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An exploratory study on competitive intelligence: Managers' information needs in higher education sector

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ABSTRACT
Competitive intelligence is the collection and analysis of information to support strategic decision making for an organisation, as a means to achieve competitive advantages. Identification of information needs is a prerequisite for the subsequent actions and activities in the competitive intelligence process, and, if not done well, optimal intelligence will not be provided. Intending to identify the information needs of university managers in higher education sector, this study addressed the different dimensions of information needs, information sources, and channels used by them. Due to the nature of the subject and research objectives, the research approach was qualitative based on Grounded Theory, an inductive, theory discovery methodology. Twenty-three university managers in Iran were purposively sampled for interviews. It was found that their information needs were mostly about university competitors, university customers and their higher education providers. Their information needs for strategic decisions and actions were about their collaborators in education and information field, effective marketing about product and services, as well as economic, socio-cultural and legal aspects. They need to pay attention to political and economic information in dealing with unexpected topics. Managers obtained information they needed from four types of information sources and channels - human, organisations, open source documents and captured media, and mixed channels. Electronic information sources were considered to be more abundant for them than printed sources. The paper suggests that the findings can contribute to the design, implementation, and development of competitive intelligence information systems that managers and decision-makers are among its major users.

Keywords: Competitive Intelligence; Business intelligence; Higher Education; Information Needs; Higher education; University managers.

INTRODUCTION

Nowadays, for many reasons, such as globalization, sustainability, individualization, competition, complexity, the demand for knowledge, IT development, threats, crises, and a common view in the organisation, competitive intelligence for organisations is important (Håkansson and Nelke 2015). Competitive intelligence is a systematic and ethical process for collecting and analysing information on competitors, market-place, and competition

and then disseminating intelligence that can affect those organisations' decisions, programmes, and actions (Anica-Popa and Cucui 2009). There are many models for competitive intelligence, but in some of them, the identification of the information needs about key intelligence topics (KITs) has been addressed. KITs are fundamental, significant, and prioritised issues for the organisation. They have the greatest significance to an organisation's managers, and consequently, providing purpose and direction for competitive intelligence operations (Pellissier and Nenzhelele 2013).

In some models, information needs' identification is part of the planning and direction stage (Cloutier 2013; Salguero, Resende Jr and Fernandez 2017; Strauss and Du Toit 2010). However, identifying information needs is part of the detection phase in the competitive intelligence model (Garcia-Alsina, Ortoll and Cobarsí-Morales 2013; Garcia-Alsina, Cobarsí-Morales and Ortoll 2016). But, it is considered as an independent step in the competitive intelligence diamond model by Oraee, Sanatjoo and Ahanchian (2020) or Botha and Boon (2008). Realising the importance of identifying information needs in the intelligence process, therefore, it is a separate step in this research. Although the identification of the information needs cannot solely improve the decisions, it is a prerequisite for the next actions and activities in the competitive intelligence process, and, if not done well, optimal intelligence will not be provided and user satisfaction will not be met.

On the one hand, Individuals and organisations are exposed to the signals of the surrounding world (Håkansson and Nelke 2015). organisations are the environments in direct contact with information, and from many researchers' views, the environment is considered to be the source of information for the organisation (Choo and Auster 1993). Among the features of this informational environment is the abundance of information on the one hand and the lack of useful and relevant information on the other hand. In other words, there is a paradox in it. Managers and decision-makers in different domains of decision making require information and intelligence. This information must be relevant, precise, accurate, comprehensive, up-to-date and timely (Venter and Goede 2017).

It is imperative to focus deeply on the users' information needs, to help solve these problems and a better understanding of the information that leads to decision making and actions in the competitive intelligence process. Thus, identifying and recognising the managers' information needs is highly essential and sensitive.

Also, there are three classical problems in determining the managers' information needs about key intelligence topics: initially and foremost, the reticent managers, who hardly express their needs. The second classic problem relates to the managers who want to know about everything, because they are not able to describe their needs and believe that they will be aware of what they need once they find it. The third classic problem deal with management's needs which is the executive that responds to, "You tell me what I need". This is the most frustrating situation according to Herring (1999). This indicates that the information needs of managers are unclear, leading to the fact that the information provided is not based on their real needs. Only paying attention to information needs is not enough. As Wilson (1981) states that, although individuals' information needs have been addressed, the information sources and the use of information that should meet the needs directly have been neglected.

Many examples of research available are concerning competitive intelligence in different contexts. But in non-profit sectors, it has received trivial attention (Garcia-Alsina, Cobarsí-Morales and Ortoll 2016) and specifically, in higher education and university institutes,

little research has been carried out (Garcia-Alsina, Cobarsí-Morales and Ortoll 2016; Garcia-Alsina, Ortoll and Cobarsí-Morales 2013). Non-profits sectors have organisational needs and obligations. First, they need to plan with their increasingly competitive and dynamic environment in mind to achieve the sustainability of their actions (Weerawardena, McDonald and Mort 2010). Furthermore, they must be held accountable for their activities and the management of their funds. They depend on their environment for financial and human resources from governments and private sectors, in the form of donations or grants. Finally, by creating value and obtaining benefits, they can continue on with their activity. To this end, they use competitive intelligence techniques, such as benchmarking, market studies and information management (Brouard, Larivet and Sakka 2010). The difference between these organisations, in front of others, is the kind of their information needs. There is also faint literature about competitive intelligence and information needs in common (Maungwa and Fourie 2017) and these are more acute in Iran.

