
A New Proposed Model on Industrial Researchers' Information Behaviour Based on Wilson's Models

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Abstract

The recognition of a major behaviour is very important for the design and organization of a system that provides information for a particular category of researchers. The purpose of this study is to propose a new model of industrial researchers' information behaviour in order to motivate the creation of well-structured systems for the provision of adequate research information to this category of researchers. The new model is based on the integration of Wilson's models (1981, 1996 and 1999) of information behaviour and results from a larger doctoral project on industrial researchers' information behaviour. Both quantitative and qualitative research approaches were used. Survey questionnaires were distributed to industrial researchers and interviews were conducted for librarians of a federal industrial research institute in Nigeria. The new model must be understood within the context of the particular characteristics of the geographical area and institution in which the fieldwork was carried out – especially with the result that showed that mobile phones/iPads connected to the Internet were a more helpful information source than the institute's library. In order to assess the extent to which this new model applies to industrial researchers in other settings, similar projects employing the same methods would be of immense consequence.

Keywords: Industrial Researchers, Information Behaviour, Library and Information Science, Wilson's Models, Information Behaviour

Introduction

Information behaviour is very complex and its consideration from varying standpoints such as that of the information user and the mediator presents a much more complex situation that can only be understood from the in-depth study of interconnected information variables. In order to appropriately describe information behaviour, the entirety of human behaviour in connection with information sources as well as both

active and passive information-seeking, and of course information application must be considered (Wilson, 2000). Information behaviour is also described as the “generation, acquisition, management, use and communication of information, and information seeking” (Ingwersen & Järvelin, 2005: 259).

The return of Nigeria to democratic rule in 1999 has put a lot of pressure on successive administrations to speedily get the nation industrialized. Industrial researchers are in the forefront of this development but there is conspicuous enormous dearth of data and documented evidence of their works and a scarcity of well-structured systems to provide them with adequate information. Hence, a study was conducted to close this knowledge gap. This paper emanates from the outcome of a larger doctoral project carried out on information needs and information-seeking behaviour of researchers working in an industrial research institute in Nigeria. One of the study’s primary objectives was to obtain first-hand data about contemporary information needs and preferences of industrial researchers as information users and ascertain important environmental factors influencing their information behaviour. Subsequently, a new model on industrial researchers’ information behaviour based on Wilson’s models was developed to demonstrate the process.

Earlier models of information behaviour

The concept of a model and Wilson’s models of information behaviour are hereby discussed.

Information behaviour models

In comparison to other Library and Information Science fields, human information behaviour is seen to use a high volume of theories that are drawn from other related disciplines (McKechnie, Goodall, Lajoie-Paquette & Julien, 2005; McKechnie, Pettigrew & Joyce, 2001; Pettigrew & McKechnie, 2001). Several theories including the 72 theories listed by Fisher, Erdelez and McKechnie (2005) in their book, ‘Theories of information behaviour’ are applicable to the field of information behaviour. In respect of the agreement on a generally accepted theory or theories on information behaviour, Järvelin and Wilson (2003) opine that there has been dawdling advancement in the emergence of a rich one. This has to do with the fact that existing theories of information behaviour have not sufficiently expanded or improved the understanding of human behaviour and by implication not conferring a practical value on these theories (Robson & Robinson, 2013). Consequently, the suggestion for the consideration of a conceptual model based on its merits (Robson & Robinson, 2013) rather than theories considering its weakness and the failure to build on existing theory (Case, 2007; Vakkari, 2008) is well placed in this paper.

Bates (2005) describes a model as “a kind of proto-theory, a tentative proposed set of relationships, which can then be tested for validity”. Bates further explains that models are most informative at the description and prediction stages of understanding a phenomenon. Many of information behaviour models that have been put up by researchers are not certainly appropriate to all user groups (Du Preez, 2008) - this

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statement exposes the fact that diverse models should be developed that will be applicable to different user groups' information behaviours for the purpose of inclusiveness. This paper will not discuss every existing model in detail, however, it is important to acknowledge and discuss Wilson's models of information behaviour since the new proposed model of industrial researchers' information behaviour of the study is inspired by them. Therefore, Wilson's information behaviour models of 1981, 1996 and 1999 are hereby succinctly discussed.

Wilson model(1981)

This model as seen in Figure 1 is traceable to the year 1981. Thomas Daniel Wilson came up with a variety of three models to describe his original concept of information behaviour that focuses on person-centric way of thinking. The first model talks about the user of information attempting to search for needed information by overcoming barriers such as personal, interpersonal, and environmental. This model shows an interaction among three contributing factors that make the person to become conscious of his/her information needs. They are: (a) personal primary needs such as physiological needs, affective needs, and cognitive needs; (b) person's social role such as work-related responsibilities and performance expectations from the individual; and (c) external environmental factors such as work environment, socio-cultural environment, politico-economic environment and physical environment. Wilson (2005) states that this form of model is the most cited because it focuses on the information needs foundation and information seeking barriers.

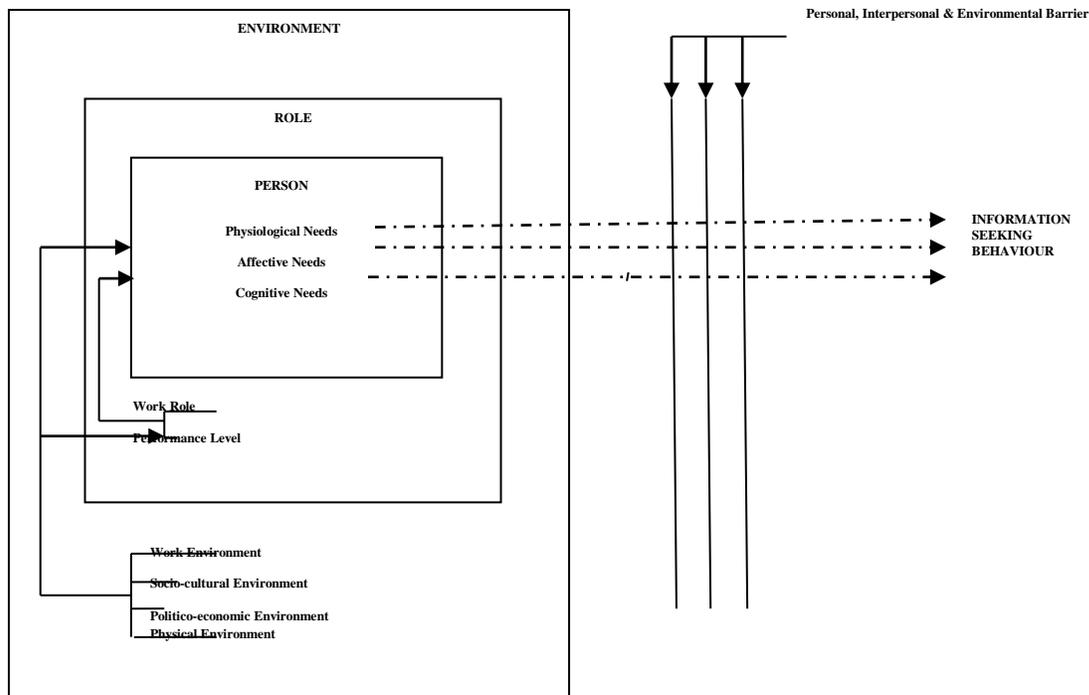


Figure 1: Wilson's 1981 model of information behaviour

The second model depicts that the recognition of a need by a person is a stimulating factor to seeking for information. The model pinpoints three fundamental

