were always occupied, users were forced to go back to their offices and do online searches and probably come back again to the library for alternative options.

Question 34 asked the respondents to identify any problems that hindered access to digital information (see Appendix B). Two (8%) of the respondents said they had no problems, 13 (54%) indicated poor Internet connectivity, while 16 (66%) lamented about restricted access. This question was further elaborated on in the group discussions where respondents revealed that they had problems accessing digital information that was available on ActiveConnect citing that the link was malfunctioning and had connection problems (see Appendix C, question 12). In addition, the majority of respondents concurred that there was a need to increase the Internet bandwidth speed, as connections were poor.

In a group discussion with Scientists, one respondent highlighted a concern of download size limit. To verify this information, the researcher contacted the IT Department, which confirmed that the downloading of large files was not necessarily limited, but was monitored. From what the researcher gathered, the concern raised could be true, in that, when downloading large files, the Internet speed was very slow, to the extent that, in certain situations, the document would not open at all or would take too long to open which resulted in users thinking that there was a size restriction. This problem therefore relates back to slow Internet bandwidth.

4.7   Usage patterns of electronic resources

To establish usage patterns of digital resources, it was important to identify the digital sources that respondents had used; for what purposes; from where they had accessed them; how they accessed them and frequency of use. Questions 22 to 27 of the questionnaire sought data on usage patterns. Focus group discussions and observations were used to gather the same data to clearly establish patterns of use.

4.7.1 Digital sources used

Question 22 (see Appendix B) required respondents to identify electronic resources they had used in their work. Respondents were required to select all applicable sources they had used. These included electronic journals, electronic books, electronic magazines and newsletters, websites, online databases and the ActiveConnect. Table 6 shows that the majority of respondents had used almost all identified sources in their work.

Table 6: Digital sources used (N=24)

Electronic Sources	Respondents	%
Electronic journals	23	96
Electronic books	22	92
Electronic magazines and newsletters	10	42
Online databases (e.g. ScienceDirect, WIOFISH, FAO, fishBase, ASFA)	20	83
Websites (e.g. university website, WIOMSA)	24	100
Locally generated e-resources on ActiveConnect	20	83

In the discussion groups, most of the respondents confirmed that they had used a wide range of digital sources (see Appendix C, question 2). Some of the digital sources mentioned include Open Access Journals, Google Scholar, Institutional Repositories, ScienceDirect, JSTOR, theses and dissertations, blogs, university websites, e-books, e-journals and ActiveConnect. A review of the organisation's Internet Policy (see Appendix F) revealed that respondents had Internet access to search the web, meaning they could access free content available on websites and databases. In addition, the Online Access Catalogue (OPAC) showed that digital content available to users included papers published in scientific journals, electronic books, digitised theses and dissertations and ORI investigational reports. Respondents also had access to a number of scientific journals from ScienceDirect database via the University of KwaZulu-Natal.

After identifying digital sources used, a question was posed in the focus group discussions to evaluate the adequacy of the digital resources offered by the ORI Library (see Appendix C, question 4). Below are some of the responses given:

- "ORI library is one of the best marine science libraries offering print material, I honestly don't know for sure if digital resources can achieve that level",
- "Using the word adequacy may not even be applicable, as far as l know we don't have access to a lot of journals that are useful for our work. Whatever is there is not useful to me",
- "Digital content available is too limited, there is need to subscribe to more online journals and databases as most of us are relying on free content available online",

- "The electronic resources available here are not nearly as adequate as print resources, we still have a long way to go",

- "In my opinion, l think the content we have is reasonable especially considering that all scientists research output is digital",

- "The only digital resources l know of are those available on ActiveConnect which is a frustrating database because it's always not functioning properly",

- "I don't really have much knowledge of what digital resources are available; for the most part, l search the Internet or ask the librarian to get it for me",

- "Electronic resources are poor and not adequate for a research institute. For the little access that we have, we don't have it directly. I don't like the idea of having to ask someone to download content for me; l want to have the freedom to download as much as l want and when l want to".

These responses clearly indicate that there is general dissatisfaction among respondents on the digital resources available. Also reflected here is absence of knowledge of by some respondents of what digital resources are available to them. However, an analysis conducted by the researcher on the library holdings (see Appendix F) revealed that the catalogue is clearly labelled 'Electronic content', to identify all media that was available in electronic format. ActiveConnect was a service that other respondents had made use of, even though it was being identified as inefficient. This shows that training on online information retrieval should be encouraged so that all library users are aware of the resources available and how to make use of them.

4.7.2 Purpose of use

When asked to state for what purposes they had used digital resources (see Appendix B, question 23), 21 (88%) of the respondents indicated that they had used digital resources for writing theses and/or projects, 15 (62%) used them for writing research papers for publication, 21 (88%) had consulted digital sources to keep up with progress in their field and nine (38%) for teaching purposes. In a discussion with the Scientists (see Appendix C, question 2), respondents identified other purposes of using digital resources which included reviewing of documents, development of project proposals, fund-raising projects and for consultancies.

4.7.3 Where access was obtained

Respondents were requested to state from where they had accessed digital resources (see question 24, Appendix B). Figure 5 illustrates the findings.
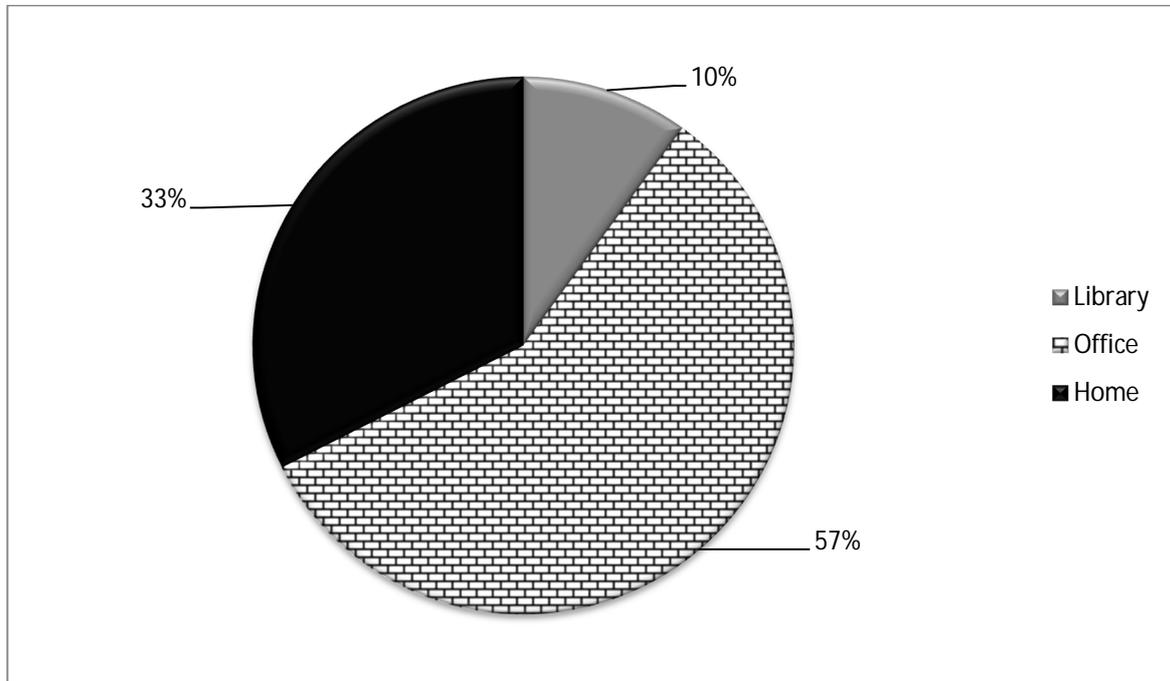
Figure 5: Where digital resources were accessed from (N=24)

Fourteen (57%) of the respondents gained access from their offices, eight (33%) indicated they had access from home and 2 (10%) indicated they had access from the library. These results show that some respondents had access from more than one place; for example, having access from the office as well as from home. The majority of the respondents had access from their offices, with only a few having accessed digital information from the library. These results correspond with observations made by the researcher that a few users were using the library computers because of limited availability of computers to access digital information.

4.7.4 Access rights

Question 25 (see Appendix B) requested respondents to indicate if they had direct access to the digital information they had used. Sixteen (67%) respondents revealed that they had direct access, six (25%) indicated they did not have direct access and two (8%) did not respond. Those who indicated that they did not have direct access were further asked to state how they accessed digital resources. Eight (33%) of the respondents, encompassing all the students and

one Scientist, indicated they had off-campus access via the University of KwaZulu-Natal. However, SAAMBR (2006:8) stated that, in a functional relationship between the ORI and the University of KwaZulu-Natal, the ORI scientists offer fishery training courses, supervision of post-graduate students and examination of theses. According to this agreement, ORI Scientists were entitled to enjoy UKZN privileges, which included using library resources, as they were regarded as teaching staff of the university. This means only one Scientist was using this privilege. Another 12 (50%) of the respondents indicated they had access via the librarian and two (8%) indicated they had access through other people.

4.7.5 Frequency of use

Respondents were asked to indicate, on average, how often they used digital information for work purposes (see question 26, Appendix B). The results show that two (8%) of the respondents used digital information once a month, only one (4%) of the respondents once a week, eight (34%) of the respondents several times a week and 13 (54%) of the respondents several times a day. Respondents were asked to indicate, within predetermined times, how much time they spent per day using digital information for job-related activities (see Appendix B, question 27). Three (12%) used less than 30 minutes, seven (29%) used between 30 minutes and one hour, four (17%) used between one to two hours, three (13%) of the respondents used between two to three hours and seven (29%) used more than three hours a day. With 13 (54%) of the respondents using digital information several times a day and 10 (42%) spending more than two hours each day, the results reflect high usage of digital information by respondents. These results are depicted in Figure 6.
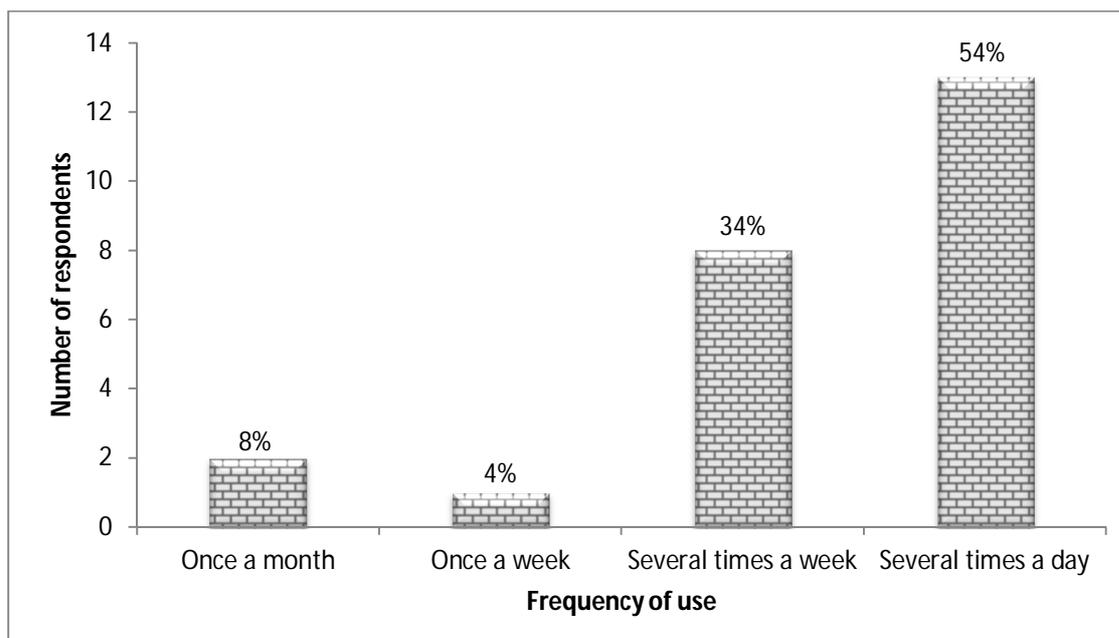
Figure 6: Frequency of use of digital content (N=24)

An analysis of library usage statistics was conducted to complement and substantiate quantitative data gathered from questionnaires on patterns of use of electronic resources (see Appendix F). On average, eight requests were received via e-mail per day asking for electronic articles. Most of the requested material already existed in the library in print format. Although it was not possible to create usage statistics of digital information on ActiveConnect, the frequency of users complaining that the service was down was evidence that digital information was being used. Circulation statistics showed a gradual decrease in lending out of books compared with previous years. However, inter-library loan requests for books were still common.

The researcher observed usage patterns of digital resources (see Appendix E). It was observed that library computers were always busy. In certain instances, some users would wait to get a turn to use the computers. It was noticed that respondents would often be seen scanning articles. The researcher observed the frequency of library visits to establish how often print material was being used, as a way of ascertaining the popularity of digital information. It was noted that library visits were generally low compared with previous years. At the same time, the majority of those who visited the library would be seen scanning articles and browsing the Internet and not borrowing books or sitting to read.

4.8   Prospects for the development of a centralised digital repository

The purpose of this study was to establish predictors of users' preferences for digital information at the ORI Library, with a view to developing a framework that would inform on improving digital information dissemination programmes to enhance access to and preservation of digital content. To establish the feasibility of conducting such a project, data was collected from management to elucidate on issues of budgets, policies, ICT infrastructure development and capacity building plans (see Appendix D). Two sessions of individual face-to-face interviews were conducted. Relevant data gathered from questionnaires, focus group discussions and documents were presented here.

4.8.1   The place of the ORI Library in the overall functions of SAAMBR

To establish the importance of the library to the organisation, the researcher requested management to describe the contributions made by the library to the overall functions of SAAMBR (see question 1, Appendix D). The first interviewee stated that:

> The ORI Library is viewed as the repository of the organisation where the history of the organisation is stored. As the only specialised marine library in the region, it is a critical source of information that has benefited a number of people interested in marine conservation.

In a separate discussion, the second interviewee explained:

> The library is a research tool that offers specialised marine and aquatic information services to our scientists here at the ORI, SAAMBR employees and the society at large. It is an excellent repository for research output at the ORI.