Therefore, intending to identify the information needs of university managers in the higher education sector, the current study addresses the different dimensions of information needs, information sources, and channels used by them. The results of this research can contribute to the design, implementation, and development of competitive intelligence information systems that managers and decision-makers are among its major users. It can add to the richness of the conceptual data model used in these systems. This research will facilitate the provision of the right intelligence to the right person at the right time. The results also help librarians and information professionals who support competitive players such as university managers and decision-makers to have a clear understanding of the information needs and ways to addrees these needs.

LITERATURE REVIEW

The concept of information need has been fundamental to many models and studies within information science and has been the motivation for much research on "information seeking, information use and interactive systems design" (Ruthven 2019, 78). Information need is described by Wilson (1981) as a relative and internal concept in individual's mental experiences; Krikelas (1983), as the identification of the existence of doubt in a person; Belkin (1989), as an inadequate state of knowledge; Dervin (1983), as a gap or a stop on the journey of life; and Kuhlthau (1993), as a gap in knowledge or a lack of understanding. Information need is the set of information that an individual need to eliminate mental unknowns, make decisions and make new conclusions.

According to Maungwa and Fourie (2017), problems such as identification, determination and articulation of information needs, lack of application of good information seeking and retrieval skills, information overload, the choice of information sources, and disregard to validate data lead to intelligence failure in terms of information behaviour. Also, they pointed out a lack of conceptual understanding of competitive intelligence (process and value), inadequate positioning of the competitive intelligence process and function in the organisation, lack of access to information, individual abilities and information practices. Håkansson and Nelke (2015) also considered more or less the same cases in competitive intelligence implementation. They stated that knowledge about the information needs of the organisation at different levels and various sources and channels of information is needed.

There are different methods to determine information needs. Vuori (2006) in his study presents five key issues or key intelligence topics (questionnaires, interviews, observations,

critical success factors and intelligence) that he considers as the most employed. These methods are not mutually exclusive and could be complementary.

As has been voiced in competitive intelligence literature, the information needs are determined by key intelligence topics. Herring (1999) states that key intelligence topics are considered as issues of critical importance in competitive intelligence. From Vuori's (2006) point of view, determining the information needs of the key intelligence topics has the following advantages in comparison with other choices:
a) It promotes interaction between the managers and competitive intelligence unit; and
b) It trains managers to express their information needs.

In a model presented by Herring (1999), the key intelligence topics fall into three categories, namely:
a) Strategic decisions and actions;
b) Early-warning topics, for example typically stress activities and subjects by which the manager does not want to be surprised; and
c) Descriptions of the key players in the specific marketplace, including competitors, customers, suppliers, and regulators.

This model has been widely used in competitive intelligence literature, but not using it in the context of universities and higher education can be seen. In this study, Herring's (1999) model is a base for identifying information needs. Herring's model designs a process to detect key intelligence topics, systematically, in a collaborative environment and dialogue between the competitive intelligence professionals and intelligence users. This conversation allows competitive intelligence professionals to keep the needs inventory updated. In this way, the organisation ensures that the competitive intelligence function is always aligned with its objectives.

In the context of universities and higher education, the study of information needs has focused more on the needs of students, graduates, or faculty members. But few studies investigated the university managers' information needs. Pellow and Wilson (1993) investigated the information needs of academic heads of departments at the University of Sheffield. During the pilot stage, 12 heads of department were interviewed. In the first pilot study, the information needs were about the critical success factors and competitor intelligence, research funding alternatives and opportunities, potential student needs and student employment needs and the performance and marketing of new courses were identified. In the general study also other people, such as university librarians and senior administrators were interviewed. The information needs of department managers included external funding opportunities, the policies of the research councils and funding councils, and the provision of financial and management information.

Huotari (1998a; 1998b; 1999) also focused on identifying the information needs with the basis of approach the critical success factors in the University of Tampere study in Finland. Interviews were conducted with people from different sections of the university, such as the strategic apex and the middle level. Information needs were about information management infrastructure, performance, and using information systems, information on systems' output, planning and quality. Information on the academic departments' information needs and on personnel related to division of labouring was necessary. Information about customer feedback, technical development of information management infrastructures, the quality of the generated information, network use in teaching, funding, professional knowledge of the staff were other parts of the needs. The sources and

information channels used included information systems, Internet, internal electronic information sources, external manual sources (such as publications, newsletters, scientific journals, reports), and organisations, consultants and services on statistical reports. In addition, magazines, newsletters, plans, journals, minutes of meetings, books, statistics, notice boards and information services provided by the other service units, e-mail and face-to-face contact, phone were among the sources and channels used.