needs namely: physiological, cognitive and affective needs. However, significant things to note are that the needs of the seeker and the barriers to pursuing the needs occur in a context that may bring together personal characteristics, person's role at work or in life, and the environments. The seeker makes demand on formal or informal information sources, services, and systems such as libraries, information centres, online databases, etc. Wilson (2006) shows that this model portrays an element of reciprocity where the seeker may involve others for exchanging and using information (human interactions). If the actions of seeking for information are positive, the seeker utilizes information to satisfy their information need fully or partially. This model reveals that the repetition of search process is apparent.

The third model emphasizes the self-motivating characteristics of information seeking in which the process continues until success is achieved. This changing process brings many factors to play that determine information seeking. The determinants that form the elements of this model are: (a) the context of the seeker – the general life of the person; (b) the system employed - computer or machine-based system used directly or with the assistance of a mediator; and (c) the information resources – which could be print or digital. Regarding this aspect, Potnis (2015) underlines the adoption of the term 'technology' which signifies any set of devices, tools, or mechanism that assists information-seeking behaviour.

The strengths of the models have been brought to light by a number of researchers. Ingwersen and Järvelin (2005) describe the models as one of the best theoretical models on information seeking. They reveal that the models have been established for a long time with the notion of information, information need, information seeking and utilization. Ellis (1993) submits that the models are remarkably applicable to the study of the needs underlying information-seeking behaviour of users. Furthermore, Ellis points out that the models are appropriate for uncovering the facts of everyday life of the people being investigated. Potnis (2015) points forward that the models identify gaps in information science research. Also, Potnis states that the models continue to serve as a reference framework with the same validity at the time of inception. This supports Wilson (1999)'s stance- that it is a macro model of information-seeking behaviour.

The weaknesses of the model have also been highlighted. Wilson (1999)'s criticism of his own model reveals that hypotheses about information context are stated without making them explicit and that it does not indicate the processes whereby a person is affected by context or how context affects his/her perception of barriers to information seeking. Ingwersen and Järvelin (2005) indicate that although Wilson (1981)'s model recognizes many factors affecting information behaviour but it does not analyse work tasks and individual situations or contexts in detail. Case (2007) underscores that the model ascribes little or no importance to documentary information sources that form the largest information sources. Prigoda and McKenzie (2007) uncover that the model ignores the questions of sources, characteristics and personal preferences of users. They also add that the model generalizes information seeking irrespective of users' occupations or roles without analysing type and extent of information sources or the sufficiency of available information to meet the needs of information users. Finally, Potnis (2015) discloses that

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the original concept of the model does not suggest any causal relationship among information behaviour concepts.

Wilson model (1996)

Figure 2 presents Wilson's (1996) revised information behaviour model. Wilson (2005) highlights that this model emphasizes on the interconnected theories that are found in Library and Information Science and other disciplines that discuss information behaviour. Beverley, Bath and Barber (2007) opine that the model is built on two basic prepositions: the first is information need being a secondary type of need that arises out of a set of primary needs in everyday life; and the second centres on various personal and external barriers experienced by users during information search and acquisition. In this revised model, three thoughts are presented namely: context of information needs, context of information-seeking and context of information processing and use. Two explanatory variables are also presented which are activating mechanism and intervening variables. These two variables serve as changing factors that explain and represent effects of various external conditions on the information behaviour of seekers of information.

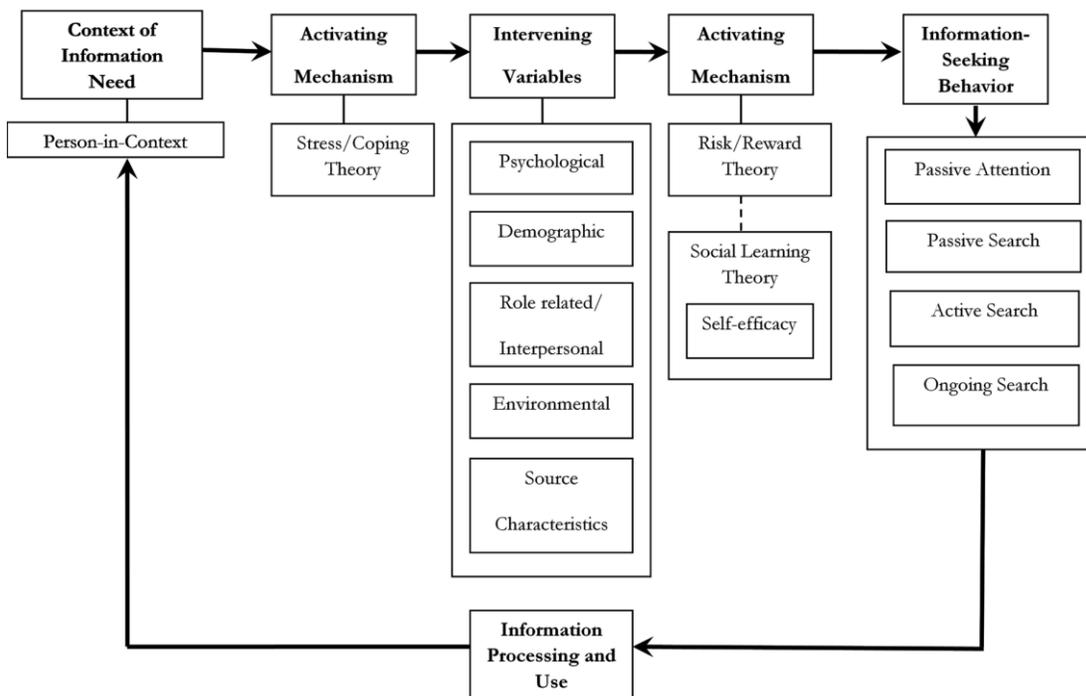


Figure 2: Wilson's (1996) revised information behaviour model

Potnis(2015) posits that the model recognizes various motives behind the realization of information needs. They are: (a) unlearned motives (curiosity and sensory stimulation); (b) social motives (desire for affiliation, approval or status, or aggression); (c) economic motives (financial gains, savings, and other monetary enhancements); (d) physiological motives (hunger, health-related motives, and thirst); (e) affective needs (escapism, emotional release, companionship, social utility, reality exploration, and value reinforcement); and (f) cognitive needs (desire to learn new information, the

psychological state resulting from perception, the pursuit of reasoning for existing form of knowledge, and the attempt to confirm values and beliefs held by users).

