RESEARCH ARTICLE

Implications of Kuhlthau's Information Search Process Model Among Aquaculture Farmers in Namibia

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Abstract

This article uses Kuhlthau's Information Search Process (ISP) to illustrate howinformation managers can assist aquaculture farmers with information to satisfy their information needs and improve theirinformation search process.This study adopted a mixed methods research, which employed a concurrent triangulation design, combining qualitative and quantitative research approaches.The survey respondents were selected using a census while key informants (managers) were selected using the purposive sampling technique. A total of 60 fish farmers including technicians who were working in the ponds (whose work according to the researcher was seen as equal to that of the fish farmers) were included in the survey.In addition, six key informants who in this case, known as managers were sampled purposefully and interviewed in their respective work stations. The study revealed that Kuhlthau's Information Search Process as a framework provides specific areas where information experts and providers can teach aquaculture farmerswith appropriate information searching skills. The study also showed that the majority of fish farmers in Namibia undergo a search process when satisfying their information needs amidst a number of challenges which they faced. With the challenges faced by aquaculture farmers when searching information, the study recommended that information providers should be aware of Kuhlthau's Information Search Process model so as to assist aquaculture farmers on how to satisfy their information needs by carrying out an effective search process.

Keywords: Information Search Process, Information Access, Information Literacy.

1. Introduction

A number of theorists have investigated on the information need, access and usage of information; chief proponents amongst these include, Wilson (1998; 2000), Dervin (1993; 1996), Ellis, Kuhlthau(1991).

According to Wilson (1981), information behaviour is the totality of human behaviour in relation to sources and channels of information, including both active and passive information-seeking, and information use. Wilson (1981) adds that information seeking behaviour is the act of actively seeking information in order to answer a specific query, while information searching behaviour is the behaviour, which stems from the searcher interacting with the system in question. Accordingly, this paper showed that

aquaculture farmers in Namibia participated in both information seeking process.

Wilson's model (1998; 2000) suggests that information-seeking behaviour arises as a consequence of a need perceived by an information user, who, in order to satisfy that need, makes demands upon formal or informal information sources or services, which result in success or failure to find relevant information.

If successful, the individual then makes use of the information found and may either fully or partially satisfy the perceived need or, indeed, fail to satisfy the need and have to reiterate the search process. Wilson's model also shows that part of the information-seeking behaviour may involve other people through information exchange and that information

perceived as useful may be passed to other people, as well as being used (or instead of being used) by the information seeker himself or herself. In order to understand the relationship of information seeking behaviour to this study, one used the Kuhlthau's Six Stage Information Processing model to undertake an in-depth analysis of information seeking behaviour of fish farmers as well as the activities performed by an individual farmer in Namibia in relation to acquisition of scientific information with regards to the improved cultivation and practices.

Namibia has in place a number of national and international information centres supporting information on fisheries and aquaculture. Amongst these centres include the National Marine Information and Research Centre (NatMIRC), Namibia National Oceanographic Data Centre and other specialised libraries at Kamutjonga and MFMR headquarters. Aquaculture farmers are estimated to be 241 households practicing fish farming in the four political regions; that is, Ohangwena, Omusati, Oshikoto and Zambezi regions (NSA, 2015).

The fishing sector in Namibia remains one of the biggest contributors to the local economy, while being the second most important foreign exchange earner for Namibia after mining. According to the Namibian Newspaper of 30 March 2017, the fisheries industry in 2016 provided roughly N$10 billion in foreign exchange. The sector also remains one of the biggest employment creators in the country as it currently sustains 16 800 jobs directly, according to the latest available statistics (MFMR, 2017). Regardless of Namibia's strong fishing industry due to the abundance of fish species, literature remains silent concerning the kind of information accessed and utilised by aquaculture farmers in nurturing, sustaining and developing their fish farms as has been revealed by FAO (2001).

The study on the "Implications of Kuhlthau's Information Search Process model to aquaculture farmers in Namibia"applied Kuhlthau's Six Stage Information Process Model of information seeking behaviour to unravel the stages of information search process undertaken by aquaculture farmers in Namibia. This implies that when aquaculture farmers are confronted with information demands in their different roles, they use the information they have accumulated over the years, but when that information becomes inadequate, they are inclined to seek relevant information elsewhere to fill in the information gap.