The second interviewee added that the library was identified as one of the services that the ORI could offer as an institution. A document analysis of the *SAAMBR Bulletin* (2011) was done by the researcher to establish how the ORI Library contributes to achieving the goals of SAAMBR. The *SAAMBR Bulletin* is a yearly organisational publication that highlights the functions and activities of the organisation. The library's role is revealed in SAAMBR's purpose statement, which specifies that the organisation exists 'To contribute to the conservation of marine and coastal biodiversity and resources by generating and disseminating scientific information and inspiring and empowering people' (SAAMBR

2011:4). This defines the library as the knowledge base of an organisation that facilitates scientific research and provides the public with information on marine conversation.

4.8.2 Management's view of the use of digital resources

Management was next asked to give its general view on the use of electronic resources (see Appendix D, question 2). The first interviewee enthused that it was a fantastic resource that is easy to use and that offers direct access to information. The interviewee pointed out that e-resources offered mobility and that it was a good storage medium that saved space. The second interviewee said that electronic resources played an important role in research, but was concerned about non-critical use and plagiarism.

4.8.3 Funding and budgets

The researcher was interested to find out what proportion of the SAAMBR budget was allocated to the library (see question 3, Appendix D). One interviewee elaborated:

> The library is a subset of the ORI division and this means that the ORI gets an annual allocation that is inclusive of all library expenditures. Out of the ORI's annual budget per year, the library is allocated 6.15%. This constitutes 1.35% of the SAAMBR annual budget.

A further question was asked to inquire if there was any budget allocated for digital resources development. In both interviews it was confirmed that no budgets had ever been assigned for the development of electronic resources for the library.

4.8.4 Collection development policy for digital resources

A library's collection development policy is a strategic document which enables the library to obtain and manage resources in line with its immediate goals, as well as reflecting wider institutional objectives and priorities (Hollingum 2013:62). With regards to electronic resources, it's a policy intended to guide the development of the digital collection. This included free Internet resources, electronic resources purchased or licensed by the library from commercial sources and digitisation of library print material. It also included external collaborations with other institutions for resource sharing. In the present study, the researcher wanted to discover if there was any collection development policy to inform digital development (see Appendix D, question 4). Both interviewees acknowledged there was no

such policy. The researcher, as the librarian, confirms that the library did not have a policy document on collection development of digital resources and neither did it have a library collection development policy in general.

4.8.5 Collaborations with other institutions

The researcher asked the interviewees to identify organisations and institutions they would wish to collaborate with, to enhance the development of e-resources (see Appendix D, question 5). The interviewees identified the CSIR, SAIAB, MCM, UKZN and other coastal universities that housed marine and aquatic information in their libraries. One of the interviewees suggested that, as a start, they would be interested in collaborating with local organisations, but at a later stage, it would be more beneficial to collaborate with marine institutions within the Western Indian Ocean region.

4.8.6 ICT infrastructure

Question 6 (see Appendix D) asked management to state the ICT infrastructure available for the organisation to facilitate access to e-resources. They both indicated that SAAMBR as an organisation had networked computers, photocopying machines, printers, scanners and Internet facilities. One of the interviewees explained that new computers were installed every three years, to make sure they had up-to-date and current machines. The responses given indicated there was a general satisfaction with the infrastructure provided for the organisation. These findings concurred with results from the focus group discussions and survey questionnaire regarding the adequacy of the ICT infrastructure. Observations by the researcher showed a lack of adequate facilities within the library.

4.8.7 Capacity building plans

The researcher sought to find out if there were any capacity building plans with regards to the use of e-resources at the ORI Library (see Appendix D, question 7). Both interviewees confirmed that there were no plans. Results on training needs (see section 4.6.3) indicated that most respondents were computer literate and were able to access digital information, as most websites and databases were user friendly.

4.8.8 Digital scholarship development within SAAMBR

The interviewees were asked to share their views and opinions on digital library development within the organisation (see question 8, Appendix D). The first interviewee stressed that digital library development was a huge area of concern. The respondent added that it was an area that needed expansion, as the use of e-resources was now a popular worldwide practice that needed to be adopted. The interviewee suggested digitisation of historical material as a way of developing e-resources in the library. The second interviewee emphasised the need for a centralised database, adding that it was a prerequisite for a research institute. The respondent warned that the establishment of a centralised digital repository would call for intensive financial input and staff training to allow its effective use.

In the focus group discussions (see Appendix C, question 13), respondents were asked to give their views and opinions on the development of a digital repository at the ORI Library. Respondents were supportive of having one integrated system which all library users could access. One respondent stated that "Having a centralised repository would be a good move, as many of us have our own collections that we cannot share with the rest of the users". Another point that emerged was that having a digital repository was a step forward, because it was a time-saving strategy that would increase productivity as access to information is improved. One respondent cautioned that a digital repository should go hand-in-hand with awareness and training, so that people know how to search and retrieve digital information. A few respondents felt that, although having a digital repository was a good idea, books were very precious and it would be hard to replace them completely. Most respondents indicated they were happy to have a digital repository, however.

4.8.9   The ORI library in 10 years' time

Interviewees were asked to state how they would want to see the library in the next 10 years from management's perspective (see Appendix D, question 9). In the first interview, the interviewee talked about having a smaller library containing books only and online access to all journals, with existing print journals archived electronically. The interviewee added that he/she would want to see the library being more social and vibrant and being one of the best e-resource libraries in the region, similar to those in developed countries. The second interviewee strongly felt there was still need for a physical library though focus should be on collection development of e-resources, as users were becoming more inclined to e-resources.

The development of a digital library was viewed as crucial, an additional bonus being that it rationalises space usage.

4.9   Summary on the findings

This chapter presented and analysed the findings of this study. Data collected from questionnaires, interviews, focus group discussions, documents and observations was analysed and presented in the form of tables, diagrams, frequencies and percentages. The results indicated that the majority of respondents preferred digital resources, even though they agreed that books were also important to keep and use hand-in-hand with electronic resources. The majority of respondents had a positive attitude towards the use of electronic resources. Enthusiasm for digital resources was high, because respondents perceived digital information to be useful and easy to use. Respondents indicated that they had been exposed to using computers for a long time, such that they were experienced in using digital resources. The results showed that ICT infrastructure was adequate to facilitate digital resource usage, but a lack was identified within the library premises. Respondents clearly indicated a need for a centralised digital repository, and prospects for the development of a digital library were high even though the study did uncover possible challenges.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.1   Introduction

The purpose of this study was to investigate predictors of users' preferences for digital information at the ORI Library, with a view that the results may be used to improve management of digital information to benefit users. In the previous chapter, findings of the study were presented, using the research questions as the guiding framework. The discussion of the results in this chapter is also underpinned by the research questions. The following aspects are discussed: predictors of users' preferences for digital information, users' attitude towards the use of digital information, user competency with regards to computer usage, ICT infrastructure available to facilitate access to digital information and usage patterns of digital information. The discussions of results in this chapter are benchmarked against similar studies that have used the TAM as the theoretical framework. This study was informed largely by the TAM.

5.2   Predictors of users' preferences for digital content

The first research objective of this study sought to determine predictors of users' preferences for digital information. The technology acceptance model, as espoused by Davis (1989), focuses on the determinants of computer usage in terms of perceived ease of use and perceived usefulness. The model emphasises the user's perceptions about '*how useful is it for me*' and '*how easy is it to use*' as powerful determinants that can influence a user's acceptance and adoption of technology. According to the model, applications are considered '*useful*' if they contribute to accomplishing the end-user's purpose and '*easy to use*' if the effort required in making use of the application is modest relative to the end-user's frame of reference (Doll, Hendrickson and Deng 1998:483). These aspects of the TAM in relation to this study are elaborated in the sections that follow.

5.2.1   Perceived ease of use

Results on the perceived ease of use showed that the majority of respondents perceived digital information as easy to use. Overall, the results from the survey questionnaire revealed that 92% (22) of the respondents perceived digital information as easy to use, while only 8%

(2) of the respondents did not perceive digital information as easy to use. Similarly, results obtained from the focus group discussions showed that most respondents perceived digital information to be easy to use and outlined, among other reasons, that it was up-to-date and offered a wide coverage, it was easy and quick to access, easy to store, share and carry around. In part, these results concur with observations made by Armstrong and Lonsdale (2007:258) that access to e-resources had reduced the time spent searching for information, as saving time is a priority. A study by Deng (2010:96) revealed the availability of a variety of resources and their accessibility and time-saving features, availability of search tools and the absence of physical space limitations as attributes of ease of use. Renwick (2005:23) added that ease of use of electronic resources was also divulged by its international coverage to both retrospect and current information. In support of this view, narrative findings of this study revealed that respondents preferred digital information because it provided the latest methodologies which made their work easier and improved its quality.

Ease of use is affected by the adequacy of, or a lack of, ICT infrastructure. A study by Park et al. (2009:204) confirmed that ease of access had a positive effect on perceived ease of use, adding that accessibility was one of the prominent disadvantages for users in developing countries. Deng (2010:96) noted that ICT facilities play an important role in facilitating easier, faster and wider access to digital information. A study conducted by Egberongbe (2011) on the use and impact of e-resources at the University of Lagos showed that users were dissatisfied with IT infrastructure and this affected the use of digital resources. Ndinoshiho (2010) found that many e-resources were substantially under-utilised in African universities because of a shortage of computers and unreliable Internet connection. Ahmed's study (2013) on the use of electronic resources in some universities in Bangladesh found that electronic resource usage could be better with the improvement of IT infrastructure. Early studies in developed countries revealed that limited access to computer terminals deterred respondents from using digital resources (Ray and Day 1998). In the present study, ease of use was facilitated by the accessibility to IT infrastructure by respondents of this study. All respondents of this study had networked computers in their offices; with some having laptops to work on during field trips.

However, like other studies, not all respondents agreed to perceived ease of use of digital information. Only two (8%) of the respondents in the survey questionnaire did not perceive

digital information as easy to use. Results from focus group discussion provided reasons why some respondents did not perceive digital information as easy to use (see section 4.7.4). As examples, slow Internet, difficult-to-use websites, unclear instructions and inability to download material were cited. In a study to identify factors affecting virtual patron satisfaction with online library resource services, Tyler and Hastings (2011:27) found that there was need to improve the search tools, make instructions clearer and create more friendly websites as this was compromising ease of use of the digital library. Thong, Hong and Tam (2009:233) revealed interface characteristics which include terminology, screen design and navigation as significant deterrents to perceived ease of use, with terminology having the strongest impact on perceived ease of use of digital libraries. Similarly, Ibrahim (2004:24) emphasised the influence of language as a barrier to the use of electronic resources in the United Emirates, where the Arabic language is the formal language of communication and yet electronic resources are in English. Language was also found to be one of the largest obstacles facing access to fisheries information, as it is published in many different languages (FAO 2009:20).

Within the African context, Brown (2002:3) gave cautionary advice:

> For cultures with high uncertainty and avoidance, as is found in South Africa, and Africa in general, more structure and fewer complications when using a technology provide for more favourable perceptions about that technology.

In a nutshell, Brown (2002:3) was advising that, in Africa, for technology to be accepted, it has to be free from the antecedents mentioned above, as they negatively impact on ease to use.

Within the field of aquatic and marine science, Macharia (2005:89) found that digital collections were easy to use, in the sense that important information was placed close at hand, dissemination of new research was made faster and this created access for wider audiences. The availability of grey literature, which is often difficult to discover and access, yet essential to fisheries science, could now be disseminated and retrieved easily online (Haas et al., 2009:5).

The above discussions show a correlation between perceived ease of use and usage. It can be observed that usage is high when a system is easy to use in terms of functionality and accessibility. Conversely, usage is low when access is restricted and when a system is not easy to use or manipulate. Therefore this study confirmed the perceived ease of use as a valid determinant of technology acceptance.

5.2.1.1 Correlations between perceived ease of use and actual usage

Past research has proved that perceived ease of use can directly influence system usage (Davis 1989; Brown 2002; Vaidyanathan, Sabbaghi and Bargellini 2005; Yusoff et al., 2009). In his attempt to validate the TAM, Davis (1989) conducted a series of studies using perceived ease of use as an independent variable and system usage as the dependent variable. Davis (1989) found that perceived ease of use was significantly correlated with current usage and future usage. A strong correlation is also revealed in this current study, where preference is tending towards digital information. Results showed that current usage was high because 22 (92%) of the respondents perceived digital resources to be easy to use.

Yusoff et al. (2009) obtained similar results when they investigated usage of the e-library among students in a public university in Malaysia. The study employed the TAM to examine how individual differences, perceived ease of use and perceived usefulness relate to actual use of an e-library. With regards to perceived ease of use, the authors hypothesised that, when the application of the e-library is perceived to be easy to use, it is more likely to be accepted by the users. The results confirmed the assumption and further indicated that students found that the e-library was easy to use and they were more willing to use it for information retrieval to improve the quality of their assignments. Their study concluded that digital library settings need to be both easy to learn and easy to use.

Correlations between ease of use and usage were also revealed in a survey conducted by Suki and Suki (2011) to examine the relationship between perceived usefulness, perceived ease of use, perceived enjoyment, attitude and subscribers' intention towards using 3G mobile services. Among other findings, the results confirmed that perceived ease of use was significantly related to actual use. The findings showed that subscribers learnt to use 3G services quickly. The importance of perceived ease of use towards 3G mobile services, in terms of how easy or effortless it is to communicate with each other, was emphasised.

A meta-analysis of the TAM, conducted by Yousafzai, Foxall and Pallister (2007:299), revealed that while the direct effect of perceived ease of use on usage has been found in selected studies, the cumulative findings indicate that perceived ease of use is not a dominant predictor of usage in the TAM. The authors qualified their statement by explaining that, although perceived ease of use might not be important in determining the level of use of a system, it may influence the initial decision to adopt a system in voluntary situations. The inclusion of perceived ease of use was thus significant in this study, as the use of digital information was a behavioural choice initiated by individual library users. In addition, the inclusion was necessary as the use of digital resources was a new development within the organisation.

Venkatesh (2000:342) acknowledged that much previous research has established that perceived ease of use was an important factor influencing user acceptance and usage behaviour of information technologies. There are many investigations that found ease of use to be influential in system usage (Davis 1989; Adams, Nelson and Todd 1992; Brown 2002; Averweg 2008; Suki and Suki 2011). Based on these and the overall findings of this study, perceived ease of use can be confirmed as a significant determinant in predicting the actual use of electronic resources. The results confirm a correlation between perceived ease of use and actual usage.