Within the model, activating mechanism is explained in the theories of stress/coping theory, risk/reward theory, social learning theory and self-efficacy. The stress/coping theory takes into account people's orientations toward threats and turning away their attention from those threats. The model introduces risk/reward theory (Murray, 1991; Settle & Alreck, 1989) to explain the influence of incentives on information-seeking behaviour. Risk-taking attitudes of individuals affect the process of seeking information and developing information sharing and awareness in a group-setting (Sonnenwald & Pierce, 2000). Another element is self-efficacy which is the central construct in the social cognitive theory that covers a conviction possessed by a searcher. This shows that the searcher would successfully execute certain behaviour to produce desirable outcomes. Hence, the revised model introduces social learning theory to measure the level of self-efficacy and its effect on information-seeking behaviour.

In the course of seeking, the individual may interact with manual information systems (such as a newspaper or a library), or with computer-based systems (such as the World Wide Web) that will help in the seeking process (Wilson, 2000). The revised model segments the process of information-seeking into active and passive modes. The active mode consists of active searching and ongoing searching, and the passive mode embraces passive attention and passive searching. Typically, active search involves specific information as an output of the search that is initiated by individuals or organizations. In contrast, passive searching signifies those occasions when one type of search results in the acquisition of information that happens to be pertinent to the individual. Passive search typically leads to gaining unpremeditated type(s) of information.

Intervening variables are barriers to engaging in information needs and they could play supportive or interruptive role in the process of information seeking. The six categories of intervening variables are psychological, demographics, role-related or interpersonal, source characteristics, environmental, and economic. Psychological variables are beliefs and value systems that often times reflect in our actions, including our information-seeking behaviour. Demographics have to do with age, gender, employment status, socio-economic status, ethnic origin, marital status, and co-habitation. Role-related or interpersonal variables relate with one's role in the society and their relationship with others which influence several aspects of information behaviour. Source characteristics are characteristics of sources of information (both formal and informal sources) that affect the process of selecting information from the particular source. Environmental variables influence people's choice of processing information and acting on it. Economic variables in this revised model consider direct cost of products or services and the value of time in information seeking.

According to Potnis (2015), the strengths of the model include: (a) it is a richer source of hypotheses and further research than the original concept; (b) it is easily related to other information-seeking behaviour theories, which strengthens the claims made by the model; and (c) it draws attention to the totality of information behaviour and shows how a specific piece of research contributes to an understanding of the whole

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phenomenon. Its limitations are: (a) it does not integrate original concept with the related concepts from all the fields; and (b) it cannot explain everything that has to do with information behaviour.

Wilson model (1999)

Wilson (1999)'s model (Figure 3) is a problem-solving one. It amalgamates the investigations in the domain of information behaviour. The ability of the user to rise above challenges to seeking information makes this model to be collapsible with earlier forms. In the model, information seeking, searching and uses are believed to be connected with the goal-directed problem solving process which includes problem recognition; problem definition; problem resolution; and solution statement (Wilson, 2000). Potnis (2015) emphasizes that in the process of information seeking and utilization, a user can interact with three categories of information namely: problem information, domain information and problem-solving information. Potnis (Wilson, 2000) elucidates that: problem information is about the structure, properties and requirements of the problem at hand and it can be accessed by the user in the problem environment or document; domain information is about facts, concepts, laws and theories; and problem-solving method entails the methods of problem treatment, that is, how a particular problem should be formulated and solved – this diagnostic stage involves problem-solving information that only experts can decode.

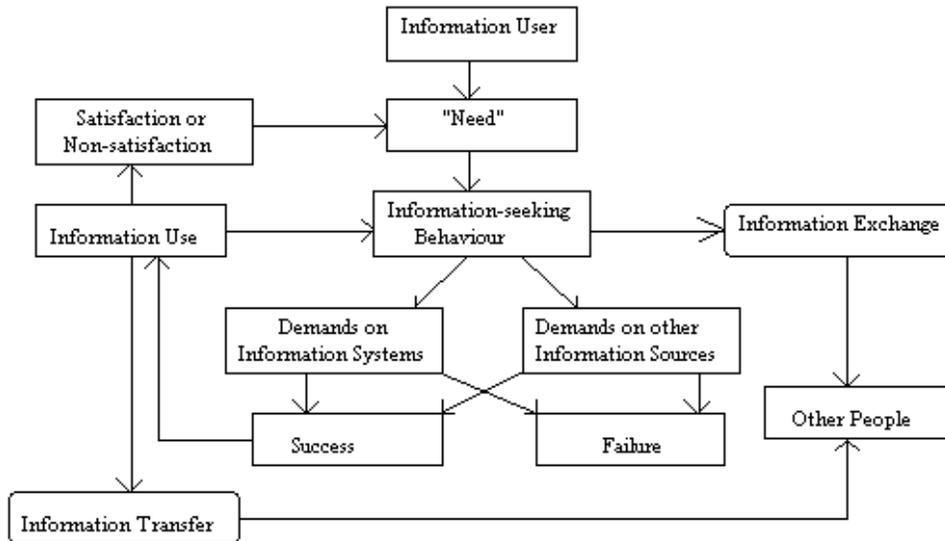


Figure 3: Wilson's (1999) model of information behaviour

Wilson's (1999) model reflects key elements of Wilson's (1996) revised general model with regard to its focus on information users, their information needs, their information-seeking behaviour and their context. In particular, it emphasizes the impact of personal and cultural influences on information use which relate to the intervening variables (psychological, demographic, role related/interpersonal, environmental and source characteristics). Potnis (2015) remarks that the model presents other features such as: (a) the inclusion of problem-related contextual features for information seeking, personal, and psychological factors; (b) it depicts explicit relationship between information

needs and seeking; and (c) it shows that acquiring information is not always an end in itself. He further states that the strengths of the model are: it is a much needed depiction of the inter-relationship between information behaviour, information seeking and information retrieval; it provides a framework to explain goal-oriented information-seeking behaviour; and it continues to serve as frameworks for developing and testing new combinations of information behaviour constructs and theories with a wide range of users groups from different parts of the world. Majyambere (2014) adds that the strength of the model is that it does not simply designate a sequence of events, but it goes beyond that and describes a sequence of human behaviour by referring to relevant variables. According to Potnis (2015), the criticisms are: it is limited to defining and solving problems; and its central focus is on the general processes of information seeking and not on the information search context or the types of information that is available.

Table 1 presents excerpts from the table in Potnis (2015: 103). These excerpts bring to light some key concepts and weaknesses in Wilson's models which point to the reasons why a new model is proposed to illustrate industrial researchers' information behaviour. The new model will describe industrial researchers' information behaviour within the circumstances that form the environment that their actions and reactions to information take place.