Garcia-Alsina, Ortoll and Cobarsí-Morales (2013) investigated the competitive intelligence practices at Spanish universities before and after the adaptation process with European Higher Education. Information needs to be included in the discovery of social, technological, political, and other changes, and the resources and information used were placed in the groups, namely, stakeholders consulted, internal and external source.

Most studies on information needs have used a qualitative approach and are exploratory, indicating that this area has not yet been adequately explained. Few studies have focused on the information needs of the university and higher education managers in the competitive intelligence process. In the studies conducted, information needs were investigated along with other competitive intelligence dimensions. However, due to the importance of identifying information needs in the competitive intelligence process, it is necessary to examine these factors through a comprehensive and in-depth study.

METHOD

Due to the nature of the subject and research objectives, this research approach is qualitative, and it has an interpretive paradigm. On this basis, the qualitative method was used to provide a desirable representation of the domains examined in this study. The information identification required in the higher education context lacks sufficient theoretical foundations, so Grounded Theory method has been used.

The research population consisted of Iranian universities managers. Managers were those who engage in policy-making and decision-making in the research and education department of the university. These universities were the top 10 universities in Iran with a high ranking in international ranking systems. Purposive sampling method was used. In purposive sampling, the researcher identified the characteristics of the intended population and found participants with specific recruitment criteria. The criteria for choosing participants were:

a) They were manager in research or education departments at universities under the supervision of The Ministry of Science, Research and Technology,
b) They had more than ten years of management experience,
c) They were interested in the competitive intelligence field, and
d) Somehow they were active in the competitive intelligence process.

Having identified 40 people who met the criteria, an interview invitation was sent to them via e-mail and followed up by telephone calls several times. The invitation ensured their interest or activity in the competitive intelligence process and they were also provided with main questions. It was assured that the principle of privacy and confidentiality were respected at all stages of the research and that participants agreed to volunteer. Theoretical saturation was used to complete the sampling. A total of twenty-three participants were interviewed, all of whom were from five universities (Table 1).

The semi-structured interview protocol was used for data collection with four main questions. The in-depth interview was conducted face to face. The four main questions were as follows:
"What information do you need about the main players in the competitive environment of the university (such as competitors, service providers etc.)?"
"What information do you need for your future decisions and actions about the university?"
"What information do you need with regard to dealing with unexpected topics?"
"What are the information sources and channels that provide you with the information you need?"
Additional and supplementary questions were asked to obtain more information where necessary. Each interview session lasted for 40 to 70 minutes.

Table 1: Participants' Demographics

Participant Code	Field of Study	Management Experience in University (Years)	University Code
P-1	Non-Management	5	A
P-2	Non-Management	7	A
P-3	Management	5	A
P-4	Non-Management	10	A
P-5	Non-Management	4	B
P-6	Management	3	B
P-7	Management	10	B
P-8	Non-Management	12	B
P-9	Non-Management	3	B
P-10	Non-Management	5	C
P-11	Non-Management	6	C
P-12	Management	7	C
P-13	Non-Management	10	C
P-14	Non-Management	5	D
P-15	Non-Management	7	D
P-16	Management	9	D
P-17	Non-Management	5	D
P-18	Non-Management	11	D
P-19	Management	15	E
P-20	Non-Management	7	E
P-21	Management	4	E
P-22	Non-Management	8	E
P-23	Non-Management	5	E

In analysing the qualitative data, a sentence was chosen as the unit of analysis for coding, since it is the easiest unit to distinguish between topics. In this way, it was thought that the texts were analysed in detail. After extraction, codes were categorized. The constant comparison showed the differences and similarities among codes. The categories were separated or merged. The three coding stages used were open, axial, and selective coding. Open coding or the first level of coding that is also called base-coding was the first stage of data analysis and breakdown. Data was broken into its smallest unit. The axial coding or the second level of coding was the next stage. This stage involved specifying the patterns in the data. This stage was the level of categorisation. This required a constant comparison of data. Selective coding or the third level of coding was the next stage and the process by which the categories were related to the core category. Coding was done by using the MAXQDA software version 12, qualitative research tool.

The opinion of an expert in the field of competitive intelligence outside the research team members was used to ensure the correctness of coding after controlling and investigating one of the inside members. The experts was also a researcher in information needs and behaviour topics. The agreement of the expert coding with the researcher coding was calculated with the help of MAXQDA software. In this study, the agreement between the two coders, in other words, the coding reliability, was 80 percent. For the trustworthiness of research, four criteria were considered, namely credibility, transferability, dependability, and conformability (Lincoln and Guba 1985).

FINDINGS

The study findings are presented in two sections. First, the information needs identified in the process of competitive intelligence, and second, the information sources and channels used. Three coding stages - open, axial, and selective coding - were performed on the data. After the codes were identified, they were categorized, as shown in Tables 2 - 5.