5.2.2 Perceived usefulness

With regard to analysing and interpreting perceived usefulness, Doll, Hendrickson and Deng (1998:863) warned researchers and practitioners to be cautious in interpreting usefulness scores for different types of computer applications. The authors stressed that, in the context of word processing, usefulness may have a different meaning; it may mean appearance and/or grammatical accuracy, as well as productivity, yet usefulness variables emphasise enhanced productivity rather than improved grammar or enhanced appearance. This cautionary statement helped the researcher to focus on evaluating the usefulness of digital resources in improving job productivity.

The findings of this study, gleaned from the survey questionnaire, showed that the majority of respondents, constituting 18 (76%), perceived digital information to be useful. The statement, '*I would find digital information useful in my job*' (see Appendix B, question 15) had 23

(96%) of the respondents agreeing with it. During the focus group discussions, the majority of respondents were positive about the usefulness of digital information, stating that it improved their quality of work, it allowed them to work remotely, it offered a wide source base and improved their productivity, as more time was being devoted to work rather than moving up and down searching for information (see section 4.3.2). These findings clearly supported their behaviour of scanning material that existed in print format in the library so that they could access them electronically from their offices. Escalated requests for electronic documents, requests for the development of a centralised digital repository and the realisation and acceptance that scholarly communication was tending towards digital scholarship revealed the perceived usefulness of digital information to them.

Electronic resources have been found to provide an effective means for research scholars to locate plenty of information which they could read and subsequently cite in their work (Madhusudhan 2010:501). According to this author, electronic resources are crucial in the changing nature of scholarship. They allow access to information scholars would not otherwise have found. This explains how useful electronic resources have been regarded. Kumar and Singh (2011) found that scientists evaluated electronic resources to be quite useful, such that their levels of satisfaction with the resource were very high. They revealed that electronic resources had an impact on the competence level of scientists and improved their intellectual activity necessary for research (Kumar and Singh 2011:43). In a study to investigate student attitudes towards electronic resources, conducted by Ray and Day (1998), one of their major aims was to measure end-user satisfaction and the usefulness of electronic resources. Respondents were asked to state whether or not they acquired significant information on the Internet and whether or not their work would suffer without electronic resources. A majority of the respondents concurred that electronic resources were useful and their work would suffer without them but quite a number had not yet been convinced.

In agreement with the results obtained by Ray and Day (1998), the present author found that not all respondents perceived digital information as useful. Respondents valued electronic resources differently. Only one (4%) of the respondents disagreed on the perceived usefulness of digital information (see section 4.3.2). Print was said to be easier to read and better for making notes, because computer screens strained the eyes. Print material was thought to be easy to reference and easier to read to find specific sections of information.

Swain (2010) confirmed that students found it convenient to use hard copies, as browsing of so much information on the web confused them because they were not comprehensively trained to retrieve pertinent electronic information easily and quickly. Mulla (2011) found that availability of too much information negatively impacted on the usefulness of the resource, because it was time-consuming for users to retrieve relevant information. This was a deterrent factor to some users.

Results of the present study revealed that, overall, five (20%) of the respondents were neutral on the perceived usefulness of digital information. However, narrative findings revealed that neutral respondents were not really neutral *per se* but questioned the usefulness of digital resources. Some respondents were concerned how digital resources could be identified as useful when they were compromising the quality of research output, as scholars were plagiarising and using unauthentic information from the Internet (see section 4.3.2). In this regard, these cohorts of respondents disagreed with the perceived usefulness of digital resources.

5.2.2.1 Correlations between perceived usefulness and actual use

A number of studies have reported a correlation between perceived usefulness and usage of an information system. In numerous experiments conducted by Davis (1989) to validate the TAM, he found that perceived usefulness significantly correlated with both self-reported current usage and self-predicted future usage. Adams, Nelson and Todd (1992:237) confirmed this correlation, adding that a possible reason for this relationship is that individuals will use computers only if they perceived that such usage will help them to achieve a desired task performance. With regards to e-libraries, Yusoff et al. (2009:80) found perceived usefulness to be positively related to the actual usage, adding that when users felt that a system was useful their usage level was higher.

A study by Thong, Hong and Tam (2002), to understand individuals' acceptance of digital libraries, reported perceived usefulness as having a significant impact on usage of a digital library. When students perceive the digital library as useful to their studies, they are more likely to use the system. It was further revealed that a digital library can be made more useful by having relevant content. Respondents in the present study were quite convinced that the print collection was comprehensive, but doubted if the digital collection would ever reach

that level. Although the available digital information was relevant, the findings showed that it was not adequate. The fact that users would scan documents, solicit online access from friends, conduct information searches on websites, blogs and Google, were clear signs of inadequacy. Simultaneously, this behaviour manifested how useful digital information was to them. Respondents emphasised the need to improve access by subscribing to more electronic resources, as well as developing a centralised system that would allow users to share digital resources that were currently sitting on individual computers.

Yusoff et al. (2009:78) discovered that, although most researchers found perceived usefulness to be strongly related to usage, there were some findings that showed not much significant effect on usage, such as Brown's (2002) and Averweg's (2008). These findings agree with the results of the current study, which showed that the relationship of perceived usefulness with usage was not strongly linked. This was revealed by a number of survey respondents either disagreeing or being neutral on the perceived usefulness of digital information (see section 4.3.2). Appendix B, questions 10, 12 and 14, respectively, showed that:

- *'Using digital information would improve my work performance'* had two (8%) of the respondents disagreeing with this statement and six (25%) being neutral,
- *'Using digital information would enhance my effectiveness on the job'* had a total of one (4%) of the respondents disagreeing and six (25%) remaining neutral to the statement,
- *'Using digital information would make it easier to do my job'* had one (4%) of the respondents disagreeing and five (21%) being neutral to the statement.

Overall results on perceived usefulness indicate that most of the respondents perceived digital information to be useful and were happy that, among other reasons, digital resources allowed them to work remotely, anytime and from anywhere. Users needed not physically visit the library to use print formats, but could stay at home or in the office and access online library resources and services via network or authentication methods at any time (Renwick 2005:21). The fact that respondents were observed scanning material that existed in the library showed how useful digital resources were to them. Their quest for access to more digital resources and need for a digital library are a testimony to their perceived usefulness of digital resources. Users were showing a preference for digital content, because they perceived the resource to be useful for their work. Davis (1989:334), in his concluding remarks, emphasised that

perceived usefulness is a strong correlate of user acceptance and should not be ignored by those attempting to design or implement successful systems.

5.3   A comparison of perceived ease of use, and perceived usefulness with, actual use

Davis (1989) identified perceived ease of use and perceived usefulness as the core constructs of technology acceptance. One of the major findings in Davis' (1989:333) study was that usefulness was more significantly and strongly linked to usage than was ease of use. These findings are supported by a number of researchers who found perceived usefulness to be the most highly predictive determinant towards usage (Taylor and Todd 1995; Pan et al., 2005; Porter and Donthu 2006; Miller and Khera 2010). Anandarajan, Igbaria and Anakwe (2002:51) found that perceived usefulness exhibited a stronger and more consistent relationship with usage than other variables reported in the literature. Henderson and Divett (2003:392) found perceived ease of use of a system not uniquely contributing to the prediction of behaviour when usefulness was considered, giving the impression that the contribution of perceived ease of use to the prediction of behaviour was mediated by perceived usefulness.

Hong et al. (2002:115) pointed out that some studies have acknowledged the superiority of perceived ease of use over perceived usefulness (Brown 2002; Averweg 2008). The current study showed perceived ease of use having a stronger relationship with usage than perceived usefulness. Comparing results from the survey questionnaire, 22 (92%) of the respondents perceived digital content to be easy to use, while 18 (75%) of the respondents perceived digital information to be useful. Results from the interviews showed a significant number of respondents challenging the usefulness of digital resources, as they were concerned with non-critical use and plagiarism by scholars. At the same time, results on perceived ease of use showed that the majority of respondents were motivated to use digital information because they felt it was user-friendly and offered a wide source base that was quick and easy to search (see section 4.3.1). With digital information, it was easy to locate, retrieve, use, carry around, store and share relevant information. Additionally, ease of use was also facilitated by the availability of ICT infrastructure and competencies that users had with computers (see sections 4.5 and 4.6, respectively). The overall findings proved perceived ease of use to be a major determinant to usage rather than perceived usefulness. These findings agree with

Brown's (2002:3) observation that in Africa, ease of use provides more favourable perceptions about a technology than any other cause.

Brown (2002:3) stated that "In developing countries, the conventional wisdom that perceived usefulness is the main predictor of adoption has been challenged". This view was supported by Anandarajan, Igbaria and Anakwe (2002:51), who observed that the TAM was developed and tested mainly in the developed countries, where the culture has been described as associative and where people typically use rational cause and effect paradigms to create perceptions. The authors noted that, as with Africa, where cultures are described as abstractive, relationships between perceptions and behaviour may not follow this pattern (Anandarajan, Igbaria and Anakwe 2002.51). Their study found that perceived usefulness was not a motivating factor to microcomputer usage in Nigeria. Averweg's (2008) study to assess IT adoption in 31 organisations in Durban found that perceived usefulness was not significantly correlated to usage. An observation made by Brown (2002:11) was that ease of understanding had a greater influence on system usage in most developing countries, where the language of instruction is not the mother tongue. This means that perceived ease of use has more weight than perceived usefulness in most developing countries.

In the context of digital libraries, Hong et al. (2002:115) noted that there are two main reasons why perceived usefulness has a stronger effect. First, Hong (2002:115) observed that in the early stages of exploring the digital library, perceived ease of use is the major determinant of system use and, in the later stages of stable usage, when users have accumulated more experience with using the digital library, the significance of perceived ease of use will decrease, while the significance of perceived usefulness will increase. According to Davis (1989:333), users are driven to adopt an application primarily because of the functions it performs for them, and secondarily for how easy or hard it is to get the system to perform those functions. Davis (1989:333-334) added that users are often willing to cope with some difficulty of use in a system that provides critically needed functionality, despite the fact that difficulty of use can discourage the adoption of an otherwise useful system.

These conflicting results of various studies on the relationship between perceived ease of use, perceived usefulness and actual usage pose difficulties for many scholars. Doll, Hendrickson and Deng (1998:839) concluded that:

Despite its wide acceptance, a series of incremental cross-validation studies have produced conflicting and equivocal results that do not provide guidance for researchers or practitioners who might use the TAM for decision-making.

Davis (1989:335) strongly defended his theory however and emphasised that "perceived usefulness and ease of use are people's subjective appraisal of performance and effort, respectively, and do not necessarily reflect objective reality". Davis explained that beliefs are seen as meaningful variables in their own right, which function as behavioural determinants, and are not regarded as surrogate measures of objective phenomena, as was often done in information systems research. Segars and Grover (1993:525) aligned with Davis (1989) and reasoned that studies should in no way diminish the value of Davis' original scales or the value of identifying measures that explain technology acceptance, but should instead challenge the information system community to further explore the nature and specific influences of factors that may alter the user perception-usage equation.

5.4   Users' preferences for digital information

The discussions above revealed perceived ease of use and perceived usefulness as the cornerstone of individual acceptance of technology. The present study has revealed the link between each construct with usage of digital information and how these constructs are helpful in predicting acceptance to digital information usage. It can be concluded that, as technologies continually change, so do the users' perceptions about ease of use and usefulness of an information system. To this end, Teo et al. (2009:1007) cautioned that those who perceive technology to be easy to use and useful may soon experience limitations if they do not keep abreast of advances in the relevant technologies. There is thus a need to continuously upgrade one's skills. At the same time there is a need for researchers to conduct follow-up studies to determine the effect of these changes on individual technology acceptance.

5.5   Users' attitude towards the use of digital information

Davis, Bagozzi and Warshaw (1989:987) stated that perceived usefulness and perceived ease of use are beliefs about a new technology that influence an individual's attitude towards, and use of, that technology. Davis, Bagozzi and Warshaw (1989) explained that attitude is based on the salient beliefs that a person has about the consequences of a given behaviour and his or her evaluation of those consequences. Choi, Kim and Kim (2007:227) elaborated: "a person

will have a more positive attitude towards performing an action if he or she believes it will have major consequences and that these will be good".

Findings on users' attitude towards use revealed that respondents had a positive attitude towards digital information (see section 4.4). Overall results from the survey questionnaire showed that 21 (88%) of the respondents had a positive attitude towards digital information. Appendix B, questions 16 and 19, which read *'Using digital information is a good idea'* and *'I am positive towards use of digital information'*, respectively, had all 24 (100%) respondents agreeing to the statements. Respondents were positive that digital information helped them achieve their work goals more easily and allowed them to work faster. In a study to evaluate the emerging trends in the use of electronic resources, Deng (2010) found that users developed a positive attitude towards digital information because of the rapid development of information and communication technologies and their understanding of the purposes of various information sources. Madhusudhan (2010) found that use of electronic resources had become an integral part of the information needs of research scholars of Kurukshetra University. Their positive attitude towards electronic resources made them realise the benefits of the resources and how they could positively influence academic efficiency.

Porter and Donthu (2006), using the TAM, conducted a survey to explain how attitudes determine Internet usage. They found that attitude toward Internet usage was significantly and positively correlated with Internet usage. Their study, not only confirmed the theoretical importance of attitude in the basic TAM, but also demonstrated that, in the context of Internet use, other beliefs such as perceived access barriers can significantly influence consumer attitudes. Particular beliefs about a technology differently affect consumers from diverse segments of the population (Porter and Donthu 2006:1003). These findings were revealed in the present study, where students aged between 20 and 30 years had a positive attitude, while the majority of respondents over 50 years old felt otherwise.

Results concerning attitude towards use revealed that, although respondents were positive about digital resources, they did not necessarily have a negative attitude towards print resources. These findings were confirmed in the survey questionnaire, in which, 10 (42%) of the respondents were neutral, while three (12%) disagreed with the statement *'I prefer digital content to print'* (see Appendix B, question 21). It is for this reason that some respondents

felt that print and digital resources needed not to be compared with each other, as each had its own strengths and weaknesses; but they could complement each other. Nevertheless, digital information was well received by respondents at the ORI Library. The growing preference for digital information by users at the ORI Library was attributed to their positive attitude towards the resource. The present results confirm that attitude was a valid TAM variable that can be used to predict actual use.