Table 1: Key concepts and weaknesses in Wilson's information behaviour models

	Original Concept: Three Models (1981)	Revised Model (1996)	Revised General Model (1999)
Key Concepts Covered	Information, User Studies, Information needs, and Consequences	Stress-coping theory, Risk-reward theory, Self-efficacy, Context, Information-seeking behaviour, and Information process and use	Problem-oriented information seeking, searching, and use, Goal-oriented information-seeking behaviour
Weaknesses	It does not assume barriers to seeking information have any effect on the user motivation for seeking information It does not provide sufficient attention to contextual factors It does not provide any direct or explicit	It does not integrate original concept with the related concepts from all the fields It cannot explain everything to do with information behaviour	It is limited to defining and solving problems Its central focus is not on the information search context

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	hypotheses to be tested		
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Methodology

The study used a mixed methods research (MMR) design which involved the application of both the quantitative and qualitative research approaches for the purpose of triangulating research methods (Neuman, 2014; Yeasmin& Rahman, 2012). This removed the limitations of employing one research method. A survey research strategy was employed to collect quantitative data through a questionnaire while interviews were used to collect qualitative data. Using MMR with the goal of triangulation enabled the collection, analysis and interpretation of qualitative and quantitative data so that the ensuing combination resulted in complementary strengths that equi-posed the weaknesses of using one method, and increased results validity (Johnson, Onwuegbuzie& Turner, 2007; Neuman, 2014; Yeasmin& Rahman, 2012).

The target population was 171 industrial researchers and five librarians of the Federal Institute of Industrial Research Oshodi (FIIRO). Eventually, a sample comprising of 165 industrial researchers and five librarians took part in the study. Six industrial researchers who were Directors were excluded from the study because of bureaucratic constraints. The five librarians were interviewed because of their relevance in the process of information provision and their knowledge about industrial researchers' information requirements. The advantage of this approach is that librarians as experts are familiar and concerned with the subject matter and a check is put in place as to establish industrial researchers' information needs and information-seeking behaviour. In the end, 114 industrial researchers were satisfactorily reached (response rate of 69.1%) and all the five librarians were interviewed.

The questionnaire and the interview schedule were pilot-tested on some industrial researchers and librarians of the institute respectively. The understanding and corrections were checked and a final questionnaire and interview schedule with acceptable wording and precision of the questions were achieved. The questionnaire, accompanied by a consent letter from the institute's Director General was administered by the researcher with the help of five research assistants. The interviews were conducted by the researcher. The answers were suitably coded - for the interview answers, recurring themes were used for analysis and for the questionnaires; Statistical Package for the Social Sciences (version 15) was employed for analysis.

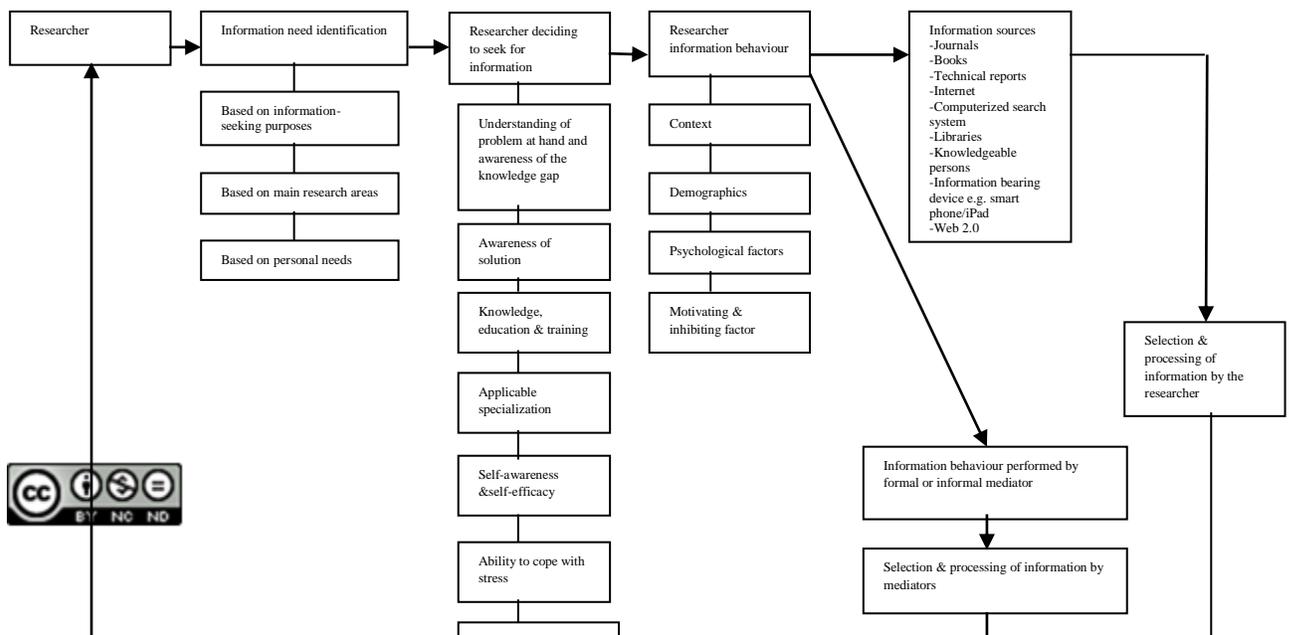


Figure 4: A new model on industrial researchers' information behaviour based on Wilson's models

Results and analysis – the description of the new model

The study's results that basically form the stages in the new model are sorted out and presented as follows: information need identification; researcher deciding to seek for information; researcher's information behaviour; information behaviour performed by formal or informal mediators; information sources; selection and processing of information by the researcher; selection and processing of information by mediators; information need solution conveyance to the researcher; and information use/application. The new model (Figure 4) is presented first as following discussions will refer to specific stages. It shows two rudimentary approaches to information seeking as industrial researchers satisfy their information needs – these approaches essentially determine industrial researchers' information behaviour. First, the industrial researcher can seek for information personally and second, he/she can utilize the assistance or services of people, devices or systems. It should be noted that: (a) the mediators are library and information professionals or any information worker in the library that have been sufficiently educated and trained to provide information need solution(s). In addition, mediators are also in the form of information systems that have been designed to offer information need solution(s); (b) the stages of selection and processing of information by the researcher, selection and processing of information by mediators and information need solution conveyance to the researcher will be explained together because of their connectedness despite being different stages in the new model; and (c) individual statistics are independent of one another except otherwise stated - this statement means that the researchers can be counted in more than one category.

Information need identification

Fundamentally, information behaviour involves information seeking after the need for information is identified or recognized. The needs, wants and goals of the information users (industrial researchers) motivate them to seek information. These aspirations may

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be internally or externally activated, recognized or unrecognized, anticipated or unexpected, cognitive or affective.