2. Objectives of the Study

Information service providers need to establish how aquaculture farmers' search knowledge and information in Namibiaand problems they encounter in doing so. This research study highlights the level of information search skills of aquaculture farmers through an analysis of Kuhlthau's Information Search Process (ISP) model. This study aims to influence an understanding of the information search process among fish farmers in Namibia.

3. Research Methodology

This mixed methods research employed a concurrent triangulation design, combining qualitative and quantitative research approaches. The study used a survey to collect data for the quantitative research, and semi-structured interviews, and document analysis for the qualitative research. The population comprised of all fish farmers and their managers in Namibia. The survey respondents were selected using a census while key informants (managers) were selected using the purposive sampling technique.A total of 60 fish farmers including technicians who were working in the ponds (whose work according to the researcher was seen as equal to that of the fish farmers) were included in the survey. In addition, the key informants who in this case, known as managers were sampled purposefully and interviewed in their respective work stations. The criteria used in selecting these key informants (managers) were based on their positions, which they hold in their institutions and their knowledge of the subject area.

4. Literature Review

4.1 Definition of Information Need and Search/ Seeking

Kari (2010), after analysing different definitions from a number of authors such as Savolainen (2009), Limberg (1999), Kirk (2002) and Wilson (2000) concluded that information search is the functional process of information seeking and information retrieval as well as satisfying an information need. Wilson (2000) argues that the initial phase in the information search process is to identify an information need.

According to Rather and Ganaie (2018), an information need is the perception of a lack of information that provokes one to develop a need for it. The same sentiments were expressed by Rather and Ganaie (2018) who saw a need as the amount of information a user requires to fulfil the search intent. There is no agreed definition of information need (Nicholas &

Herman, 2009, p. 2) and in this study an information need is the "need for information that individuals ought to have in order for them to perform their job effectively". It is often believed that information need may exist when there is a gap between the state of the present knowledge possessed by somebody and that which they need to deal with or solve some problems or handle a present situation.

4.2 Aquaculture Information as a Component of the Search Process

To start defining aquaculture information, the researcher recognises the need to define agricultural information of which whose armpits it belongs. Agricultural information, according to Ofuoku et al. (2008), is all published knowledge in all aspects of agriculture and that the quality of such information depends on three attributes which are accuracy, timeliness and relevance.

Access to adequate information is very essential to increase agricultural productivity (Emmanuel, 2012). To link this statement to this study, where the thrust is on fish farmers, it is therefore imperative to view aquaculture information as a resource like land, labour and capital. Aquaculture information is guided by the definition provided by Ofuoku et al. (2008), which is all published knowledge on aquaculture and meets the requirements in terms of accuracy, timeliness and relevance.

It is also a resource which is expendable such as land, labour, capital etc., and fish farmers utilise information to improve their farming practices.

According to AIIM (2002) information access is the findability of information regardless of format, channel, or location. Morville (2005) is credited for the popularisation of the term "findability" for the Web.

In 2005, Morville defined findability as the ability of users to identify an appropriate Web site and navigate the pages of the site to discover and retrieve relevant information resources though it appears to have been first coined in a public context referring to the web and information retrieval by Alkis Papadopoullos in a 2005 article entitled "Findability".

It is from this development where scholars of information science (Papadopoullos, 2005; Morville, 2005) tried to connect the concept of information findability with information access. Related studies on information seeking by Ugboma (2010), Ofuoku et al. (2008) and Ekoja (2003) reveal that seeking

information is very essential for increased productivity by fish farmers. In Nigeria agricultural information is available through NAERLS and its information services, (Ekoja, 2003).

Agricultural information is also available in the many agricultural research institutes and school of agriculture in the universities (Adomi et al., 2003) as well as the government ministries of agriculture. Many previous studies confirm that the problem of farmers is access to agricultural information; and that even with the advent of information technologies which has succeeded in eliminating bottlenecks in information dissemination; constraints to information seeking is still a real experience (Oladele, 2006).

This study applied the information search process (ISP) model by Kuhlthau (2004), which proposed a model comprising six stages of task initiation, selection, exploration, focus formulation, collection and presentation, which fall within three areas of experience - thinking, feeling and actions. These three areas of experience occur at each of the six stages. Kuhlthau's (2004) Model of the Information Search Process that focuses on three different areas of the search experience: affective (feelings), cognitive (thoughts), and physical (actions).

5. Findings and Discussion

Kuhlthau's model (2004) was groundbreaking when published and remains critical to the practice of information search because it articulated that research was more than a series of activities for a researcher to undertake. The ISP (Figure 1) presents a more general understanding of the research process by mapping it across three domains: what researchers are doing (physical actions), thinking (cognition), and feeling (emotion).