Information Needs

(a) Information Needs About Key Players

The information that the managers need about about the key players in the competitive environment of the university are classified under three main categories, based on the type of the key players, namely university competitors, university clients or customers and university service providers. The sub-categories and correponding coding for each key players are presented in Table 2 (university competitors), Table 3 (university customers) and Table 4 (university service providers)

Information Needs About University Competitors

The first category of university managers' information needs was related to information about university competitors on the state of science and technology of the competitors, and their customers, education service providers as well as their financial status (Table 2). The following quotes from two participants are employed to support the findings:
"In the current competitive conditions, our competitors are very important for us. We need information about the situation of other universities in terms of science and technology products, faculty members, and their students. We would like to know the financial condition of the competitors " (P-13)

"We need information about the scientific status of competitors, such as in what subject areas they are researching or in what place they are in the ranking of world universities. It's very important to know what they are doing to not to be outdone" (P-22).

Information Needs About University Customers

The second category of university managers' information needs was related to information about university customers, which include educational customers and research customers. Information on university students, as university educational customers, on services and products of higher education was required by the managers (Table 3). The following quotes from two participants are employed to support the findings:
"In this competitive environment, we should be aware of the status of our students, such as how many students are honored at the International Olympiads, or the owner of invention and innovation" (P-11).

Table 2: Information Needs About University Competitors (First Main Category)

Sub Category		Code
1	**2**	
Information needs about science-technology	**Research information about competitors**	Specific scientific areas considered by the competitors Competitors' innovations and new research technologies Number of research centers affiliated with the competitors Number of business incubators affiliated with the competitors Number of spinoffs affiliated with the competitors Number of articles published in *Science* and *Nature* journals Number of articles indexed in citation databases (Scopus, GSISI) Numbers of citations received by the competitors Number of highly cited articles Impact Factor of the journals publishing the faculty members' articles Impact Factor of the journals publishing the articles that refer to the faculty members' articles Marketing approaches for research products
	Educational information about competitors	New educational technologies New educational fields New educational groups New educational grades Marketing approaches to attract students
	Common information between education and research about	The international collaboration of the competitors Competitors' positions in world university ranking systems
Information needs about customer	**Information about their students**	Information on topographic characteristics of the competitors' students Financial status of the competitors' students Why students choose the competitors Information on the competitors' students receiving international science awards Information on the competitors' students possessing high ranks in the Information the competitors' students presenting inventions and innovations Level of satisfaction in the competitors' students Identifying the high-potential students of the competitors Information on approaches to attract students Highly cited students
	Information about other their customer	Information on the competitors' research results consumers Information on the competitors' contracts with other governmental organisations/ industries
Information about financial status		The competitors' research income Revenue obtained through contracts with industries (internal level) Governmental support for the competitors
Information needs about education service providers	**Information about their faculty members**	Number of faculty members Expertise and specialty of the other universities faculty members Faculty members employed; and those who leave Faculty members who have studied abroad Faculty members presenting inventions and innovations Faculty members presenting the highest number of scientific products Faculty members with the highest number of scientific citations
	Information about their managers	Organisational chart of the competitors Managerial experience and background of the managers Executive experience and background of the managers

"Information about students is very important and helps us in decision-making very much. Information about educational indicators, such as the number of participants who leave the school and students entering the next degree is needed " (P-8).

Information on research customers, which include the private sector and government organisations used researches and products conducted in the university, was also needed by the managers. The following quote from a participant is employed to support the findings:
"Governmental organisations, the private sector, and industries are our research customers, and we need to have good information about them so that we can interact with them and benefit" (P-3).

Table 3: Information Needs about University Customers (Second Main Category)

Sub Category	Code
Educational customers	Number of students studying in several grades in university Number of graduated students Number of students leaving university Number of graduate students Increase in the number of enrolls Number of students entering the market Future expenditures of university students High-potential students of the university Solutions to attract international students
Research customers	Information on industries/ private sectors/ governmental sectors willing to collaborate with university Information on the needs of industries/ private sector using the achievements or consultations of university Information on the needs of the governmental sector using the achievements or consultations of university Information on companies and/ or organisations running R&D centers Identifying profitable customers Executive experience and background of the managers

Information Needs About University Service Providers

The third category of university managers' information needs was related to information about university service providers, sub-categorised into information about faculty members and information about university managers (Table 4). The following quote from a participants is employed to support the findings:
"Information about faculty members and university managers is very valuable. A faculty member active in research helps to upgrade the university. The more persons are cited and have more scientific productions, or have gone to sabbatical opportunity abroad, they will be a privilege of the person and the university, and we need this information " (P-15).

Table 4. Information Needs about University Service Providers (Third Main Category)

Sub Category	Code
Faculty members	Faculty members using the research opportunity programme Faculty members collaborating with other universities Faculty members collaborating with educational and research institutions Faculty members collaborating with industries Faculty members collaborating with governmental organisations The scientific collaboration of faculty members Faculty members presenting the highest number of scientific products Faculty members with the highest number of scientific citations
Managers	Managerial experience and background of the managers Executive experience and background of the managers

(b) Information Needs for Strategic Decision and Actions

What information do managers need for their future decisions and actions about the university? Strategic decisions and actions information needs were placed in five sub-categories under information on (a) companies or organisations willing to collaborate with universities in education and information field; (b) effective marketing about product and services; (c) economic aspects; (d) social and cultural aspects; and (e) legal aspects (Table 5). A verbatim response illustrated these needs:

"We need to get information on the profiles, history and financial status of organisations that are willing to collaborate. We have weaknesses in marketing and we need to achieve good information on the new ways to advertise products and services. Information on the revenues of the university is important. Information on population growth rates and the age pyramid, and so on, are required for future decisions. We need to be aware of the internal regulations and the Ministry of Science" (P-7).

c) Information Needs for Early-warning Topics

What information do managers need with regard to dealing with unexpected topics? Information needs on early-warning topics had two sub-categories: political information and economic information (Table 6). One participant mentioned:

"If we need early information about the possible threats and the opportunities faced by universities, it can be said that we will need information that we do not [be] *surprised in the face of problems. If we are aware of exchange rate changes or even political issues like international relations, we may not have the trouble buying our equipment"* (P-11).

Information Sources and Channels

Four types of information sources and channels that provide the managers with the information they need were identified, namely human resources, organisations, open source documents and captured media, and mixed channels. Figures 1 - 4, depicted by Max-QDA, illustrate the specific information sources and channels to facilitate understanding of the corresponding sub-categories and codes. These four main categories are positioned in the centre, and are linked to the sub-categories.

Human resources consisted of eight sub-categories (Figure 1), namely faculty members (with 3 codes), university board of trustees, representatives of professional associations and networks, consultants (with 2 codes), university graduated students or alumni, presidency, deputies and managers, non-academic staff of the university, and students.

Table 5: Information Needs for Strategic Decision and Actions (Main Category)

Sub Category	Code
Information on companies or organisations willing to collaborate with universities in education and information field	Profiles of the companies or organisations willing to collaborate with universities
	Histories of the companies or organisations willing to collaborate with universities
	The financial status of the companies or organisations willing to collaborate with universities
Information on effective marketing about product and	Information on effective marketing for international students
	Information on effective marketing for research products
Economic information	Bank and non-bank interest rate
	Inflation rate in the country
	Exchange rate in the country
	Research induced revenue
	Governmental budget in the next year
	Training induced revenue
	Other income
Social and cultural information	Population growth rate
	Population age pyramid
	Population growth rate
	Birth and death rate
	Advertisements and promotions about university studying continuation
	The motivation to obtain a degree
Legal information	Information on the limitations of currency based transactions
	Regulations and laws about intellectual ownership

Table 6: Information Needs for Early-warning Topics (Main Category)

Sub Category	Code
Political information	Information on international relationships for students' research opportunity
	Information on international relationships for faculty members' students' research opportunity programme
	Information on international relationships for purchasing laboratory
	Information on international relationships for using scientific articles and
Economic information	Change in the exchange rate
	Funds assigned to universities

Organisations as sources and channels of information for the managers consisted of 15 sub-categories (Figure 2). Libraries, Parliament and Department of Higher Education, as well as organisations or agencies that are associated with science and technology policy, research and developmen, such as science policy research centre, science and technology observatory, research incubators and startups are important source and channel of information for university managers.