From the data collected within the study, the information need identification stage involves the industrial researchers' needs being recognized or identified in three forms namely: researchers' information needs based on information-seeking purposes; researchers' information needs based on main areas of research; and researchers' information needs based on their personal needs. These three forms identify the things that trigger information-seeking behaviour. They point to the personal, individual and national problems that are to be solved by the industrial researchers. With respect to information need identification in the study - Figure 5 shows that the industrial researchers identified research as the foremost information-seeking purpose while work-related discussion was the least; Figure 6 shows that the industrial researchers identified enzyme technology as the foremost main area of research while polymer/textile, pulp/paper technology and works/services were the least main areas of research among the listed 21 main areas of research; and Figure 7 shows that the industrial researchers identified health information as the foremost personal need while culture information was the least.

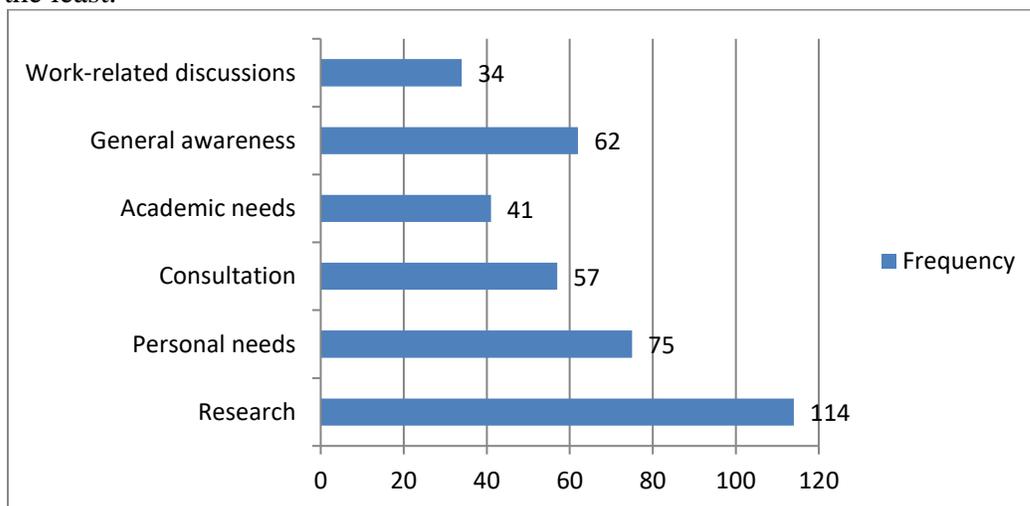


Figure 5: Information-seeking purposes

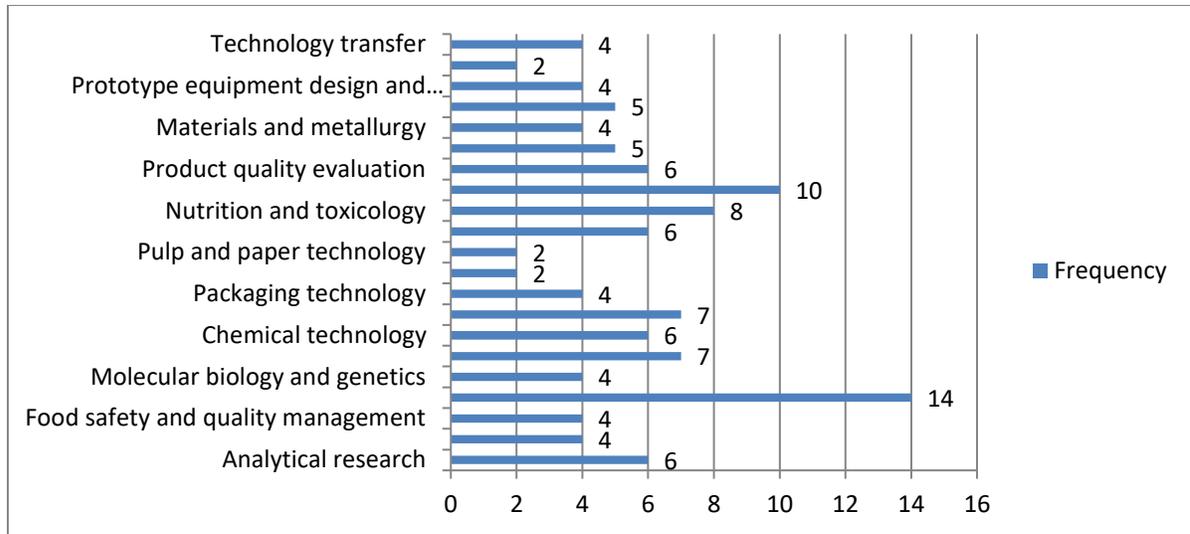


Figure 6: Main areas of research

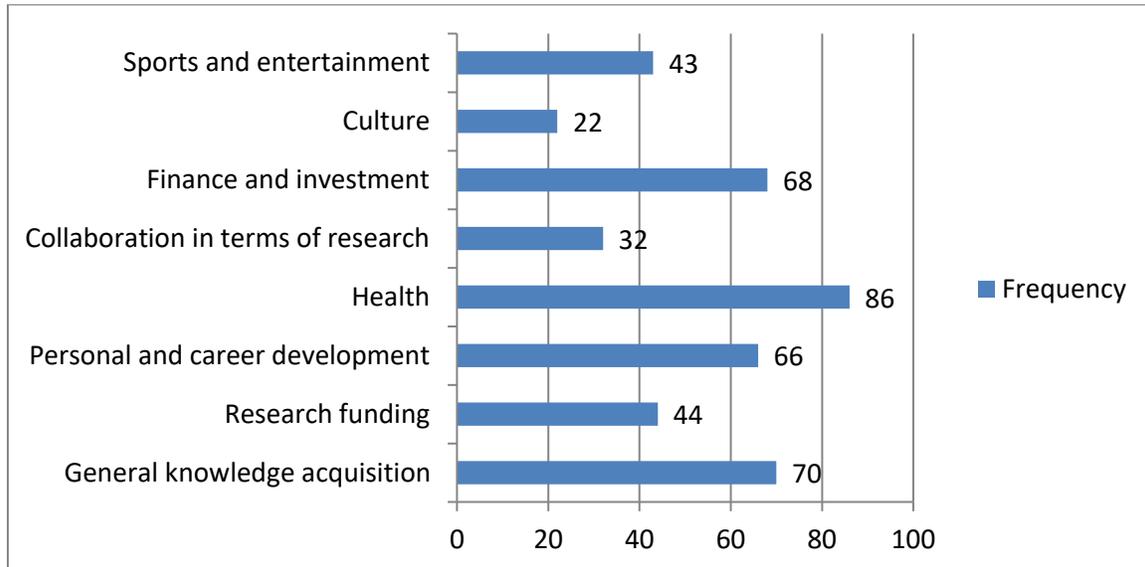


Figure 7: Personal needs

Researcher deciding to seek for information

The next stage is the information user deciding to seek for information. The industrial researcher deciding or not deciding to seek for information to address his/her information need is a function of a combination of factors. The factors include:

- Understanding of the problem at hand, which involves the perception of risk that the problem poses; and awareness of the knowledge gap – industrial researchers are always identifying problems that they can solve (as indicated in their choice of research as the number one information-seeking purpose). Fundamentally, research is about solving identified problems. These problems have been largely

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depicted by Figures 5, 6 and 7. The powers of observation, thoughts and feelings of the industrial researchers which may also be based on their clients' submissions reveal the risks that must be reduced or terminated. Consultation (attending to clients' needs) was also ranked fourth in terms of information-seeking purpose of industrial researchers – it is a pointer to the sizable importance of this intent. Consequently, the awareness of the problem brings to bear the knowledge gap to be addressed. The problem could be attended to personally - the materials for solving the problem could be within the reach of the industrial researcher or he/she can take action individually drawing from his/her mental store and digest of information. The industrial researcher could need the assistance of a library and information professional that will help with materials search for literature review – in order to know the current state of work on the problem.

- Awareness of solution – this makes the problem half solved. The industrial researchers conduct research (which may be in the form of scientific tests) as confirmed in Figure 5. All the industrial researchers showed research to be their highest information-seeking purpose. The research process will make the industrial researcher to be cognizant of the problem at hand – pointing to solution possibilities especially when the literature review exposes the knowledge gap. The solutions are adequately explored in the form of intuitiveness or repeated scientific tests to find out the best possible solution or range of satisfactory solutions.
- Knowledge, education, training and experience relevant to a subject area, task or use of information sources - in the study, the industrial researchers indicated whether they had received formal training/orientation on how to search for scientific/technical information in a manual or web environment. Results showed that the majority of the industrial researchers did not receive training/orientation for sourcing information in the manual environment (primarily the traditional library of the institute) and web environment. However, the minority that received training disclosed that they received training on: indexing; classification/cataloguing; and circulation regarding manual environment. Concerning web environment, they received training on: use of databases; use of search engines; advance searching; and determination of web information reliability. These findings to some reasonable extent talk about the knowledge, education, training, and experience of the industrial researchers and they will be of great significance to the research process as they seek to solve poised problems. It can be implied that industrial researchers need to improve on their searching skills since they are poorly trained in manual and web search for information.
- Applicable specialization – in education, a career or interest and of course the career stage. The study found that there were six different research departments in the survey institute (Food Technology; Project Development and Design; Biotechnology; Chemical, Fibre and Environmental Technology; Production, Analytical and Laboratory Management; and Planning, Technology Transfer and Information Management), and 27 different groups of information types from which industrial researchers choose from as they seek for information. These findings showed the intricate information needs of the industrial researchers based

on information types – they pointed to varying education path, career or interest proclivity that industrial researchers followed. Administrators and library and information professionals are expected to be responsive to these variations as they make provision for research information. In terms of career stage, for example, the study found that there was a statistically reliable significant difference between industrial researchers' years of working as a researcher in the institute and their educational level. This purports that career stage as represented by the industrial researchers' years of working experience is influenced by education. This is likely going to affect industrial researchers' preferences of certain information sources over others.

- Self-awareness and self-efficacy - Wilson's models talk about factors that induce information-seeking behaviour as external and also relating to individual characteristics. In our study, self-awareness and self-efficacy were evaluated from the angles of: the majority of the industrial researchers believed that they had the requisite ICT skills/competencies to pursue their quest for research information (an individual characteristic); the majority indicated that accessibility of information from the institute's library was not easy for them (an external factor); and the majority cited some external factors that were responsible for accessibility difficulty faced by them. Largely, they mentioned lack of recent books, poor research environment and bibliographic obstacles.
- Ability to cope with stress – Folkman (1984: 840) defines stress as "A relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and as endangering his or her well-being" in his stress/coping theory. Consequently, the new model on industrial researchers' information behaviour sees the ability to cope with stress as a motivating factor (referred to as activating mechanism in Wilson's models). In the first place, the motivating factors are the problems to be solved as illustrated in Figures 5, 6 and 7 that inspired the entire course of action of the industrial researchers in seeking for information. Also, the industrial researcher weighs the pressure he/she has to go through in solving the problem at hand in comparison with his/her resources and the research environment. This goes a long way to determine his/her ability of coping with the stress of seeking and finding information.
- Cognizance of other people especially the information user's acquaintance with the mediator in the information behaviour process and vice-versa – Results on the action taken after search failure by the industrial researchers showed their appreciation of other people in the information-seeking process. Knowledge of other people can help industrial researchers seek and find information more efficiently and reducing research delivery time. Actions taken included consulting colleagues and librarians, visiting another library, borrowing from a friend and finding from a friend. In fact, majority of the industrial researchers consulted other libraries in order to obtain needed information.

Researcher's information behaviour

The next phase is the industrial researcher's information behaviour. The most important feature that reveals an exhibited behaviour when information is being sought is how the
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seeking process is being carried out. It can be depicted from the viewpoint of the activities that information users engage in, the factors affecting those activities and the sources or information products involved. The new model points to a number of factors that influence information behaviour. Such factors include:

- **Context** – This is the operational environment of the industrial researchers. This entails social influences, culture, activity-related and work-related factors, finances and technology. Contextually, the developing nature of the country and the ensuing industrial environment were visible in the results of the study. Issues connected with Internet unavailability, electrical power instability while searching electronic resources, inadequate financial resources, library/librarian incompetency, accessibility, time, and so on were listed by the industrial researchers.
- **Demographics** – This talks about the information user's age, sex, education, years of working experience, etc. The study found that there was a statistically reliable significant difference between the industrial researchers' years of working as a researcher at the institute and demographic factors (age and education). Additionally, there was no statistically reliable significant difference between the industrial researchers' years of working at the institute and their sex. These results demonstrate that for industrial researchers - their age, years of working as researchers and educational level play significant role in their exhibited information behaviour. Information providers must pay attention to these characteristics in providing them with suitable information.
- **Psychological factors** – refer to information user's personality and mental processes. Result showed that: all the industrial researchers were educated; and they possessed different qualifications (bachelor's degree, postgraduate diploma, master's degree, and doctorate degree). In addition, their years of research experience showed an acceptable level of research involvement and skill. Consequently, they are informed personality with reasonable level of intellectual processing of information if information is expertly provided to them.
- **Motivating and inhibiting factors** – These are factors that encourage or discourage information behaviour. Factors that were highlighted by the industrial researchers in descending order included: trustworthiness, accessibility, nature of problem, source of information, familiarity and prior success, time, and limited financial resources. These factors will unquestionably affect the volume and quality of research turned out by the industrial researchers. It is noted from the hierarchy of the listed factors that the need to get concrete and trusted information for laudable research from the perspective of information-carrier characteristics has exerted considerable pressure on the industrial researchers; and this emphasizes the importance of education, years of research experience and training. Time and limited financial resources indicate the period dedicated for research and the income of the industrial researcher/research fund available for research respectively. The industrial researchers' incomes/research funds become a key factor when research is not adequately funded and the industrial researcher will have to finance research from his/her limited pay. This factor is conspicuous for most developing nations.