In doing so, Kuhlthau's model is rooted in empathy. The ISP is not a checklist but rather an iterative unfolding of experience that includes respect for information searcher's feelings along with discrete skills.

For many, information seeking can be emotional and uncomfortable, and librarians, information experts and instructors, though in slightly different ways need to be prepared for the challenges within the process by grounding this work in a shared experience.

Whether the data exist or not, researchers help by empathizing with the informationsearcher's experience and using that empathy to provide tools. The six steps below outline this strategy.
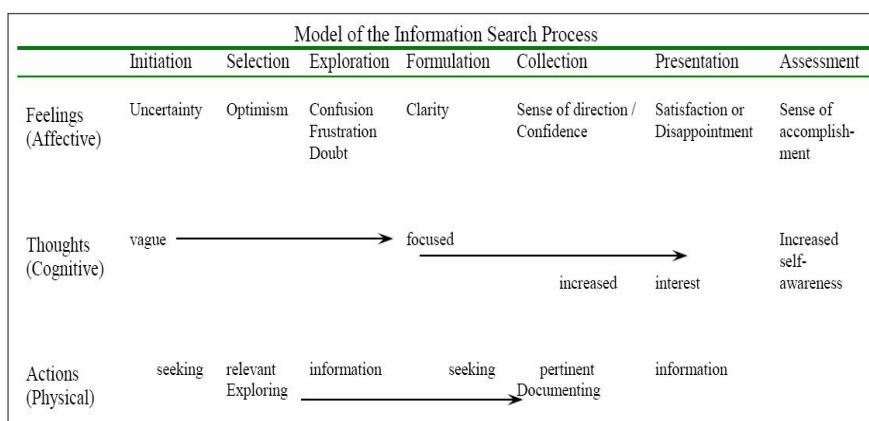
Source: Kuhlthau, 2004, p. 82

Figure 1.*Model of Information Search Process*

In this study the Kuhlthau's model of the Information Search Process was used to interrogate the information needs and search process of information and knowledge by fish farmers in Namibia. Kuhlthau's Information Search Process model was developed in the 1980s and refined in the 1990s. From the time of its conceptualisation and development, the model has been used as a framework and diagnostic tool for understanding the information seeking behaviour. The model provided the framework within which to prosecute the study.

According to Kuhlthau (2004) the stages of information process starts with Stage 1, which deals with Task Initiation, Stage 2 – Topic Selection, Stage 3 – Pre-focus Exploration, Stage 4 – Focus Formulation, Stage 5 – Information collection and Stage 6 – Search Closure (see Figure 3.1). It is important to note that at every stage of the search process, an information searcher encounters different areas of search experience such as thoughts (cognitive), feelings (affective), and physical (actions).

5.1 Task Initiation: Uncertainty, Cognitive Vagueness, and Seeking

The first stage, according to Kuhlthau (2008) starts with Task Initiation whereby the searcher prepares for the decision of selecting or choosing a topic. Here the farmer asks questions like "What am I interested in? What is an appropriate starting point? What will success (e.g., the completed assignment) look like? What do I already know (or not know) about a topic that will help (or not help) me leap into my first search?" The findings of the study revealed that respondents encountered a situation where they lacked information because of a plethora of varied reasons. Some of the reasons could be the need for information of problem solving, decision making and or performing a task as spelt out in Table 1.

This need of information is inherent as suggested by Wilson's model (1998; 2000) that an information need is a behaviour, which arises as a consequence of a need perceived by an information user. This need arises as a result of the information gap and hence the respondents showed that it is this information gap, which prompted them to initiate the search process.

It has been mentioned in the findings that respondents were always worried about improving their productivity (thoughts), and hence the feeling of looking for information for problem solving, decision making, constructing new knowledge, etc. The study also revealed that fish farmers experienced doubts, confusions, and frustrations, which were evident at all stages of Kuhlthau's (2008) model. In the initiation phase, fish farmers reported about their ability to use information though they had doubts of understanding information on aquaculture.

They also lacked experience in the farming practice and feared risking their capital. It can be inferred that fear of failure and doubts encountered by fish farmers activated them to take the initial necessary action by identifying the need for information in order to solve a problem or take a decision as has been noted in the study that fish farmers required diverse information on environment, weather, fish feed, fish harvests and markets, etc.