Other studies produced different results. Ibrahim (2004) showed that a lack of awareness about the e-resources provided by the library or ineffective channels of communication negatively affect a user's perception of electronic resources. A number of studies have revealed that poor ICT infrastructure, low computer literacy levels and restricted access resulted in users adopting a negative attitude towards digital resources (Ray and Day 1998; Deng 2010; Swain 2010; Kumar and Singh 2011; Ahmed 2013). Conversely, availability of the above-mentioned services helps improve user attitude, although it does not guarantee usage.

Adams, Nelson and Todd (1992:233) pointed out that:

> Even when usage is not strictly required as part of a job, there may be no alternative but to use that system to effectively complete the job. Thus, the user's attitude might be 'I don't like it but there's no alternative.

The findings of the present study were that use of digital information was partly a result of scholarly communication which was tending towards digital. Respondents had to use digital resources regardless of how they felt about the resource, as the bulk of information was being published electronically.

5.5.1   Correlations between attitude towards use and actual use

Some studies have found attitude to be a less important construct in terms of predicting technology acceptance. Davis, Bagozzi and Warshaw (1989:998-1000) showed that the role of attitude towards usage was limited in predicting technology acceptance. It was possible that users may use technology, even if they do not have a positive attitude towards the technology, as long as it was perceived to be useful or easy to use. Venkatesh, Morris, Davis and Davis (2003:455) observed that the role of attitude in the TAM has been inconclusive. Yousafzai, Foxall and Pallister (2007:295), however, blamed empirical investigations of the TAM, because the attitudinal construct was neglected, raising questions as to whether or not

the exclusion of attitude from the TAM was beneficial for our understanding of technology usage behaviour. In their meta-analysis of the TAM, Yousafzai, Foxall and Pallister (2007:286) found that only 14 studies tested the attitude-usage relationship, in contrast with 72 studies for the perceived usefulness-usage, 59 for the perceived ease of use-usage and 25 studies for the intention-usage link. They added that only 13% of the correlations in their database pertain to attitude, as compared to 34% for intentions, 31% for usage and 22% for perceived usefulness.

Van der Heijden (2001:180) reasoned that attitude should continue to be used to investigate factors influencing usage, because intention was most dominantly influenced by attitude and less so by usefulness, implying that attitude was indeed a very powerful mediator between the two beliefs. In the same line of thought, Yousafzai, Foxall and Pallister (2007:295) emphasised the importance of attitude:

> With the use of information systems in organisational settings becoming a common practice, we contend that attitude will be a critical factor in understanding the mandated use because it represents the degree to which users are satisfied with the system. Excluding the attitude construct from the TAM will not provide an accurate representation of the phenomenon.

Studies reviewed clearly showed that attitude is a valid construct that can be used to measure technology acceptance. The causal relationship between attitude and usage was clearly established. In the present study, results from the attitude construct corresponded with the actual use of digital information. The majority of respondents were positive about digital information and actual use of the resource was high.

5.6   External variables

Vaidyanathan, Sabbaghi and Bargellini (2005:280) noted that one of the key benefits of using the TAM to understand system usage behaviour was that it provides a framework to investigate the effects of external variables. The TAM predicts that external variables influence technology adoption indirectly, through perceived ease of use and perceived usefulness (Davis, Bagozzi and Warshaw 1989:987). The inclusion of external variables provides the possibility of examining contextual factors such as ICT infrastructure and user

competence, which are often important barriers in developing countries (Park et al., 2009:196-197). The present study examined user competency and ICT infrastructure as basic requirements for digital information usage.

5.6.1   User competencies

The TAM proposes that an individual's level of competence with a system can affect his or her perceived usefulness or ease of use of that particular system. User perceptions about ease-of-use or usefulness might vary with a user's level of competence with computing. Familiarity with a computer and time spent working on a computer are critical measures of an individual's competence with a system. These two aspects can help the user to learn more easily how to work with a digital library.

Information from electronic sources cannot be accessed in the same manner as printed sources. Adequate knowledge about computers and retrieval techniques to effectively search electronic information sources is desirable. Thus questions have been raised as to whether fisheries academic communities are fully aware of the potentials of the new technologies and if they have the skills and competencies to navigate, find, evaluate and use electronic resources (Sujatha and Murthy 2010:742). Findings of the present study revealed that 22 (92%) of the respondents had over 10 years of computer experience, while only two (8%) had over eight years (see section 4.6). All respondents reported that they had above-average computer skills. Findings on training needs revealed that respondents were confident with the skills they possessed, as only a small fraction indicated a need for training. Respondents made use of databases, websites and search engines to access information, giving the impression that they had skills to conduct searchers on their own. Respondents went on to point out that most databases and websites were user-friendly, as they provided helping hints for searchers. Respondents also had access via the librarian, who sourced digital information each time inter-library loan requests were made. However, user competence was questionable, as some users could not access content that was freely available to them online.

Experience possessed by users on the use of digital information was not convincing. General computer knowledge on its own was inadequate for effective use of online digital resources. Raymond (1988:10) explained that focussed training promotes greater understanding, favourable attitudes, more frequent use and more diverse use of applications. General experience on the use of computers is not adequate when it comes to the use of digital

resources. An investigation by Yusoff et al. (2009:80) showed that domain experts conduct faster and more focused searches than novices, as they are able to separate relevant information from irrelevant responses and increase effective searches. These results concur with findings from a study conducted by Hsieh-Yee (1998) to evaluate the effects of search experience and subject knowledge on the search tactics of novice and experienced searchers. While novice searchers showed no difference when conducting searches on familiar and unfamiliar topics, experienced searchers used synonym terms, monitored the search process and used a combination of search terms when conducting searches on familiar topics. When conducting searches on unfamiliar subject areas, experienced searchers relied on their own terminology, used the thesaurus, used offline term selection, synonyms and a combination of search terms. This shows that experienced searchers save time on their searches because they use different search tactics.

While investigating user acceptance of a digital library, Vaidyanathan, Sabbaghi and Bargellini (2005:281) noted that:

> In the case of a digital library which can encompass many complex systems working together, more specific skills are necessary for the user to succeed with the system. The key ingredient for successful use of a digital library may well be the user's expertise with search functions. Users need to possess the knowledge of the topic being searched. The more knowledge a user has about the topic, the more successful their search will be. Being comfortable searching through a database, whether a user is just using basic commands or advanced techniques, is of vital importance in the success of the search.

Their observations support findings of the present study, in that although the respondents in this study had over eight years of experience in using computers, they did not know how to effectively use digital resources. This was revealed by some respondents' failure to retrieve free content available online, some asking the librarian to download resources for them (even though they had direct access) and some scanning documents that were already available online. Although they had the experience, the researcher argues that such experience was generic and not specific to information searching and retrieval. It becomes important to emphasise training to acquire the necessary skills needed for accessing and retrieving digital

content. From the results, ease of use and usefulness of digital resources was indirectly being affected by users' lack of relevant skills.

5.6.2 ICT infrastructure available to facilitate access to e-resources

Park et al. (2009:205) explained that access barriers to digital library systems, which include infrastructure, should be overcome in order for users to fully enjoy the systems' functions and benefits. Francis (2008:144) added that since digital libraries can literally reshape access to information in a globalised, knowledge-based economy, it was useful to examine the state of the technological infrastructure on which it is predicated.

Findings of the present study revealed that respondents had access to desktops and/or laptops, the Internet, LAN, scanners and printers (see section 4.5). Nineteen (80%) of the respondents had access to all these facilities. Similar results were obtained from the focus group discussions, where most respondents confirmed that they had adequate facilities, with some having a desktop for the office and a laptop for working remotely. A possible explanation can be that the availability of ICT infrastructure encouraged the use of digital resources by the ORI Library users. The above results correspond with observations made by Iacovou, Benbasat and Dexter (1995:472), that the amount of technology currently in use in an organisation, such as computers with modems and e-mail facilities, can ease the process of adoption.

Park et al. (2009:205) found that, in developing regions, difficulty in access was one of the prominent disadvantages for users of digital resources. The digital divide was still a major hindrance in many developing nations because there were limited technological resources and skilled labour, due to financial constraints. In organisations where there was Internet access, resources such as bandwidth were severely limited or extremely expensive. Consequently, most institutions within the region find themselves working with outdated equipment as a result of the rapid changes in technology, making it difficult to improve accessibility to fisheries information by means of networking (Macharia 2005:89). This helps explains why the contribution of African countries to the development of the Aquatic Commons repository for marine and aquatic science researchers was low (9.8%), compared to that of developed countries (Ibeun 2011:2).

Accessibility of ICT infrastructure is one of the important determinants of frequency of using information sources (Thong, Hong and Tam 2002:222). Although respondents were satisfied with having networked machines in their offices, there was a lack of adequate ICT infrastructure within the library premises available to users for accessing digital resources. Respondents in this study were privileged to access digital information from their offices, but other library users who were not office-bound and who did not have computers, as well as external users, were disadvantaged, as the library had only three machines available for use. Observations made by the researcher confirmed the need for more computers, as users would often go back to their offices to search online. The development of a digital repository would require more computers as a way of increasing visibility of digital resources, as well as providing access to multiple users. Park et al. (2009:205) encouraged librarians to increase the number of public shared-access computers in order for the library system to be fully utilised. By the same token, Thong, Hong and Tam (2002:222) concurred:

> If a digital library is very difficult to access, either because of lack of computers or necessary software, users tend to perceive it as difficult to use. On the other hand, if a digital library is easily accessible, the users are more likely to perceive it as easy to use because gaining access to the digital library is the starting point to using it.

Additional survey results on ICT infrastructure revealed that 13 (54%) of the respondents lamented about poor Internet connectivity, while 16 (66%) were not happy with restricted access. The study concluded that current usage could have been higher if there was sufficient bandwidth and access to more online databases. Lederer et al. (2000) found that slow speed of downloading or viewing web pages was one of the major antecedents of digital resource usage in libraries. Smith (2007:157) reported that South Africa lacked adequate bandwidth and this impacted on the speed of access to digital information. As a result, poor connectivity negatively affects the use of electronic resources provided by digital libraries (Vaidyanathan, Sabbaghi and Bargellini 2005:282). The present study recommends libraries to minimise their bandwidth by creating a digital repository that can run within the end-user's Web browser, so that interaction with the server is reduced. Users can download online resources off a local device without necessarily having to connect to the Internet. This will improve the speed of retrieving digital information and at the same time increase usage.

5.7   Usage patterns of electronic resources

Pan et al. (2005:286) believed that actual system use was a behavioural response measured by the individual's actions in real life. The present study measured actions of digital information use for work-related purposes. Overall findings of the study revealed that usage of electronic resources was high in the ORI Library (see section 4.7). Survey findings revealed that 20 (83%) of the respondents used the ActiveConnect to access linked digital information. About 23 (96%) of the respondents used electronic journals, 22 (92%) used e-books and 24 (100%) visited websites like WIOMSA to search for information for writing research papers, for teaching purposes, for writing proposals, for consultancies and for keeping up with progress in their field. Usage statistics results showed that at least eight requests were sent per day to the librarian for digital information. At the same time, results showed a decrease in the circulation of print material, drawing the conclusion that the use of digital resources was becoming popular. Observations showed that library computers were continuously busy, respondents scanned journal articles and sections of books quite often and requested digital information each time the librarian sent out inter-library loan requests on their behalf. Apart from the above, complaints were raised each time respondents had access problems to ActiveConnect, which suggested that they made use of the system.

Usage patterns were also measured using frequency of use; how often the respondents used digital information. In general, the majority of respondents spent a considerable time working with digital resources. Eight (34%) of the respondents used digital information several times a week and 13 (54%) several times a day; giving an indication that, all inclusive, 21 (88%) of the respondents used digital information at least once a day.

Narrative findings of the study revealed that usage of digital resources was not only a result of users need for digital resources, but was also being facilitated by current trends in scholarly communication. Scholarly communication worldwide is experiencing a paradigm shift towards digital scholarship, eResearch and Library 2.0, which are all predicated on digital content. The Internet and the World Wide Web has seen new information services being developed to exploit the opportunities that networked access to digital information can provide. Many organisations, including libraries, across the globe are increasingly digitising their analogue records and/or creating others in digital format, transforming the way libraries access, store, disseminate and preserve information. As a result, use of digital repositories

and digital libraries are increasingly causing a decline in the circulation of traditional, paper-based materials. Library users are now showing a preference for electronic resources because, through digital scholarship, information was delivered to them at any time via intranets, the Internet and other fast and emerging networks.

Mulla (2011) evaluated the use of electronic resources at a college in India. It was found that frequency of use of electronic resources by scholars was relatively high, with just over 52% of the respondents using them every week. The study further revealed that electronic resources were mainly consulted for finding relevant information in user areas of specialisation, teaching purposes, for research, for communication and for gaining access to current and general information. Madhusudhan (2010) found that 62% of the respondents of university scholars used electronic resources every day and 48% used them at least once in three weeks, for purposes such as publishing of articles, keeping up-to-date in the area of specialisation and for writing theses and dissertations. The study showed that frequency of use depended on the nature of the library's electronic collection, organisation, maintenance and services.

Apart from the two studies discussed above, a number have been conducted to examine the usage of electronic resources, mainly in universities and institutions of higher learning (Ali 2005; Gowda and Shivalingaiah 2009; Deng 2010; Swain 2010; Egberongbe 2011). These studies reveal that, in general, use of electronic resources by university students and teaching staff has been accepted and is generally on the rise. The results of the present study revealed that the use of electronic resources was high. It can therefore be concluded that research institutions and institutions of higher learning use electronic resources for the same purposes and that use is on the rise. This is mainly because the population in both institutions have similar characteristics. More studies to evaluate usage in environments such as government and municipal institutions and schools would help expand the literature on digital resource usage.

5.8   The role of management

Management's support was identified as one of the key factors affecting system acceptance (Kwon and Zmud 1987:231). Igbaria et al. (1997:285) observed that the availability of adequate ICT infrastructure is greatly influenced by the management's view of the

technology and its importance to the overall functions of the organisation. Igbaria et al. (1997:285) explained that "management support is able to ensure sufficient allocation of resources and act as a change agent to create a more conducive environment for information system success". Management support was associated with greater system success. Lack of it was considered a critical barrier to the effective utilisation of information technology (Igbaria et al., 1997:285). In the present study, management supported use of computer technology by providing adequate ICT infrastructure even though it was not directed at digital library services. They were, however, positive about the development of a digital repository, stating that digital resources were important for research and its usage was now a popular practice that needed to be adopted. Furthermore, they supported the use of digital information because they saw it as a space-saving strategy and a way of preserving historical records of the organisation.