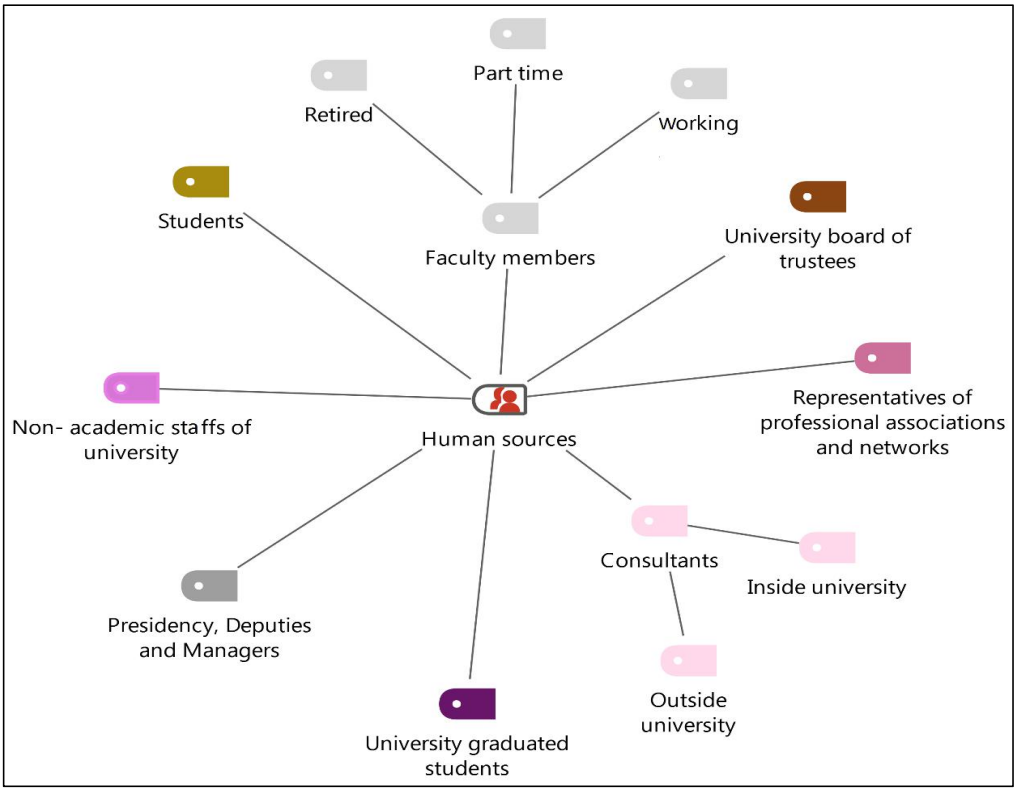

Figure 1: Human Resources as Information Sources and Channels

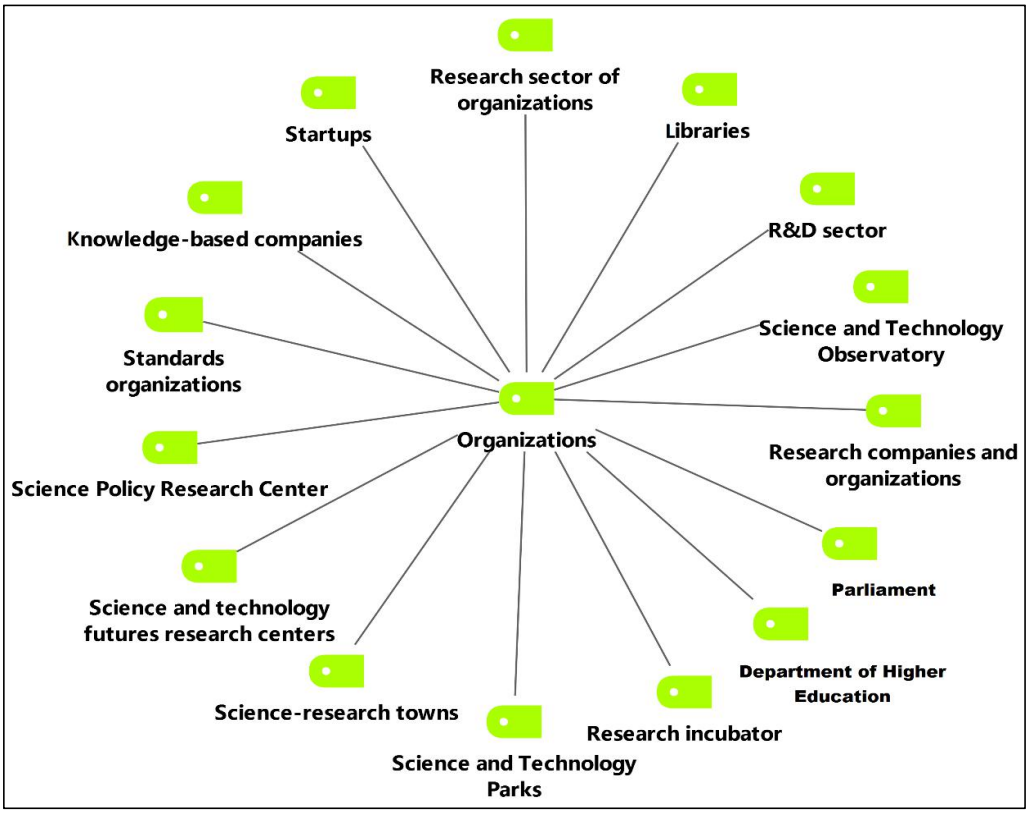

Figure 2: Organisations as Information Sources and Channels

Open source documents and captured media as sources and channels of information for the managers consisted of two sub-categories, electronic (with three codes i.e. database, websites and social scientific networks) and non-electronic (with six codes, i.e. official correspondence, technical document, books, thesis, articles and projects). Figure 3 illustrates the findings.