Table 1. *Categories of information needed by aquaculture farmers*

Category of information Needed	Yes	No
Emergency Problem solving	96.5	3.5
Performing tasks on aquaculture	98.3	1.7
Decision making related work	98.1	1.9

In Table 2 below, thirty six point seven percent (36.7%) often needed agricultural information, 43.3% often needed health information, 55% often needed environmental information, 36.7% often needed technological information, while 26.7% sometimes needed technological information, business and trade information was sometimes needed by 33.3% while 42.4% often needed government policies and plans.

Table 2. *Types of information needed by Fish Farmers*

Types of information needed	Rarely	Sometimes	Often	Very Often
Agricultural information	6.7	30	36.7	26.7
Health information	11.7	35.0	43.3	10.0
Environmental information related to aquaculture	5.0	18.3	55.0	21.7
Technological information on aquaculture	21.7	26.7	36.7	21.7
Fish business and trade information	20.0	33.3	26.7	20.0
Information on government policies	20.3	32.2	42.4	5.1

This need of information is inherent in an individual as suggested by Wilson's model (1998; 2000) that sees an information need as a behaviour, which arises as a consequence of a need perceived by an information user. This observation by Wilson interfaces with the definition by Nicholas and Herman (2009) who concludes that an information need is the need for information that individuals ought to have in order for them to perform their job effectively.

The findings of the study revealed that information needed by fish farmers is varied from agricultural, health, environmental, technological to business and trade information (see Table 2).

Respondents rated their need for each category of information on a 4 point Likert Scale using very often, often, sometimes and rarely.

The highest scores showed that 26.7% very often needed agricultural information and 36.7% often needed agricultural information, 10% very often needed health information and 43.3% often needed health information, 21.7% very often needed environmental information and 55% often needed environmental information, 21.7% very often needed technological information and 36.7% often needed technological information, while 26.7% sometimes needed technological information, business and trade information was sometimes needed by 33.3% while 42.4% often needed government policies and plans.

These high figures signify that Namibia's fish farmers in one way or the other need information just like other farmers, who require diverse information to support their farm enterprises (Ofuoku et al., 2008). The information required differed between categories of farmers and can be targeted to specific groups, based, for example, on landholding size or agro-climatic region (Rivera, 1996).

5.2 Topic Selection: Optimism, Improving Clarity, and Deeper Seeking

Depending on how well-prepared the searcher of information is like during the first stage, the searcher will have a sense of what they want to pursue and what success will look like, as well as a firmer understanding of the topic and its facets.

The second stage of the Information Search Process is dominated by deciding on the topic for research, which is known as "topic selection". As Kuhlthau defines this stage, an information searcher may start to feel emotions of optimism, relieved to be no longer wandering in the wilderness in search of a topic. Cognitively, they have a clearer understanding of the topic being researched and the topic parameters. Physically, their search transitions from skimming many sites to deeper and more focused searching.

The study showed that the respondents in their quest for the need for information, they also refined their topics. The information which they required when performing their duties included: weather forecasts, fish breeding, fish types and species, water quality, fish markets, aquaculture farming methods, current affairs and political situation, policy and legislative issues as well as other information on agriculture in general and the environment.

According to Kuhlthau (2004), this is where the searcher weighs a topic against an area of personal interest and chooses a topic with potential for success. However, at this stage respondents reported that they select their topics based on the problems they faced on their farms and shared their problems with their colleagues or extension workers. The fish farmers also reported that they often chose their topics based on the estimated availability of information and became frustrated when information was not easily found,

which are findings similar to those of Bilal (2002), Branch (2003), Kracker (2002), and Whitmire (2003). At this stage, the availability of the information used by fish farmers depended on the environment and they used the most available source of information such as colleagues, neighbours or extension workers. Bilal (2002) noted that when a selection is delayed or postponed, feelings of anxiety are likely to intensify until the choice is made.

At this point the respondents noted that they also experienced doubt and confusion as well as frustrations in terms of refining their topics and trying to relate with the problem at hand. For example, fish farmers got confused since they were not experts when browsing through a mass of aquaculture information which, in most cases was closely related to each other (topic-wise). This was when a number of factors played a crucial role on the part of the farmer when refining a

search process and these factors included, experience, level of education and seeking for assistance from a colleague or an expert.