Although the findings of the study revealed that no budgets were ever set for the development of digital collections, management showed a positive attitude and assured the researcher that within the next 10 years, a growing collection of digital resources, partly through digitisation of historical material and subscription to relevant databases, will be witnessed. Management made it clear during interviews that the ORI Library was an important, unique resource for the organisation and for the community at large, giving the impression that they will be prepared to provide or motivate for the provision of adequate funding for the development of a digital repository to keep the library viable. Their understanding of the importance of digital resources was critical to the development of a digital information dissemination programme suitable for the organisation.

Miller and Toulouse (1986) observed that in small organisations like SAAMBR the CEO has greater influence on an organisation's performance than does the CEO of a bigger organisation. These authors noted that this may suggest that management support may be much more important in small organisations, where the CEO is commonly involved in most key decisions and was perhaps the only one who could harness information technology to corporate objectives and strategy (Miller and Toulouse 1986:1403). DeLone (1988) identified the determinants of success for computer usage in small organisations. One of his major findings was that the successful use of computers was strongly linked to CEO knowledge of computers and active involvement in computerisation efforts. Yap, Soh and Raman (1992)

found a positive correlation between system successes with CEO support. It was anticipated that SAAMBR, as a small organisation might also be influenced in the same manner, such that the usage of digital information may become acceptable and become a standard practice meant to improve access to resources, resulting in improved productivity within the organisation.

Apart from giving support and being actively involved in computerisation activities, management need to work closely with employees, as they are consumers of the service. When making decisions regarding the choice of databases and online resources to subscribe to, Doll, Hendrickson and Deng (1998:862) recommend that management need not rely only on experienced or expert users, because those who have only a limited general experience with computers and consider themselves novices are able to evaluate a focal application after a brief initial exposure. Consequently, SAAMBR management, including the librarian, should involve both experienced and inexperienced users to assess the relevance and usefulness of marine and aquatic digital sources available.

5.9   Prospects for the development of a digital repository

The purpose of a library is to provide information in the format that is most preferred by the users. This way, a library can stay relevant and useful to its intended users. Users at the ORI Library are showing a preference for digital resources, signalling a need to develop digital collections. The results of this study clearly indicated a need for increased access to digital resources. Bearing in mind that the ORI Library is allocated 1.35% of the overall SAAMBR budget each year, digital collections can be developed through digitisation and creating more records in electronic format. Instead of continuing with print subscriptions, the library can switch to online subscriptions, which are normally less expensive and might even be able to subscribe to more resources. Collaborations with institutions such as the CSIR, SAIAB and coastal universities will increase access to digital content through resource sharing. Most of these institutions have developed viable and comprehensive digital repositories which the ORI Library can benefit from. This way, a shift from print to online can become a success without causing huge expenses. There is need, however, to develop a digital collection policy which will guide the selection of content that is relevant to the library. A policy helps to standardise and harmonise the use of digital media in terms of access and storage. Furthermore, a clear understanding of copyright laws and digitisation is essential. Digitisation

embraces the act of copying and copyright law prohibits the copying of original material; understanding how digital records can be created without infringing the governing laws is a prerequisite.

Apart from developing the digital collection, there is need to look at facilitating conditions to access this collection. Setting up a digital repository requires more than networked computers; it also requires digital library system software. Use of open source digital library software, such as Dspace, makes it possible to build a digital library under poor economic conditions. With DSpace, the library can deposit all SAAMBR records that were created digitally and all digitised documents and make them available to a large group of community users. Documents such as staff scientific papers, ORI investigational reports, unpublished reports and ORI special publications can continually be made available using DSpace. Aquatic and marine science institutions such as the CSIR, KMFRI and a number of local universities have used this software to develop successful repositories.

Results showed that all respondents had over eight years of experience working with the computer and 16 (67%) did not require any training on the use of electronic resources. This means that training of users may not be a priority if there is a need to cut costs. However, it is important to train the librarian in the use of digital resources, so that users are able to receive adequate training and assistance on how to effectively use the available digital resources.

It can be concluded that prospects for the development of a digital library are high, because users are showing a preference for digital content, digital resources already exist and the organisation has in place most of the necessary resources needed for the deployment of a digital repository. Most libraries struggle to set up digital library systems, because high financial input is required to acquire the infrastructure, train staff, train users and develop the digital collection. The chances of developing a digital repository at the ORI Library are however high because the findings of this study revealed that management supports the use of digital information.

5.10   Summary of the discussion of findings

In view of the findings of the study, there is a strong indication that preference for digital resources at the ORI Library is being motivated by perceived ease of use, perceived

usefulness and a positive attitude towards digital content. Perceived ease of use was identified as the strongest determinant of electronic resource usage. The emergence of the knowledge economy that is largely driven by technological innovations was a contributing factor which forced users at the ORI Library to prefer the use of electronic resources. The availability of ICT infrastructure and high competence levels positively influenced the use of digital information. A lack of relevant information retrieval skills, adequate electronic resources and the absence of sufficient library ICT infrastructure hindered the effective use of electronic resources. Finally, the findings of this study strongly imply that the use of digital resources at the ORI Library can be improved as management is positive about digital resource usage and users are in favour of having a digital repository.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1   Introduction

The purpose of this study was to investigate predictors of users' preferences for digital information at the ORI Library. The study was conducted after the realisation that users were increasingly showing a preference for digital information in a library that had most of its stock in print format. The following research questions were addressed:

1. What are the predictors of users' preferences for digital information?
2. What is the attitude of users towards the use of digital information?
3. What competencies do users have in the use of digital information?
4. What ICT infrastructure is in place to facilitate access to digital information?
5. What are the usage patterns of electronic resources?

The study was underpinned by the TAM and used the mixed method paradigm. It is expected that results of this study could be used as a framework for improving digital information dissemination within the institution. This chapter presents a summary of the research findings, conclusions and recommendations.

6.2   Summary of the study

Chapter One provided an introduction to the study, by presenting a brief background on the use of digital information in libraries, particularly in marine and aquatic science libraries and information centres. A brief history of SAAMBR and ORI was presented. An outline of the research problem was discussed. Research questions, research objectives, significance of the study, the conceptual framework guiding the study and the delimitations of the study were discussed.

Chapter Two was dedicated to presenting the study's theoretical framework and literature review. The TAM was identified as the suitable model underpinning the study and reasons for choosing the model were explained. A wide range of empirical studies that employed this model were discussed. An overview of digital resource usage in aquatic and marine science

institutions in Africa and South Africa were presented. A literature review of electronic resource use in libraries was given.

Chapter Three explained the various methods used to collect data to answer the research questions. The study adopted the mixed method paradigm for a case study research design. The respondents of this study were the ORI employees, UKZN PhD and Masters students affiliated to the ORI and SAAMBR management. Data was collected using focus group discussions, interviews, observations, questionnaires and document reviews. Quantitative data was analysed manually, using descriptive statistics. Qualitative data was analysed thematically.

Chapter Four presented the results of the study on the predictors of the preferences of users for digital information at the ORI Library. The results were presented according to the research objectives of the study in the form of tables, figures, direct quotes and narrative statements.

Chapter Five discussed the findings in light of the key research questions of the study. The results of the study revealed that perceived ease of use, perceived usefulness and attitude towards use of digital information correlated with actual usage. Perceived ease of use was identified as the strongest motivator of electronic resource usage. The availability of ICT infrastructure and users' competency were external factors that gave rise to user preference for digital information. A shift in scholarly communication towards digital scholarship was identified as an important reason why users preferred digital information. Barriers to effective resource use were lack of skills, sufficient numbers of computers for the library and adequate digital resources. Overall, the results reflected a high usage of digital resources at the ORI Library, suggesting the need to enhance digital information, increase Internet bandwidth and train users on the effective use of digital resources.

6.3   Summary of the findings

The first research question sought to identify predictors of users' preferences for digital information. Quantitative and qualitative data to answer this question was gathered using questionnaires and focus group discussions. Using perceived ease of use and perceived usefulness to predict user preference, the study found that users' preference for digital

resources was mainly driven by users' perceived ease of use of digital information, while perceived usefulness also contributed to their behaviour. These results are discussed in Chapter Five, section 5.2. With regard to the perceived ease of use (see section 5.2.1), results revealed that respondents found digital resources to be easy to use and interact with. They were motivated by the speed at which they accessed information. In addition, the results showed that respondents strongly felt that digital information was flexible; it was mobile, they could share it, transfer it and sort it into a desired order. This was revealed by the total number of 22 (92%) of the respondents agreeing that digital resources were easy to use. As with perceived usefulness (see section 5.2.2), the results showed that the majority, 18 (75%) of the respondents, perceived digital content to be useful, saying that they were able to accomplish more tasks and this increased their work output. Six (25%) of the respondents did not perceive digital information to be useful because they felt that the issue of authenticity and quality of material found online could not be guaranteed. Online content was said to be prone to plagiarism. Overall, both perceived ease of use and perceived usefulness showed a correlation with usage, but the perceived ease of use was a stronger determinant of digital information usage than perceived usefulness. The availability of ICT infrastructure and high levels of competency made it easier for respondents to adopt the use of digital information, irrespective of the usefulness or ease of use of the resource.

The second research question sought to determine user attitude towards the use of digital resources. To predict user attitude, six questions were asked in the survey questionnaire and two questions in the focus group discussions. The study revealed that 21 (88%) of the respondents were positive about digital information (see section 5.2). They strongly believed it was a good idea to use digital resources, saying that it helped them to achieve their work goals more easily and allowed them to work faster and even remotely. Respondents felt that digital information was the way to go, as scholarly communication was tending towards digital scholarship. Only one (4%) had a negative attitude, arguing that use of digital information compromised the quality of research output, as scholars were not critically analysing information available online. SAAMBR management showed a positive attitude towards digital resources by recognising that electronic resources played an important role in research, which is one of the core functions of the organisation. They also believed that use of digital resources was a space-saving strategy. Their positive attitude was also revealed by their intentions to see a growing focus on the development of electronic resources, so that the ORI Library can become one of the best e-resource libraries in the region. Like other

respondents, they were concerned about non-critical use and plagiarism associated with the use of digital information. Ultimately, a relationship between attitude and usage was clearly established; with 21 (88%) of the respondents showing a positive attitude towards digital information and usage being generally high.

The third research question sought to establish users' levels of competence in the use of digital resources (see section 5.4.2). Focus group discussions, observations and questionnaires were used to gather qualitative and quantitative data to measure user competence. Results showed that users had general experience in using computers which they applied to access digital resources. Almost all respondents, 23 (96%) had not received any training on the use of digital resources, but depended on their general experience and helping hints provided by various databases to retrieve information. The results indicated that respondents were not competent enough to fully exploit the digital resources available to them. Interviews with the management revealed that there were no funds allocated for capacity building with regards to digital resource usage in the organisation.

The fourth research question investigated the ICT infrastructure available within the organisation, to facilitate access to digital resources. Relevant data was gathered using observations, focus group discussions, questionnaires and interviews to glean data on ICT infrastructure. The results revealed that there were desktops, laptops, the Internet, Local Area Network (LAN), scanners and printers (see section 5.4.1). Respondents in this study indicated they had adequate facilities to allow them access. They all had networked computers in their offices, through which they accessed digital resources provided by the library. However, respondents were worried about the low bandwidth connection, which restricted them from accessing online resources timeously. Results showed that the library did not have adequate computers to cater for those library users who did not have computers in their offices, as well as those who came from outside the organisation.

The fifth research question intended to establish the usage patterns of digital information. Data was gathered using focus group discussions, document reviews, questionnaires and observations. The results disclosed that usage of digital resources was high (see section 5.5). The findings were that respondents spent considerable time working with a variety of digital resources, which included electronic journals, electronic books, databases, websites and

search engines. Results further revealed that usage could be improved by developing a centralised digital repository and increasing the availability of digital resources through subscriptions to relevant databases, creating records electronically, collaboration with other organisations for resources-sharing and digitisation of existing records available in print. Usage could also be improved by training users in the effective use of digital information, as well as purchasing more computers for the library, to increase visibility.

6.4   Conclusions about the study

The literature reviewed on the subject under study showed paucity of research on the predictors of users' preferences for digital information, especially in marine and aquatic libraries. Studies of digital information adoption in libraries in general are still very limited within the southern African region. Overall, the study revealed that the TAM is a valid framework that can be used to predict technology acceptance. Conclusions on each research objective are discussed below.

The first objective of the study was to determine predictors of users' preferences for digital resources. Using perceived ease of use and perceived usefulness to predict what motivated usage behaviour, the study found that users felt it was easy to use digital resources and they felt the resource was useful. However, perceived ease took on increased importance over perceived usefulness. It can be concluded that digital resources were being used because they were perceived as easy and useful by the respondents. Preference was also necessitated by scholarly communication that was tending towards digital. A massive increase in the amount of digital resources freely available online made it easier to conduct their researches.

The second objective focussed on examining user attitude towards the use of digital information. Using the TAM's attitude construct to measure this variable, the study revealed that the majority of users had a positive attitude towards digital resources, because they believed it was easy to use and also useful to some extent.

The third objective sought to evaluate user competence in the use of digital information. The findings revealed that, although users had gained considerable experience over years on general computer use, they did not possess the skills necessary to effectively utilise digital resources. This was because they did not receive any training specifically for online

information retrieval. This brings the conclusion that their ability to use digital resources was a result of their exposure to the system. Therefore users were not effectively using the available digital resources because they did not possess the necessary skills needed to access digital resources.

The fourth objective evaluated ICT infrastructure in place, to facilitate access to digital information. The results showed that respondents of this study had adequate ICT infrastructure connected to their offices, but computer terminals for accessing digital resources within the library premises were few. With only three computers available for use, dissatisfaction in terms of access is inevitable, as these cater for all employees of the organisation, as well as external users. The chances are quite high that resources are being under-utilised, because only a few machines are available for service in the library.

The final objective investigated usage patterns of digital resources. It was revealed that usage of digital information was high, as users spent considerable time consulting digital resources for work-related purposes. Resources that were being used included electronic journals, databases and search engines to locate the required information. Scanning of documents and e-mail requests for digital content were common. A conclusion can be drawn that use could be even higher and more effective if access to digital resources could be widened, more computers could be purchased for the library and users trained on information retrieval skills.