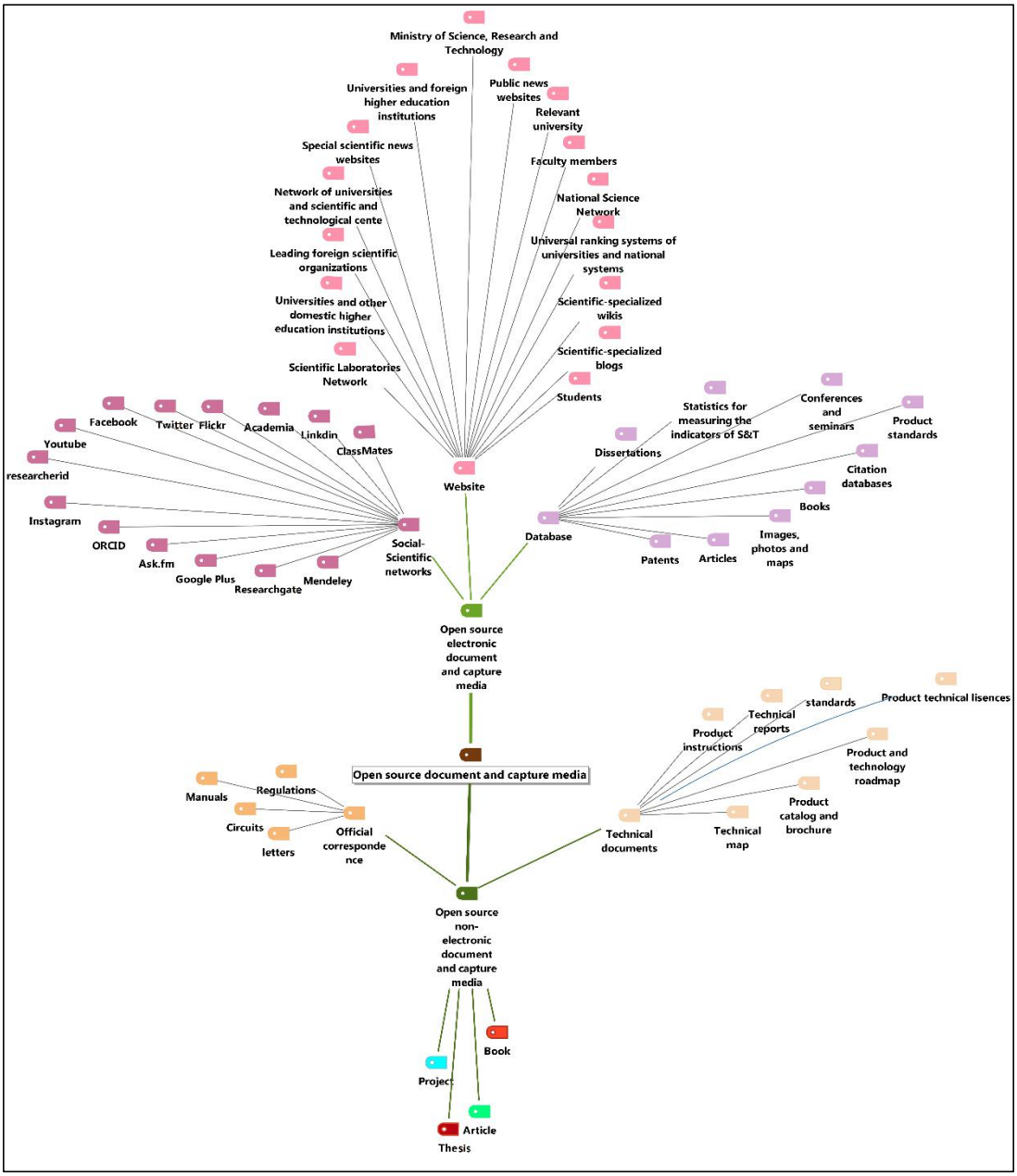

Figure 3: Open Source Documents and Captured Media as Information Sources and Channels

University managers also relied on mixed channels of information sources to address their information needs. Nine sub-categories were indentified in this study, namely workshops, congresses, education courses, conferences, lectures, sabbatical, scientific and specialized exhibitions, seminar and meetings (Figure 4).

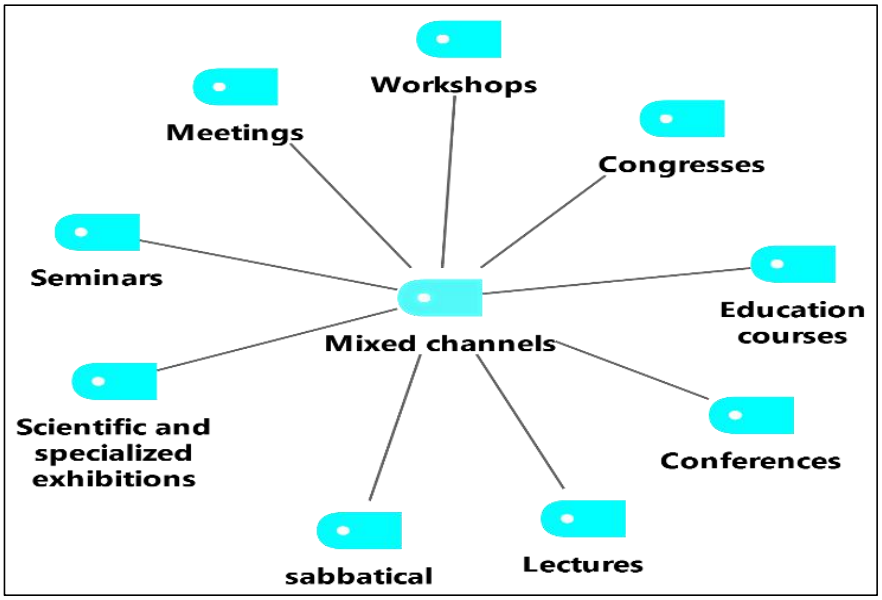

Figure 4: Mixed Channels of Information Sources

DISCUSSION

Today's universities require competitive intelligence to support strategic decision making to gain competitive advantages. The identification of the information needs is a prerequisite for the next actions and activities in the competitive intelligence process, and, if not done well, optimal intelligence will not be provided. Attention to information needs in the competitive intelligence process in higher education, among the university managers, has not received much attention. In this study, the researchers have identified the information needs of managers in the competitive intelligence process and information sources and channels resolving it. In order to identify the needs, the Herring model (1999) was used based on three categories of key intelligence topics (the key players, strategic decisions and actions, and finally, early-warning topics).