5.3 Pre-Focus Exploration: Frustration, Uncertainty, Doubt as Focused Seeking For Relevant Information Continues

The third stage of the Information Search Process deals with pre-focus exploration. At this stage, the searcher continues to search for relevant information, digging deeper into resources. According to Kuhlthau (2004), and this stage focuses on information with the intent of finding a focus. Based on their experiences, the respondents highlighted their level of education, which ranged from secondary education, with the majority having received tertiary and vocational education. It could be through this level of education that respondents were somehow able to refine and focus on general topics in aquaculture (see Figure
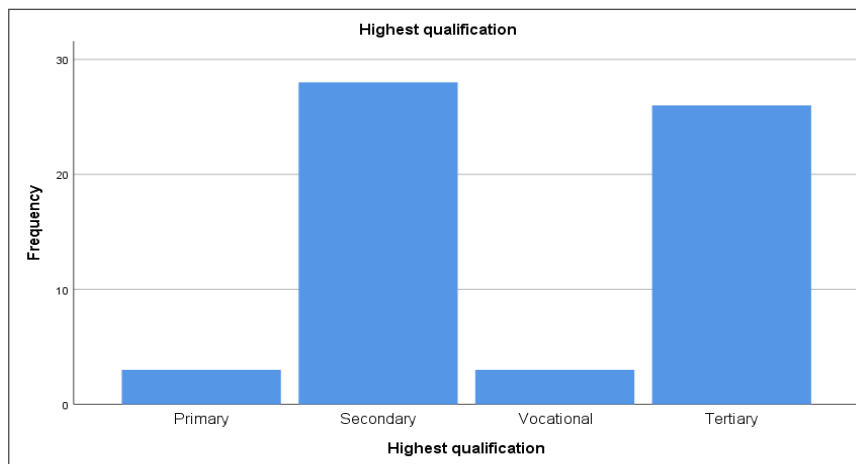
Figure 2. *Highest qualification*

The majority of respondents, 28 (47%) were secondary education, followed by tertiary education, 27 (45%) and the least with 3 (5%) each were primary education and vocational education. Two (3%) did not reveal their highest educational qualifications. These figures however, showed that the majority of the fish farmers had secondary or tertiary education and were predominantly literate.

Adefalu et al. (2013) argue that a farmer's level of education is expected to influence his or her innovativeness and ability to make decisions on various aspects of farming.

It is important for a study on information needs to look at the level of education of fish farmers since education is highly important for sustainable aquaculture growth and development (FAO, 2012) as well as access and utilisation of information and knowledge. Since the majority of the respondents in the study had some form of education; it therefore implied that the

respondents were not likely to have much difficulty in understanding and adopting modern agricultural information technologies and innovation. At this stage respondents, revealed that they read to learn about the topic or listened to the radio, and watched television. The findings of this study support earlier findings by Holliday and Li (2004), which showed that users of information tend to conceptualise information as something easily available and feel frustrated when the process is not as seamless as they expect.

5.4 Focus Formulation

The fourth stage of the Information Search Process deals with Focus formulation. It is at this stage that the searcher is involved in formulating focus on the information encountered. The findings of the study showed that respondents chose their sources of information carefully depending on which sources of information they trusted. The study revealed that they used radio, television, books, Internet, Blogs,

colleagues, libraries, academics, extension workers, community based organisations as their sources of information (See Table 3). The study also noted that respondents trusted colleagues, extension personnel and the Internet as their sources of information.

The fact that the respondents trusted the Internet as a source of information could also be evident that respondents were aware of identifying their information needs and wants amongst a pool of other topics.

Table 3. *Information sources consulted when searching for information*

	Frequency of using information sources	Very Often	Often	Sometimes	Rarely
a)	Government officials	40%	31.7%	16.7%	11.7%
b)	Extension workers	43.3%	28.3%	23.3%	5%
c)	Professional colleagues	63.3%	20%	6.7%	10%
d)	School teachers	5%	31.7%	16.7%	46.7%
e)	Community leaders	13.3%	28.3%	26.7%	31.7%
f)	Textbooks	15%	11.7%	40%	33.3%
g)	Newspapers	11.7%	26.7%	31.7%	30%
h)	Leaflets/ brochures	10%	28.3%	16.7%	45%
i)	Television	6.7%	30%	18.3%	45%
j)	Radio	18.3%	45%	16.7%	20%
k)	Internet	26.7%	21.7%	16.7%	35%
l)	Mobile phones	50%	15%	31.7%	3.3%
m)	Workshops and seminars	11.7%	31.7%	30%	26.7%
n)	Libraries	5%	10%	21.7%	63.3%

The respondents also seemed to be aware of increased frustration and anxiety to be expected mid-way through the knowledge construction process by avoiding untrusted information sources. The respondents also reported that frustrations could also result if they were inundated with a number of sources of information, which may result in confusion and failure to get the correct information due to information overload.