6.5   Recommendations

The recommendations proffered below are based on the findings of each research question on predictors of preferences of users for digital information at the ORI Library.

6.5.1 Building a digital collection

Objective five of this study assessed the usage patterns of digital resources and the findings revealed high usage of digital information. An appeal was made by users to develop a centralised digital collection. The fact that users scan and keep vast numbers of electronic documents individually makes it difficult to share the resources, as no proper system is in place to house these resources. ActiveConnect is merely a catalogue and a link to a small number of electronic documents that can only be accessed internally. This study recommends the development of a digital library to cater for the increased demand for digital resources.

Scholarly communication the world over is tending towards digital and most institutions within the aquatic and marine science have adopted the new technology, with many using free open source library software such as DSpace to build digital collections. As a way to reduce the strain on the limited financial resources that face many libraries, this study suggests that digital collections at the ORI Library can be developed by shifting from print to online journal subscriptions, purchasing of e-books instead of printed copies, collaborating with other marine institutions for resource sharing, digitising existing analogue records and creating more records in digital format by encouraging scientists to provide electronic versions of their published and unpublished works. Viable digital repository can better be developed with the help of a collection development policy and by taking advantage of open access publishing.

6.5.2   Training of library users

The third objective of the study sought to evaluate user competencies in the use of digital resources. The findings revealed that respondents had general experience in the use of computers and the majority had not received any training in the use of digital information (see section 5.4.2). This means that users were not effectively making full use of the digital resources, because they relied on their general knowledge to access information. The researcher recommends that user training be considered one of the core activities when introducing digital resources, because users need to be skilful when using and accessing digital information. Dutton (1990:2) recommended training, stressing that the skills required to search electronic resources are much greater than those required for searching print material, which most users are familiar with. Knowledge of the structure of the database and the instructions which must be input into the computer by the user, as well as an understanding of the ways in which the instructions are linked with one another, are some of the unique skills required (Ozoemelem 2009). Having such skills will improve user interaction with the system and increase resource usage. Ultimately, training increases user confidence and reduces levels of anxiety with a system (Brown 2002:15).

Training can also be extended by bringing awareness of the electronic resources available. Users are often not aware of what is available to them and, worse still, are not interested in receiving training. This was revealed in the present study, where some respondents were not even aware that digital resources existed (see section 4.7.1). Increasing awareness of the services available to ensure the effective use of electronic resources should be adopted

(Ahmed 2013:304). Awareness of electronic resources is very important for high patronage and this is recommended in studies by Ibrahim (2004) and Madhusudhan (2010).

6.5.3   Acquisition of more computers for the library

The fourth objective of the study examined ICT infrastructure in place to facilitate access to digital resources. The results showed that, although the organisation had networked computers for individual offices, the library was lacking adequate computers to facilitate access to digital information by library users (see section 5.4.1). Having so few computers for a research library gives the impression that electronic resources are being under-utilised. This study recommends that the library increases the number of computers, to allow multiple users access to online information. Increasing the number of computers increases the visibility of digital information. The results on infrastructure revealed that bandwidth was low. Although it may be difficult to increase bandwidth because of the cost implications, the need can be minimised by creating a digital repository that can run within the end-user's Web browser, so that interaction with the server is reduced. Users can download online resources off a local device, without necessarily having to connect to the Internet.

6.6   Suggestions for further research

Usage findings revealed that there is a need to develop a digital library at ORI. Given the prominence of digital resource use among ORI Library users', it would be important to investigate the issues involved in the establishment of a digital library. This will enlighten on the requirements such as financial and human input.

Findings of this study revealed that there was a general feeling that scholars are misusing digital resources and taking shortcuts in their literature searches, resulting in plagiarism and misuse of digital information. As a result, researchers have developed mixed feelings about the usefulness of digital information and are questioning the importance of such a resource. An evaluative study to support or refute the notion that the quality of research output is being compromised by use of electronic resources would help to guide future use and free the minds of many concerned scholars.

This study explored how the TAM variables influence actual usage of a system at a given time. As technology continuously changes and user services are improved, there is a need to

establish how such changes affect user interaction with a system. This gap in the literature needs to be filled by examining the magnitude of effects caused by such changes and exposing the different influences on the TAM variables and its correlations to actual use.

REFERENCES

Adams, D., R. Nelson and P. Todd. 1992. Perceived usefulness, ease of use, and usage of information technology: a replication. *MIS Quarterly*, 16(2): 227-247.

Agarwal, R. and J. Prasad. 1999. Are individual differences germane to the acceptance of new information technologies? *Decision Sciences*, 30(2): 361-391.

Agolla, I. 2011. Discovering and sharing information on the use of e-resources to enhance the use of scientific literature: case study of the Kenya Marine and Fisheries Research Institute library, Kenya. Paper read at the 37th IAMSLIC & 5th AFRIAMSLIC Conference held in Zanzibar, Tanzania, 16th-21st October. http://www.darchive.mblwhoilibrary.org/bitstream/handle/1912/5330/Agolla2011.pdf?sequence=1 Accessed 12 Marc 2013

Ahmed, S.M.Z. 2013. Use of electronic resources by the faculty members in diverse public universities in Bangladesh. The Electronic Library, 31(3): 290-312.

Aina, L.O. 2002. General issues in research. In: Aina, L.O. ed. *Research in Information Sciences: an African Perspective*. Ibadan: Stirling-Horden Publishers, pp.185-200.

Ajzen, I. 1985. From intentions to actions: a theory of planned behaviour. In J. Kuhl and J. Beckmann, eds. *Action Control: From Cognition to Behaviour.* New York: Springer-Verlag. pp. 11–39.

Ajzen, I. and M. Fishbein. 1980. Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall.

Ako-Nai, S.A.M. 2005. Executive information systems: an identification of factors likely to affect user acceptance, usage and adoption of the Unilever EIS. MIS thesis. Durban. University of KwaZulu-Natal.

Ali, N. 2005. The use of the electronic resources at IIT Delhi Library: a study of search behaviours. *The Electronic Library*, 23(6): 691-700.

Amollo, B.A. 2011. Digitisation for libraries in Kenya. Paper read at the 2nd International Conference on African Digital Libraries and Archives (ICADLA-2) held in Johannesburg at University of the Witwatersrand, 14-18 November. http://www.wiredspace.wits.ac.za/bitstream/handle/10539/11485/Amollo%20-%20Digitization%20for%20libraries%20in%20Kenya.pdf?sequence=1 Accessed 3 January 2013

Anandarajan, M., M. Igbaria and U. Anakwe. 2002. IT acceptance in a less-developed country: a motivational sector perspective. *International Journal of Information Management*, 22(1): 47-65.

Armstrong, C. and R. Lonsdale. 2007. *A general overview of the e- resource industry in: UK Serials Group: The e-resources management handbook* [Online]. http://www.serials.uksg.org/link.asp?id=3D6tuu9n7wfl18 Accessed 23 June 2012.

Averweg, U. 2008. Information technology acceptance in South Africa: an investigation of perceived usefulness, perceived ease of use and actual system use constructs. *The African Journal of Information Systems*, 1(1): 44-66.

Averweg, U. 2011. Information technology adoption in a selected area of South Africa: synthesising two surveys findings. *African Scientist*, 12(4): 193-200.

Babbie, E. and J. Mouton. 2001. *The practice of social research.* Oxford: Oxford University Press.

Babbie, E. and J. Mouton. 2007. *The practice of social research: South African edition.* Oxford: Oxford University Press.

Bailey, K.D. 1994. *Methods of social research.* 4th ed. New York: The Free Press.

Bertrand, M. and S. Bouchard. 2008. Applying the technology acceptance model to VR with people who are favourable o its use. *Journal of Cyber Therapy and Rehabilitation*, 1(2): 200-210.

Biney, C.A. 2005. Coping with the digital age in aquatic and marine science libraries in developing countries. In Kofie, R.Y. and S.K. Yiborku, eds. *Coping with the digital age in Aquatic and Marine Science Libraries in developing countries, 2nd Africa Regional Group Conference, 13-15 September.* Accra, Ghana, pp. 15-16.

Birley, G. and N. Moreland. 1998. *A practical guide to academic research.* London: Routledge.

Bless, C. 2000. *Fundamentals of social research.* Kenwyn: Juta.

Bostrom, R.P., L. Olfman and M.K. Sein. 1990. The importance of learning style in end user training. *MIS Quarterly*, 14(1): 101-119.

Bowen, G.A. 2009. Document analysis as a qualitative research method. *Qualitative Research Journal,* 9(2): 27-40.

Brophy, P. 1993. Networking in British academic libraries. *British Journal of Academic Librarianship*, 8(1): 49-60.

Brown, I.T.J. 2002. Individual and technological factors affecting perceived ease of use of web-based learning technologies in a developing country. *The Electronic Journal of Information Systems in Developing Countries*, 9(5):1-15. http://www.ejisdc.org/ojs2/index.php/ejisdc/article/viewFile/50/50 Accessed 12 July 2012.

Bryman, A. 2012. *Social research methods.* 4th ed. Oxford: University Press.

Carey, M. 1994. The group effect in focus groups: planning, implementing and interpreting focus group research. In Morse J., ed. *Critical issues in qualitative research methods.* London: Sage Publications, pp. 225-241.

Chau, P. 1996. An empirical assessment of a modified technology acceptance model. *Journal of Management Information Systems,* 12(2): 185-204.

Charnkit, P. 2010. Using the Technology Acceptance Model to investigate knowledge conversion in Thai public organisations. PhD thesis. Melbourne: Victoria University
http://www.vuir.vu.edu.au/16104/1/Puripat_Chamkit_DBA.pdf
Accessed 17 November 2012.

Chinyamurindi, W.T. and G.J. Louw. 2010. Gender differences in technology acceptance in selected South African companies: implications for electronic learning. *South African Journal of Human Resources Management*, 8(1): 1-7.

Chirra, R. and M. Madhusudhan. 2009. Use of electronic journals by doctoral research scholars of Goa University, India. *Library Hi Tech News*, 26(10): 12-15.

Choi, D. H., J. Kim and S.H. Kim 2007. ERP training with a web – based electronic learning system: the flow theory perspective. *International Journal of Human-Computer Studies,* 65: 223-43.

Chuttur, M.Y. 2009. Overview of the technology acceptance model: origins, developments and future directions. *Sprouts: Working Papers on Information Systems*, 9: 9-37.

Collins, J. 2007. Information sharing via aquatic commons. *FAO Aquaculture Newsletter* 37: 14-15.

Collins, J. and A. Gribling. 2007. Targeting European inland fisheries and aquaculture institutions for the aquatic commons. In Konjevic, S., M. Mayer and J. Haspeslagh, J. eds. *From treasures of the seas - To treasures of the Libraries: 12th Biennial Meeting of the European Association of Aquatic Science Libraries and Information Centres (EURASLIC), 2-4 May.* Krimskoe Primor'e, Crimea, Ukraine, [CD-ROM] pp. 1-2.

Collins, K.J., G.M. du Plooy, M.M. Grobbelaar, C.H. Puttergill, M.J. Terre Blanche, G.H. van Eeden and D.J. Wigston. 2000. *Research methods in the social sciences*. Pretoria: University of South Africa.

Connaway, L.S. and T.J. Dickey. 2010. *The digital information seeker: report of findings from selected OCLC, RIN and JISC user behaviour projects*. England: JISC.

The Council for Scientific and Industrial Research. 2013. CSIR Information Services (CSIRIS).
http://www.csir.co.za/csiris/ Accessed 18 May 2013

Creswell, J.W. 1994. *Research design: qualitative and quantitative approaches*. London: Sage.

Creswell. J.W. 2003. *Research design: qualitative, quantitative and mixed methods approaches*. 2nd ed. London: Sage.

Creswell, J.W. and V.L.P. Clark. 2011. *Designing and conducting mixed methods research*. 2nd ed. Thousand Oaks: Sage.

Crotty, M. 1998. *The foundations of social research: meaning and perspective in the research process.* London: Sage.

CSIR *see* The Council for Scientific and Industrial Research.

David, M. and C.D. Sutton. 2011. *Social research: an introduction.* 2ⁿᵈ ed. Los Angeles: Sage.

Davis, F.D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3): 319-340.

Davis, F.D. 1993. User acceptance of information technology: system characteristics, user perceptions and behavioral impacts. *International Journal of Man-Machine Studies*, 38:475-487.

Davis, F.D. and V. Venkatesh. 1996. A critical assessment of potential measurement biases in the technology acceptance model: three experiments. *International Journal of Human-Computer Studies,* 45: 1996, 19-45.

Davis, F.D., R.P. Bagozzi and P.R. Warshaw. 1989. User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, 35: 982-1003.

DeLone, W.H. 1988. Determinants of success for computer usage in small firms. *MIS Quarterly*, 12(1): 51-61.

Deng, H. 2010. Emerging patterns and trends in utilising electronic resources in a higher education environment: an empirical study. *New Library World*, 111(3/4): 87-103.

Denscombe, M. 1998. *The good research guide for small-scale social research projects.* Buckingham: Open University Press.

Denzin, N.K. and Y.S. Lincoln, eds. 1998. *Collecting and interpreting qualitative materials.* Thousand Oaks: Sage publications.

Dhanavandan, S., S.M. Esmail and M. Nagarajan. 2012. Access and awareness of ICT resources and services in medical college libraries in Puducherry. *Library Philosophy and Practice (e-journal).* Paper 750. http://www.digitalcommons.unl.edu/libphilprac/750/ Accessed 13 September 2012.

Doll, W.J., A. Hendrickson and X. Deng. 1998. Using Davis's perceived usefulness and ease-of-use instruments for decision making: a confirmatory and multigroup invariance analysis. *Decision Sciences,* 29(4): 839-869.

Dutton, B.G. 1990. An introduction to end-user searching. In Bysouth, P.T., ed. *End-user searching: the effective gateway to published information.* London : Aslib, pp. 1-18.

Egberongbe, H.S. 2011. The use and impact of electronic resources at the University of Lagos. *Library Philosophy and Practice (*e-journal). http://www.digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1490&context=libphilprac Accessed 17 June 2013.

Endra, A. 2011. The role of the National Fisheries Institute (NaFIRRI) information centre in disseminating information to researchers and educators. Paper read at the 37th IAMSLIC & 5th AFRIAMSLIC Conference held in Zanzibar, Tanzania, 16-20 October. https://www.darchive.mblwhoilibrary.org/bitstream/handle/1912/5324/Endra2011.pdf?sequence=1 Accessed 19 April 2013.