Information behaviour performed by formal or informal mediators



The next stage is information behaviour performed by formal or informal mediators. As mentioned earlier, the mediators are intermediaries who are formally or informally recognized to reason, search, classify, and filter information such as human or system mediators. Examples are library and information professionals and library staff in the study who decide on information availability and accessibility, information systems, and designers of database structures and systems. An industrial researcher may apply his/her own knowledge and available resources and interact with search systems, devices and information services (making use of databases, catalogues, archives, search engines, etc.) in order to get information or industrial researchers' pursuits may motivate and create a feedback from the mediator(s) and in response they deliver information need solution(s). The interviews of the institute's librarians revealed that they are aware of industrial researchers' vast usage of current books, journals and research reports and they consciously assist them with the timely provision of these materials based on availability especially after annual project defence. In addition, the interviews showed that information is disseminated immediately it is available at the institute's library. One of the librarians claimed to have used WhatsApp in communicating and sharing information with some industrial researchers.

Information sources

The next stage is the information sources that the information users consult, and the information sources that the mediators offer to address information needs. Figure 8 shows a bar chart indicating the eighteen information-source groupings as revealed by the industrial researchers. The groupings include: journal articles; review articles; conference abstracts and proceedings; books; professional meetings/workshops; content pages; indexes and abstracts of journals; research reports/patents/facts sheets; technical reports; pamphlets/leaflets; Internet sources; theses and dissertations; newsletters; library catalogues; face to face conversation/discussions with colleagues; emails/blogs/webinars/discussion forums; librarians/library staff; and knowledgeable persons in the field. The result showed that journal articles were the most important information source whereas newsletters were the least important information source. Other information sources uniquely placed in the new model are information bearing devices e.g. smart phone/iPad and Web 2.0 technology (connected to the Internet), which reflect more dynamic and organized applications for seeking and finding information by the information users. The study's results indicated that all the industrial researchers unquestionably agreed to using mobile phones/iPads to search for information and the majority frequently used mobile phones/iPads. All the industrial researchers indicated that they considered the mobile phone/iPad more helpful in obtaining research information than using the institute's library. This is a pointer to the poor provision of information at the institute's library – a reflection of an external factor that will affect industrial researchers' information behaviour. As well, it shows little or no Internet connectivity at the institute's library or within the institute. The Web 2.0 tools utilized by the industrial researchers included Facebook, Twitter, LinkedIn, Google+, Instagram, Pinterest and WhatsApp. The study's result showed that the majority of the industrial researchers used the WhatsApp and the least used was the Instagram. These new applications of Web 2.0 technology will require well informed and trained mediators.

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This study illustrates that the information and information sources utilized by the industrial researchers and presented by the mediators possibly share similar attributes. They are classified into two major categories namely:

- Utility – This includes usefulness, relevance, timeliness, accessibility and ease-of-use of information or of a source.
- Credibility – Pointing to trustworthiness and reliability of information source and the information provided.

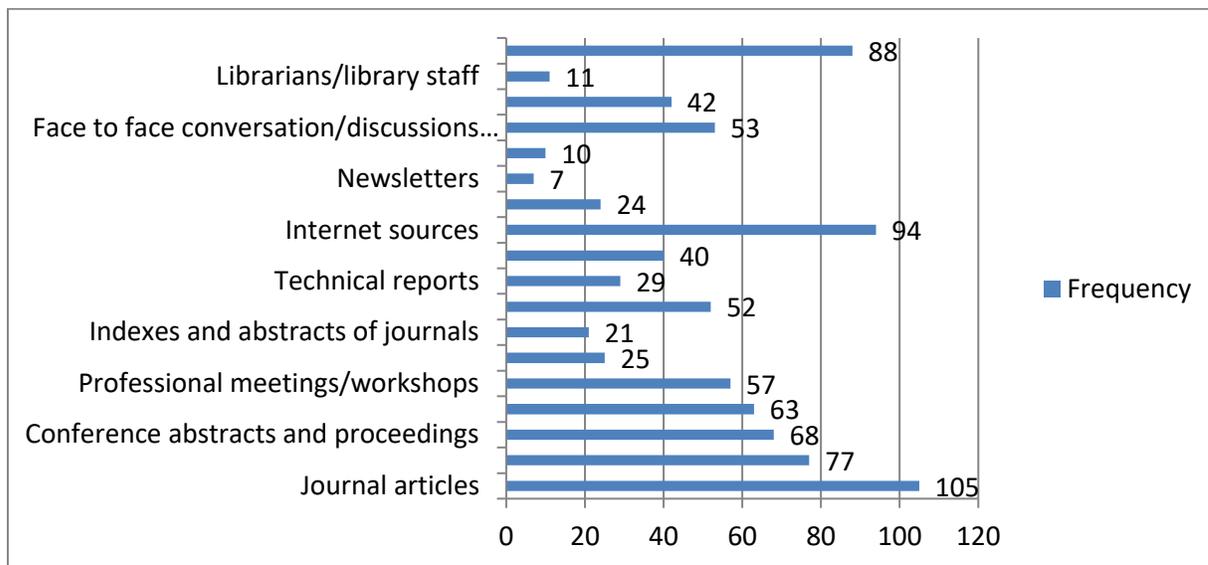


Figure 8: Frequency of importance of information sources

In relation to the sequence in which industrial researchers prefer consulting information sources, the study's result showed that the topmost sequence preferred was Internet → personal collection → colleagues → library followed by Internet → colleagues → personal collection → library and library → Internet → personal collection → colleagues. These sequences show that the Internet is well preferred for information needs consultations. The result of the study also showed that industrial researchers preferred both print and electronic formats of research journal articles/reference materials compared to print only and electronic only to satisfy information needs. The majority of the industrial researchers believed that both print and electronic formats are reliable when simultaneously used to seek and find information.

Selection and processing of information by the researcher/selection and processing of information by mediators/information need solution conveyance to the researcher

Considering all the above mentioned characteristics, both the information user and mediator will have to sufficiently select and process information to satisfy their information-satisfaction mission. The industrial researcher may also select and process the acquired information personally (the use of smart phones/iPads or Web 2.0 tools) or make use of various mediators and their services (library and information professionals, library staff, colleagues, knowledgeable persons in the field, etc.) as revealed in the study, and utilize the effects of mediators' information seeking and processing. For example,

librarians' interviews attested to the fact that they provide answers to researchers' requests by selecting and processing information from services such as reference and information service, techno-economic information service, and retrospective search for old journal editions and research reports. The industrial researcher may almost exclusively rely on a mediator or play the role of helping the mediator to appropriately know the information he/she wants. However, essentially, it is a mediator who engages in systematic information activities: asking, seeking and searching, for this category of industrial researchers. In the long run, information need solution from the mediator is conveyed to the industrial researcher. The information need solution(s) is expected to suit the research need and purpose of the industrial researcher(s).