Kracker (2002) posits that it is important for information providers to understand the needs of the searcher who in this case is the fish farmer through the information inquiry process to be ready to intervene in helpful ways.

5.5 Information Collection

The fifth stage is the information collection stage, which deals with gathering information that defines, extends and supports focus. The findings showed that respondents were involved in information collection

and gathering.

The findings showed that information was gathered through various sources such as Internet, extension workers/ knowledgeable person, guidelines/ manual reports, textbooks, work colleagues, etc., and such information was used for problem solving, decision making, constructing new knowledge or ideas (see Table 4).

Generally, the purpose of gathering this information was to improve their productivity and farming methods. As was explained by Kuhlthau (2004), the description of the stages of affective, cognitive and physical experience of users continued to be found at this stage whereby the fish farmer builds confidence to complete the task and used the relevant sources of information such as maps, atlases, databases, Websites, etc. or even requesting for assistance from a colleague or expert in the field to complete the task.

Table 4. *Most valuable information sources*

	Most valuable information sources	Best	Better	Good	Poor
a)	Knowledgeable person/ expert	32.7%	40%	27%	0%
b)	Internet	50%	1.8%	31.3%	0%
c)	Textbooks	50%	50%	0%	0%
d)	Guidelines/ manuals and reports	13.3%	24.4%	62.2%	0%
e)	Work colleagues	52.4%	38.1%	9.5%	0%

5.6 Information Search Process

The sixth stage, according to Kuhlthau (2004) is the search closure, which concludes the information search process. The findings of the study could not ascertain whether respondents needed any additional information after reaching this stage but what is clear from the findings was that respondents increased their knowledge and skills on fish production where they felt some sense of relief, satisfaction and accomplishments by finding relevant information sources.

Sometimes disappointment could arise at this stage, which may require the respondent to restart or redefine his information search process. According to Kuhlthau et al. (2008) the information search process model describes feelings, thoughts and actions in an information seeking task with a discreet beginning and end, where considerable construction of knowledge takes place.

The findings also revealed that respondents working on digital environments such as the Internet tended to get confused in the search process stages when they tried to build knowledge of their topics, but the easy availability of information encouraged them to skip certain stages and thus ended up with superficial descriptive conceptions of their topics.

The description of the stages of affective, cognitive and physical experience of users continued to be found on the last phase of the study and the results indicated that the model was relevant and useful as a theoretical framework (Kuhlthau et al. 2008) to information need and search process of information and knowledge by fish farmers in Namibia. Kuhlthau's (2004) Information Search Process model remains a useful research tool for designing, framing and analysing the investigation of information seeking behaviour in complex tasks and also continues to be useful for designing user centred information services and systems for any information user group in the information search inquiry process (Kuhlthau et al.,2008).

6. Conclusion

Kuhlthau's Information Search Process as a framework provides specific areas where information experts and data providers can each support users in their information searches. If information providers help prepare information in a variety of disciplines, then they need to be prepared to contribute to the critique and creation of information as well. The study also showed that the majority of fish farmers in Namibiaundergo as search process when satisfying their information needs and were also somehow challenged with search skills, low levels of information literacy skills, low levels of understanding the subject matter and aquaculture farming practices, information sources scattered in different ministries, agencies or offices and information overload as a result of not being able to access information from the Internet.

The challenges faced by aquaculture farmers when using information enabled the study to recommend the following which will form the basis of the improving productivity in fish farms.

a) Information providers should be aware of Kuhlthau's Information Search Process model so as to assist farmers on how to satisfy their information needs by carrying out an effective search process.

b) Networking amongst aquaculture organisations and farmers should be improved so that Internet and email facilities are available to all farmers. Individual farmers and researchers should be encouraged to join Internet or social media discussion groups and post their best practices on the Internet. This will allow a wider dissemination of aquaculture information.

c) The Ministry of Fisheries and Marine Resources should coordinate with all Ministries and departments as well as institutions dealing with aquaculture to support easy accessibility of information.

d) Fish farmers should regularly attend information literacy training so that they are able to find, locate, use and disseminate information on acqualture.

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