FAO *see* Food and Agricultural Organisation of the United Nations

Farhoomand, A.F. 1992. Scientific progress of management information systems. In Galliers, R.D. ed. *Information systems research: issues, methods and practical guidelines.* Oxford: Blackwell Scientific Oxford, pp. 93-111.

Finlayson, A.J. 2010. Patterns of use of web-based library e-resources among students on the Howard College Campus of the University of KwaZulu-Natal. MIS thesis. Durban: University of KwaZulu-Natal.

Fishbein, M. and I. Ajzen. 1975. *Belief, attitude, intention and behavior: an introduction to theory and research.* Reading, MA: Addison-Wesley.

Fontana, A. and J.H. Frey. 2005. The interview: from neutral stance to political involvement. In Denzin, N.K. and Y.S. Lincoln, eds. *The sage handbook of qualitative research.* 2nd. ed. Thousand Oaks, CA: Sage, pp. 695–727.

Food and Agricultural Organisation of the United Nations. 2009. *Information and knowledge sharing.* Rome: FAO.

Francis, H. 2008. Digital libraries: opportunities and challenges for the English-speaking Caribbean. *Information Development,* 24: 143-150.

Gerring, J. 2007. *Case study research: principles and practices.* Cambridge: University Press.

Glanz, K., B.K. Rimer and K. Viswanath, eds. 2008. *Health behaviour and health education: theory, research, and practice.* 4th ed. San Francisco, CA: Jossey-Bass.

Godin, G. 1994. Theories of reasoned action and planned behaviour: usefulness exercise promotion. *Medicine and Science in Sports and Exercise*, 94: 1391-1394.

Gowda, V. and D. Shivalingaiah. 2009. Attitude of research scholars towards usage of electronic information resources: a survey of the university libraries in Karnataka. *Annals of Library and Information Studies*, 56: 184-191.

Gray, D.E. 2009. *Doing research in the real world*. 2nd ed. Los Angeles: Sage.

Haas, S., P. Merrikin, A. Gribbling and F. Merceur. 2009. The aquatic commons model: the roles of IAMSLIC, FAO and IFREMER in supporting open access to fisheries and aquaculture management. http://www.conference.ifla.org/past/ifla75/101-haas-en.pdf Accessed 21 March 2013.

Harun, N.H. 2010. Digital libraries initiatives in Malaysia: readiness and perceived conditions for future growth. MSc thesis. Kuala Lumpur: University of Malaya. http://www.dspace.fsktm.um.edu.my/xmlui/handle/1812/1054?show=full Accessed 9 July 2012.

Heeks, R. 2002. Information systems and developing countries: failure, success, and local improvisations. *The Information Society*, 18: 101-112.

Henderson, R. and M.J. Divett. 2003. Perceived usefulness, ease of use and electronic supermarket use. *International Journal of Human-Computer Studies*, 59: 383-395.

Hollingum, J. 2013. Collection development policies in law firm libraries: do we need them? *Legal Information Management*, 13(1): 62-65.

Hobbis, I.C.A. and S. Sutton, S. 2005. Are techniques used in cognitive behaviour therapy applicable to behaviour change interventions based on the theory of planned behaviour? *Journal of Health Psychology*, 10(1): 7-18.

Hong, W.Y., J.Y.L. Thong, W.M. Wong and K.Y. Tam. 2002. Determinants of user acceptance of digital libraries: an empirical examination of individual differences and system characteristics. *Journal of Management Information Systems*, 18(3): 97-124.

Hsieh-Yee, I. 1993. Effects of search experience and subject knowledge on the search tactics of novice and experienced searchers. *Journal of the American Society for Information Science,* 44(3): 161-174.

Hussey, J. and R. Hussey. 1997. *Business research: a practical guide for undergraduate and postgraduate students.* Palgrave: Basingstoke.

Iacovou, C.L., I. Benbasat and A.A. Dexter. 1995. Electronic data interchange and small organisations: adoption and impact of technology. *MIS Quarterly*, 19(4): 465-485.

Ibeun, M.O. 2011. Contributions of African countries to the development of the aquatic commons repository and the challenges in searching for information. Paper read at the 37th IAMSLIC & 5th AFRIAMSLIC Conference held in Zanzibar, Tanzania, 16-20 October. https://www.darchive.mblwhoilibrary.org/bitstream/handle/1912/5308/Ibeun2011.pdf?sequence=1 Accessed 12 May2013

Ibrahim, A.E. 2004. Use and user perception of electronic resources in the United Arab Emirates University (UAEU). *Libri*, 54: 18-29.

Igbaria, M. and M. Tan. 1997. The consequences of information technology acceptance on subsequent individual performance. *Information and Management*, 32(2): 113-121.

Igbaria, M., N. Zinatelli, P. Cragg and A.L.M. Cavaye. 1997. Personal computing acceptance factors in small firms: a structural equation model. *MIS Quarterly*, 21(3): 279-305.

Jackson, C.M., S. Chow and R.A. Leitch. 1997. Toward an understanding of the behavioural intentions to use an information system. *Decision Sciences*, 28: 357-389.

Johnson, R.B. and A.J. Onwuegbuzie. 2004. Mixed methods research: a research paradigm whose time has come. *Educational Researcher*, 33(7): 14-26.

Kim, Y.J., J.U. Chun and J. Song. 2009. Investigating the role of attitude in technology acceptance from an attitude strength perspective. *International Journal of Information Management*, 29: 67-77.

Kripanont, N. 2007. Examining a technology acceptance model of Internet usage by academics within Thai Business Schools. PhD Thesis, Melbourne, Victoria University. http://www.vuir.vu.edu.au/1512/1/Kripanont.pdf Accessed 6 January 2008.

Kumar, S. and M. Singh. 2011. Access and use of electronic information resources by scientists on National Physical Library in India: a case study. *Singapore Journal of Library & Information Management*, 40:33-49.

Kwon, T.H. and R.W. Zmud. 1987. Unifying the fragmented models of information systems Implementation. In Boland, R.J. and R.A. Hirshheim, eds. *Critical issues in information systems research.* New York: John Wiley, pp. 227-251.

Kvale, D. 1996. *Interviews*. London: Sage.

Lederer, A.L., D.J. Maupin, M.P. Sena and Y.L. Zhuang. 2000. The technology acceptance model and the world wide web. *Decision Support Systems*, 29(3): 269-282.

Lee, Y., K.A. Kozar and K.R.T. Larsen. 2003. The technology acceptance model: past, present and future. *Communications of the AIS*, 12(50): 752-780.

Legris, P., J. Ingham and P. Collerette. 2003. Why people use information technology? a critical review of technology acceptance model. *Information and Management,* 40(1/2): 191-204.

Macharia, J. 2005. Improving access to fisheries and aquaculture grey literature in Kenya. In Kofie, R.Y. and S.K. Yiborku, eds. *Coping with the Digital Age in Aquatic and Marine Science Libraries in Developing Countries, 2nd Africa Regional Group Conference, 13-15 September.* Accra, Ghana, pp. 87-90.

Madhusudhan, M. 2010. Use of electronic resources by research scholars of Kurukshetra University. *The Electronic Library*, 28(4): 492-506.

Masrom, M. 2007. Technology acceptance model and e-learning. Paper read at the 12th International Conference on Education held in Malaysia at Universiti Brunnei Darussalam , 21-24 May.
http://www.eprints.utm.my/5482/1/MaslinMasrom2006_Techn.pdf Accessed 12 May 2013

Mathieson, K. 1991. Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research*, 2(3): 173-191.

Miller, D. and J-M. Toulouse. 1986. Chief executive personality and corporate strategy and structure in small firms. *Management Science,* 32(11): 1389-1409.

Miller, J. and O. Khera. 2010. Digital library adoption and the technology acceptance model: a cross-country analysis. *The Electronic Journal on Information Systems in Developing Countries*, 40(6): 1-19.

Morgan, D. 1996. Focus groups. *Annual Review Sociology,* 22: 129–152.

Mouton, J. 1996. *Understanding social research*. Pretoria: Van Schaik.

Mulla, K.R. 2011. Use of electronic resources by faculty members in HKBK College of Engineering: a survey. *Library Philosophy and Practice* (e-journal). http://www.digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1625&context=libphilprac Accessed 16 September 2013.

National Oceanography Centre Southampton. 2013. The National Oceanographic Library. http://www.noc.ac.uk/national-oceanographic-library Accessed 21 May 2013.

Ndinoshiho, J.M. 2010. The use of electronic information services by undergraduate nursing students at the University of Namibia's northern campus: a descriptive study. *Information Development,* 26(1): 57-65.

Neumann, W.L. 2000. *Social research methods: qualitative and quantitative approaches*. 4th ed. Boston: Allyn & Bacon.

Neumann, W.L. 2006. *Social research methods: qualitative and quantitative approaches.* 6th ed. Boston: Pearson Education.

Nov, O. and C. Ye. 2008. Users' personality and ease of use of digital libraries: the case for resistance to change. *Journal of the American Society for Information Science and Technology*, 59(5): 845-851.

Nyika, E.A. 2009. African marine science repository for the electronic publications (OceanDocs): experience of the Institute of Marine Science, University of Dar es Salaam, Tanzania. Paper read at African Digital Scholarship & Curation Conference held in Pretoria at CSIR Conference Centre, 12-14 May. http://www.ais.up.ac.za/digi/docs/nyika_paper.pdf Accessed 2 November 2012

Ozoemelem, O.A. 2009. Use of electronic resources by postgraduate students of the Department of Library and Information Science of Delta State University, Abraka, Nigeria. *Library Philosophy and Practice*. http://www.webpages.uidaho.edu/~mbolin/obuh-alex.html Accessed 14 July 2013.

Pan, C-C., S. Sivo, G. Gunter and R. Cornell. 2005. Students' perceived ease of use of an elearning management system: an exogenous or endogenous variable? *Journal of Educational Computing Research,* 33(3): 285-307.

Patton, M.Q. 2002. *Qualitative research and evaluation methods*. 3rd ed. Thousand Oaks, CA: Sage Publications.

Park, N., R. Roman, S. Lee and J.E. Chung. 2009. User acceptance of a digital library system in the developing countries: an application of the technology acceptance model. *International Journal of Information Management*, 29: 196-209.

Peters, D. A. 1993. Improving quality requires consumer input: using focus groups. *Journal of Nursing Care Quality,* 7: 34–41.

Pettigrew, A.M. 1985. Contextualist research and the study of organizational change processes. In Mumford, E., R. Hirschheim, G. Fitzgerald and A.T. Wood-Harper, eds. *Research Methods in Information Systems.* Amsterdam: North Holland, pp. 53-78.

Polit, D.F. and B.P Hungler. 1999. *Nursing research: principles and methods*. 6th ed. Philadelphia: Lippincott.

Porter, C.E. and N. Donthu. 2006. Using the technology acceptance model to explain how attitudes determine Internet usage: the role of perceived access barriers and demographics. *Journal of Business Research*, 59: 999-1007.

Powell, R. 1997. *Basic research methods for librarians*. 3rd ed. Greenwich, Conn.: Ablex.

Ray, K. and J. Day. 1998. Student attitudes towards electronic information resources. *Information Research*, 4(2). http://www.informationr.net/ir/4-2/paper54.html Accessed 16 August 2013

Raymond, L. 1988. The impact of computer training on the attitudes and usage behaviour of small business managers. *Journal of Small Business Management,* 26(3): 8-13.

Renwick, S. 2005. Knowledge and use of electronic information resources by medical sciences faculty at the University of the West Indies. *Journal of Medical Library Association,* 93(1): 21-31.

Robson, C. 2002. *Real world research*. 2nd ed. Oxford: Blackwell.

SAAMBR *see* South African Association for Marine Biological Research.

Salanje, G.F. 2007. Managing grey literature in fisheries and aquaculture information: experiences in Malawi. Paper read at the 33rd IAMSLIC Conference and 17th Annual SAIL Meeting, Sarasota, Florida, 7-11 October. http://www.community.eldis.org/.59ee3fb9/Managing%20Grey%20Literature.pdf   Accessed 1 May 2013

Saunders, M., P. Lewis and A. Thornhill. 2000. *Research methods for business students*. 2nd ed. Harlow, Essex : Pearson Education.

Segars, A.H. and V. Grover. 1993. Re-examining perceived ease of use and perceived usefulness: a confirmatory factor analysis. *MIS Quarterly,* 17: 517-525.

Shaw, M. 2007. Broadening e-access to resources at the South African Institute for Aquatic Biodiversity (SAIAB). In Konjevic, S., M. Mayer and J. Haspeslagh, J. eds. *From Treasures of the Seas - To Treasures of the Libraries: 12th Biennial Meeting of the European Association of Aquatic Science Libraries and Information Centres (EURASLIC), 2-4 May.* Krimskoe Primor'e, Crimea, Ukraine, [CD-ROM] pp. 1-11.

Shroff, R.H., C.C. Deneen and E.M.W. Ng. 2011. Analysis of the technology acceptance model in examining students' behavioural intention to use an e-portfolio system. *Australian Journal of Educational Technology*, 24(4): 600-618.

Silva, P.M. and G.A. Dias. 2007. Theories about technology acceptance: why the users accept or reject the information technology? *Brazilian Journal of Information Science*, 1(2): 69-86.

Smith, J.G. 2007. The impact of electronic communications on the science communication process — investigating crystallographers in South Africa. *IFLA Journal*, 33(2): 145-159.

South African Association for Marine Biological Research. 2006. Wise resource management and biodiversity conservation. *SAAMBR Bulletin* 31: 6-8.

South African Association for Marine Biological Research. 2008. Oceanographic Research Institute. *SAAMBR Bulletin* 33: 5-8.

South African Association for Marine Biological Research. 2009. SAAMBR vision and commitment. *SAAMBR Bulletin* 34: 2.

South African Association for Marine Biological Research. 2011. 60 years of marine conservation. *SAAMBR Bulletin,* 36:2-4.

Sujatha, H.R. and Murthy, H.S. 2010. End-user training on the utilization of electronic information sources in fisheries sciences institutions in South India. *The Electronic Library*, 28(5): 741-754.

Sujatha, H.R. and M.V. Mudhol. 2006. Electronic information resources on fisheries: a study. *Annals of Library and Information Studies*, 53: 96-102.