Information use/application

Ultimately, this leads to just-in-time information use and application by the industrial researcher(s). The model represents a cyclical process. Therefore, if the need is not met, that is, a failure, the process is repeated until a success is achieved where information need(s) of the industrial researcher(s) is adequately met.

Conclusion

None of the existing models of information behaviour explicitly includes exclusive factors of this category of industrial researchers working in a developing economy with obvious retrogressive external factors. This is specially revealed in the industrial researchers' assertion of considering the mobile phone/iPad to be more helpful than the institute's library in obtaining research information. In addition, a cost implication factor is well-founded here because the industrial researcher will have to use his/her limited remuneration to acquire information. Also, the model to a large extent is straightforward revolving round two variables – the information user (industrial researcher) and the mediator. Furthermore, so far, there has been little attempt to explore user-mediator standpoint of developing nations' federal research institutions as to come up with an information behaviour model – this study will be one of the point of departure studies.

The recognition of a major behaviour is very important for the design and organization of a system that provides information for a particular category of researchers, and it should be the first crucial step of any research conducted into researchers' behaviour and needs. The new model must be understood within the context of the particular characteristics of the geographical area and institution in which the fieldwork was carried out. In order to assess the extent to which this new model applies to industrial researchers in other settings, similar projects employing the same methods would be of immense consequence.

References

Bates, M. J. (2005). An introduction to metatheories, theories, and models. In Fisher, K. E., Erdelez, S. & McKechnie, L. (eds). *Theories of information behaviour*. Medford, NJ: Information Today.

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- Beverly, C. A., Bath, P. A. & Barber, R. (2007). Can two established information models explain the information behaviour of visually impaired people seeking health and social care information? *The Journal of Documentation*, 63(1), 9-32.
- Case, D.O. (2007). *Looking for information. A survey of research on information seeking, needs, and behaviour*. San Diego, CA: Elsevier/Academic Press.
- DuPreez, M. (2008). *Information needs and information-seeking behaviour of consulting engineers: a qualitative investigation* (Unpublished MIS thesis). University of South Africa, Pretoria, South Africa.
- Ellis, D. (1993). Modeling the information-seeking patterns of academic researchers: a grounded theory approach. *The Library Quarterly*, 63(4), 469-486.
- Fisher, K. E., Erdelez, S. & McKechnie, E. F. (2005). *Theories of information behaviour*. Medford, NJ: Information Today.
- Folkman, S. (1984). Personal control and stress and coping processes: a theoretical analysis. *Journal of Personality and Social Psychology*, 46(4), 839-852.
- Ingwersen, P. & Järvelin, K. (2005), *The turn. Integration of information seeking and retrieval in context*. Dordrecht: Springer.
- Järvelin, K. & Wilson, T. D. (2003). "On conceptual models for information seeking and retrieval", *Information Research*, 9(1). <http://InformationR.net/ir/9-1/paper163.html> (Accessed 2020 October 30th).
- Johnson, R. B., Onwuegbuzie, A. J. & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, 1(2), 112-133.
- Majyambere, M. (2014). *Information seeking behaviour of humanities/arts international postgraduate students in public universities in Kwazulu-Natal Province, South Africa*. (Unpublished doctoral thesis). University of Kwazulu-Natal, Kwazulu-Natal, South Africa.
- McKechnie, E.F., Goodall, G.R., Lajoie-Paquette, D. & Julien, H. (2005). "How human information behaviour researchers use each other's work: a basic citation analysis study." *Information Research*, 10(2). <http://informationr.net/ir/10-2/paper220> (Accessed 2020 October 30th).
- McKechnie, L., Pettigrew, K.E. & Joyce, S.L. (2001). The origins and contextual use of theory in human information behaviour research. *New Review of Information Behaviour Research*, 2, 47-63.
- Murray, K. B. (1991). A test of services marketing theory: consumer information acquisition activities. *Journal of Marketing*, 55(1), 10-25.
- Neuman, W. L. (2014). *Social research methods: qualitative and quantitative approaches*. Essex: Pearson Education Limited.
- Pettigrew, K. E. & McKechnie, L. (2001). The use of theory in information science research. *Journal of the American Society for Information Science and Technology*, 52(1), 62-73.

- Potnis, D. (2015). Wilson's information-seeking behaviour models (1981, 1996, 1999). In M. N. Al-Suqri, & A. S. Al-Aufi (Eds.), *Information seeking behaviour and technology adoption: Theories and trends* (pp. 94-112). Hersley, PA: Information Science Reference.
- Prigoda, E. & McKenzie, P. M. (2007). Purls of wisdom: a collectivist study of human information behaviour in a public library knitting group. *Journal of Documentation*, 63(1), 90-114.
- Robson, A. & Robinson, L. (2013). Building on models of information behaviour: linking information seeking and communication. *Journal of Documentation*, 69(2), 169-193.
- Settle, R. B. & Alreck, P. (1989). Reducing buyers' sense of risk. *Marketing Communications*, 14, 34-40.
- Sonnenwald, D. H. & Pierce, L. G. (2000). Information behaviour in dynamic group work contexts: interwoven situational awareness, dense social networks and contested collaboration in command and control. *Information Processing & Management*, 36(3), 461-479.
- Vakkari, P. (2008). "Trends and approaches in information behaviour research". *Information Research*, 13(4). <http://InformationR.net/ir/13-4/paper361.html> (Accessed 2020 October 30th).
- Wilson, T. D. (1981). On user studies and information needs. *Journal of documentation*, 37 (1), 658-670.
- Wilson, T. D. (1997). Information behaviour: an interdisciplinary perspective. *Information Processing & Management*, 33(4), 551-572.
- Wilson, T. D. (1999). Models in information behaviour research. *Journal of documentation*, 55(3), 249-270.
- Wilson, T. D. (2000). Information behaviour, special issue on information science research. *Informing Science*.
- Wilson, T. D. (2005). Evolution in information behaviour modeling Wilson's mode. In Fisher, K., Erdelez, S. & McKechnie, L. (eds). *Theories of information behaviour*. Medford, NJ: ASIST Monograph Series - Information Today Inc.
- Wilson, T. (2006). 60 years of the best in information research: on user studies and information needs. *The Journal of Documentation*, 62(6), 658-670.
- Yeasmin, B. & Rahman, K. F. (2012). Triangulation research method as the tool of social science research. *BUP Journal*, 1(1), 154-163.

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