Suki, N.M. and N.M. Suki. 2011. Exploring the relationship between perceived usefulness, perceived ease of use, perceived enjoyment, attitude and subscribers' intention towards using 3G mobile services. *Journal of Information Technology Management*, 22(1):1-7.

Swain, D.K. 2010. Students keenness on use of the e-resources. *The Electronic Library*, 28(4): 580-591.

Tahir, M.M.K. and F. Shafique. 2010. Use of electronic information resources and facilities by humanities scholars. *The Electronic Library*, 28(1):122-136.

Takona, P.J. 2002. *Educational Research Principles and Practice*. Lincoln: Writers Club Press.

Taylor, S. and P.A. Todd. 1995. Understanding information technology usage: a test of competing models. *Information Systems Research*, 6: 144-176.

Tammaro, A.M. 2008. User perceptions of digital libraries: a case study of Italy. *Performance Management and Metrics,* 9(2): 130-137.

Tashakkori, A. and C. Teddlie. 2003. *Handbook of mixed methods in social and behavioural research*. Thousand Oaks: Sage.

Teddlie, C. and A. Tashakkori. 2009. *Foundations of mixed methods research: integrating quantitative and qualitative approaches in the social and behavioral sciences*. Thousand Oaks, CA: Sage.

Tella, A. 2011. Predicting user's acceptance of e-library from the perspective of technology acceptance model. *International Journal of Digital Systems*, 2(4): 34-44.

Teo, T., B.C. Lee, C.S. Chai and S.L. Wong. 2009. Assessing the intention to use technology among pre-service teachers in Singapore: a multigroup invariance analysis of the Technology Acceptance Model (TAM). *Computer Education*, 53:1000-1009.

Terre Blanche, M., K. Durrheim and D. Painter. 2006. *Research in practice: applied methods for the social sciences*. 2nd ed. Cape Town: University of Cape Town Press.

Thong, J.Y.L., W. Hong and K-Y. Tam. 2002. Understanding user acceptance of digital libraries: what are the roles of interface characteristics, organisational context and individual differences? *International Journal of Human-Computer Studies*, 57: 215-242.

Tyler, K. and N.B. Hastings. 2011. Factors influencing virtual patron satisfaction with online library resources and services. *The Journal of Educators Online*, 8(2): 1-33. http://www.thejeo.com/Archives/Volume8Number2/TylerandHastingsPaper.pdf Accessed 3 February 2013.

Vaidyanathan, G., A Sabbaghi and M. Bargellini. 2005. User acceptance of digital library: an empirical exploration of individual and system components. *Issues in Information Systems*, 6(2): 279-285.

Van der Heijden, H. 2001. Factors influencing the usage of websites: the case of a generic portal in the Netherlands. https://www.domino.fov.uni-mb.si/proceedings.nsf/0/6f0c1ac2361a3b16c1256e9f002fab84/$FILE/11_Heijden.pdf Accessed 14 May 2013.

Vaughn, S., J.S. Schumm and J. Sinagub. 1996. *Focus group interviews in education and psychology*. Thousand Oaks: Sage.

Venkatesh, V. 2000. Determinants of perceived ease of use: integrating control, intrinsic motivation and emotion into the technology acceptance model. *Information Systems Research,* 11(4): 342-365.

Venkatesh, V. and F.D. Davis. 1996. A model of the antecedents of perceived ease of use: development and test. *Decision Sciences*, 27(3): 451-481.

Venkatesh, V., M.G. Morris and P.L. Ackerman. 2000. A longitudinal field investigation of gender differences in individual technology adoption decision making processes. *Organizational Behavior and Human Decision Processes*, 83: 33-60.

Venkatesh, V., M.G. Morris, G.B. Davis and F.D. Davis. 2003. User acceptance of information technology: toward a unified view. *MIS Quarterly,* 27(3): 425-478.

Webster, J.G. and D. Bartley. 2006. Information for responsible fisheries: libraries as mediators: synthesis of Thursday 13 October – 'Fisheries Day' and continued cooperation between IAMSLIC and FAO. In Anderson, K.L. and C. Thiery eds*. Information for Responsible Fisheries: Libraries as Mediators, 31st IAMSLIC Annual Conference, 10 – 14 October*. Rome, pp.265-276.

Yap, C.S., P.P. Soh and K.S. Raman. 1992. Information systems success factors in small business. *Omega*, 20(5/6): 597-609.

Yin, R.K. 1984. *Case study research: design and methods*. Thousand Oaks, CA: Sage.

Yin, R. K. 2003. *Case study research: design and methods*. 3rd ed. Thousand Oaks: Sage.

Yousafzai, S.Y., G.R. Foxall and J.G. Pallister. 2007. Technology acceptance: a meta-analysis of the TAM: Part 1. *Journal of Modelling in Management*, 2(3): 281-304.

Yusoff, Y.M., Z. Muhammad, M.S.M. Zahari, E.S. Pasah and E. Robert. 2009. Individual differences, perceived ease of use, and perceived usefulness in the e-library usage. *Computer and Information Science*, 2(1): 76-83.

Zmud, R. 1979. Individual differences and MIS research: a review of the empirical literature. *Management Science*, 25(10): 966-979.

APPENDICES

Appendix A: Letter of consent

Cover letter to the respondents

Prof./Dr./Mr/Ms
P.O. Box 10712
Marine Parade, Durban
South Africa

4 April 2013

Dear Respondent,

I am Grace Mutsvunguma (Student Number 212562280), a Masters in Information Studies candidate at the University of KwaZulu-Natal, Pietermaritzburg Campus, South Africa. I am conducting this study as part of the academic requirements for the award of Master's degree in Information Studies.

The librarian's experience working at the Oceanographic Research Institute (ORI) Library reveals that, increasingly now than before, users are showing a preference for digital information yet the bulk of the collection is in print. Scanning of books and requesting of articles in digital format has become common. This case study aims at soliciting information regarding predictors' of users' preferences for digital information at the ORI Library, with a view to providing a framework on improving digital information dissemination.

You are kindly requested to participate in this study by completing a questionnaire and responding to interview questions. Participation is voluntary and employees will not be advantaged or disadvantaged in any way for choosing to participate or not to participate in the study. You are free to withdraw from the study at any point without any penalty. Responses will be treated with strict confidentiality, that is, completed questionnaires and interview responses will not be accessible to anyone except myself and my research supervisor.

Should you require any further information, please feel free to contact me or my research supervisor. Contact details are provided below.

Yours Sincerely,

Grace Mutsvunguma
0845533490
gracemutsvunguma@gmail.com

……………………………..   ………………………………
Supervisor: Prof. S. Mutula   Co Supervisor: Dr. Z. Nsibirwa
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For ORI Library users on predictor's of users' preferences for digital information

Instructions for completing the questionnaire
- **Please complete the questionnaire as honestly as possible**
- **Kindly answer all the questions in the questionnaire unless if you are advised otherwise**
- **Indicate your answers to each question by putting a tick, circle or writing in the spaces provided.**

Biographical Data

1. Please state your Gender: Male [ ]   Female [ ]

2. Please state your age category
   Less than 20 years [ ]   20 – 30 [ ]   30 – 40 [ ]   40-50 [ ]   Over 50 [ ]

3. Please state your job title/status?
Scientist [ ]   Research Assistant [ ]   PhD and MSc Student [ ]

Predictors of preference for digital content

Perceived ease of use
4. Learning to use digital information would be easy for me

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree **[ ]**

5. I would find it easy to get digital information to do what l want to do

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree **[ ]**

6. My interaction with digital information would be clear and understandable

Strongly Agree [ ]   Agree [ ]   Neutral [ ]   Disagree [ ]   Strongly Disagree [ ]

7. I would find digital information flexible to interact with

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree **[ ]**

8. It would be easy for me to become skilful at using digital information

Strongly Agree [ ]   Agree [ ]   Neutral [ ]   Disagree [ ]   Strongly Disagree [ ]

9. I would find digital information easy to use

Strongly Agree [ ]   Agree [ ]   Neutral [ ]   Disagree [ ]   Strongly Disagree [ ]

Perceived usefulness

10. Using digital information would improve my work performance.

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree **[ ]**

11. Using digital information would enable me to accomplish tasks more quickly.

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree **[ ]**

12. Using digital information would enhance my effectiveness on the job.

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree **[ ]**

13. Using digital information in my job would increase my productivity.

Strongly Agree [ ]   Agree [ ]   Neutral [ ]   Disagree [ ]   Strongly Disagree [ ]

14. Using digital information would make it easier to do my job.

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree **[ ]**

15. I would find digital information useful in my job.

Strongly Agree [ ]   Agree [ ]   Neutral [ ]   Disagree [ ]   Strongly Disagree [ ]

Attitude towards use of digital information

16. Using digital information is a good idea.

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree **[ ]**

17. It is wise to decide on using digital information.

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree **[ ]**

18. Using digital information is favourable for me.

Strongly Agree [ ]   Agree [ ]   Neutral [ ]   Disagree [ ]   Strongly Disagree [ ]

19. I really find it beneficial to use digital information.

Strongly Agree [ ]   Agree [ ]   Neutral [ ]   Disagree [ ]   Strongly Disagree [ ]

20. I am positive towards use of digital information.

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree **[ ]**

21. I prefer digital information to print.

Strongly Agree **[ ]**   Agree **[ ]**   Neutral **[ ]**   Disagree **[ ]**   Strongly Disagree [**]**

Actual use of digital content

22. What digital information sources have you used for you work?
Please tick all those that apply

E-Journals	
E-Books	
E-Magazines & Newsletters	
Locally generated e-resources (e.g. ActiveConnect pdfs')	
Online databases (e.g. ScienceDirect, ASFA)	
Websites	
Other, *Please specify*	

23. For what purposes do you use digital information?
Please tick all those that apply

Writing thesis/project	
Writing a research paper for publication	
To keep up with progress in the field	
For teaching purposes	
Other, *Please specify*	

24. From where do you access these resources?
Library [ ]   Office [ ]   Home [ ]   Café [ ]

25. Do you have direct access to these digital resources? Yes [ ]   No [ ]
If your answer is No, how do you access them? *Please specify*_____

_____

_____

26. On average, how frequently do you use digital information for work purposes?
1) Don't use at all   **[ ]**   4)   Several times a week **[ ]**
2) Once a month   [**]**   5)   Once each day **[ ]**
3) Once a week **[ ]**   6)   Several times each day **[ ]**

27. On average, how much time do you spend per day using digital information for job-

related activities?

1) Almost never   [ ]   4)   1-2 hours [ ]
2) Less than 30 minutes [ ]   5)   2-3 hours [ ]
3) Between 30 minutes to 1 hour [ ]   6)   more than 3 hours   [ ]

Competence in the use of computers and electronic resources

28. How long ago did you begin using computers?
    1) Less than a year [ ]   4) 6 - 7 years [ ]
    2) 2 - 3 years [ ]   5) 8 - 9 years [ ]
    3) 4 - 5 years [ ]   6) more than 10 years [ ]

29. Indicate your overall computer literacy

Very Good [ ]   Good [ ]   Average [ ]   Poor [ ]   Very Poor [ ]

30. Have you had any training on the use of digital resources?   Yes [ ]   No [ ]

31. Would you need training on how to search and retrieve information from electronic
    sources? Yes   [ ]   No   [ ]

ICT Infrastructure available to access digital information

32. Please indicate the ICT infrastructure available to you at work.
    Please tick all those that apply

Desktop Computer	
Laptop	
Printer	
Scanner	
Local Area Network Connection	
Internet /World Wide Web	
Other, *Please specify*	

33. How adequate is the ICT infrastructure for accessing digital information?

Please specify _____

_____

34. Do you face any problems related to digital information access?   Yes [ ]   No [ ]
If your answer was YES, what are some of these problems?
    [ ] Electric power Interruption
    [ ] Poor Internet connectivity
    [ ] Lack of IT support
    [ ] Restricted use
    Other, *please specify*_____

_____

THANK YOU

Appendix C: Focus Group Discussions

Respondents grouped into Scientists, Research Assistants and Students to discuss predictors of users' preference for digital information.

1. What are your preferences between print and digital information and why?

2. What digital resources have you used and for what purposes?

3. What effect do e-resources have on the nature of your work?

4. How adequate are the digital resources provided at ORI compared to print resources?

5. How has use of digital resources benefited you in your work?

6. What are the reasons that influence you in using digital information?

7. What skills and competencies do you have to effectively use digital resources?

8. What training would you require to be able to effectively make use of digital resources?

9. How adequate is the ICT infrastructure for you to access digital information?

10. What would you suggest to improve access to digital resources?

11. Would you encourage your colleagues to use digital information and why?

12. What problems do you face when using digital information?

13. What are your views and opinions to the development of a digital repository?

Appendix D: Interview Guide for the CEO and ORI Director

The CEO and ORI Director responded to these questions:

1. What is the place of the ORI Library in the overall functions of SAAMBR?
2. What is your general view on the use of e- resources and digital development?
3. Funding and budgets
   - What proportion of the SAAMBR budget is allocated to the library?
   - How much of the budget is allocated to the development of e-resources?
4. Are there any collection development policies in place?
5. Which organisations would you wish to see SAAMBR collaborate with to enhance the use of e-resources?
6. What ICT infrastructure does your organisation have in place to facilitate the use of e-resource?
7. What capacity building plans does your organisation have to facilitate effective use of e-resources?
8. Kindly elucidate on the prospects for digital scholarship development within SAAMBR?
9. Where would you want to see the library in the next 10 years?

Appendix E: Observation Schedule

The researcher observed the following to determine predictors of users' preference for digital content at the ORI Library

1. Library visits by respondents

2. Digital information available in the library

3. Usage of library digital resources

4. Assistance received in using digital resources

5. Scanning of library material

6. Use of library computers

7. ICT infrastructure available in the library

8. Availability of digital information

9. Patterns of usage of print and digital information

10. Internet connectivity in the library

11. Distribution of digital content the library

Appendix F: Document Review Schedule

The researcher reviewed these documents:

1. SAAMBR Bulletins
   - History of the organisation
   - History of the library

2. SAAMBR Internet Policy
   - Organisational rules governing Internet use

3. ORI Library Catalogue
   - Digital resources available in the library

4. Circulation/usage statistics
   - Lending of books
   - Statistics on the use of digital resources

5. E-mails requests for electronic articles