Echoing Pellow and Wilson's (1993) research, this study found that the information needs of university managers were different from the needs of other higher education community such as faculty members and students. The findings of the research demonstrated that university managers need a wide range of information. This information was not only about the internal organisation, but also included information relating to the far environment (socio-cultural information, economic, and political information), and close to the organisation (e.g. information about competitors). These were also voiced in Håkansson and Nelke's (2015) study. Managers were not indifferent to changes and environments outside the university and they needed information in this regard.

The information needs about the key players were placed under university competitors, university clients or customers and university service providers. Managers considered domestic and foreign universities as their competitors, and they needed information about competitors' customers, competitors' suppliers, and competitors' science and technology products. Maintaining the current position or gaining a better position for the university was not possible without considering information about their competitors. Since the main

role of higher education is research, teaching and learning, university managers needed information about their educational and research customers, who were largely students, industries, private and governmental organisations. The largest providers of higher education from the perspective of the managers were faculty members and university managers, and the former also needed information about them. Pellow and Wilson (1993) and Huotari (1998a; 1998b; 1999) also highlighted these information needs.

Managers needed information for future decisions and actions, and this information were about their collaborators in education and information field, effective marketing about product and services, economic, socio-cultural and legal aspects. Political and economic information were prerequisites that managers need to pay attention to in dealing with unexpected topics. Pellow and Wilson (1993) and Garcia-Alsina, Cobarsí-Morales and Ortoll (2016) also revealed these information needs.

The type of working tasks of managers in the field of competitive intelligence is complex. In these working tasks, the information needed is for solving problems, making decisions and policies, expediting actions, and performing activities. Therefore, information needs are more ambiguous and less reliable (Saracevic 1996) and their responses may be in different types of information sources. People in these tasks face more difficulties in accessing information, and consequently, information processing is associated with weaknesses. People use more scientific and specialised information resources to perform these tasks. Therefore, it is necessary to identify information needs, identify resources commensurate with the diversity and complexity of information needs, and organise, prepare, and access information to perform these tasks, mainly complex ones.

Managers in this study were exposed to a rich context of information and used four general types of information sources and channels - human resources, organisations, open source documents and captured media, and mixed channels. The size of information available to them was quite wide and extensive as revealed from the identified codes. According to Maungwa and Fourie (2017), the breadth of resources leads to the success of competitive intelligence, but care must be taken in selecting the most useful resources.

Managers received a large portion of their information from different people and organisations and created networks with these entities. These networks can be formal or informal. The networks the managers were connected to were also related to other people and organisations. According to Jaworski, Macinnins and Kholi (2002), the wider the network in terms of size and diversity, the more knowledge it has, and more accurate, timely, and faster will the information be obtained. Besides, there is a greater likelihood that different perspectives on key issues are expressed, and miscellaneous pieces of information will likely be identified and eliminated, and the perceived risk of a decision is reduced.

Open source documents and captured media, especially electronics sources, were more widely used by managers, compared to non-electronic sources. These types of sources such as database, websites and social scientific networks reduce the information poverty of the individuals and the organisation. Choo et al. (2008) believe that increasing the available information helps reduce environmental uncertainty (i.e. uncertainty in the information or lack of information) about the organisation's external environment. Nevertheless, information overload is a failure factor in competitive intelligence (Maungwa and Fourie 2017).

Findings show that, along with open sources, individuals were of great importance as the primary source of information. As stated by Håkansson and Nelke (2015), despite the widespread use of electronic channels and mixed data transfer, the oral tradition had a serious role in the information flow in the academic community. The extension of the scope of using information sources and channels was very wide, and the reviewed studies either included some of them or did not have a comprehensive classification. Although previous studies considered many sources such as books and websites, they did not find some of the information sources such as thesis and technical documents, as found in this study.

CONCLUSIONS

This study has identified the information needs of university managers in the competitive intelligence process. Due to this extensiveness of their information needs, the exact identification of the types of needs, sources, channels, and the use of each of them were either conceptually tabulated or mapped in a form of graphically representation of concepts and relationships between those concepts revealing the observed data. The present study has identified a framework that can be developed to be useful for managers of similar higher education organisations in terms of what information they need and how they can obtain this information, and using this framework in the implementing of process competitive intelligence can leap them forward in managing the university. One important output of this study is a structured list of information sources and channels used by university managers which can have many uses. According to Vuori (2006), managers have information needs and do not know what information is available or how they are obtained or used, therefore this list makes a big contribution. This list can be used with a slight difference to evaluate the information seeking behaviour of university heads and staff in various fields as well as various goals. Many of these resources can be used in the design and architecture of management information systems. Besides, science and technology managers and policymakers can use the information sources and channels when making decisions, planning, and policy-making.

It is recommended that universities set up a unit to implement the competitive intelligence process and also be responsible for the task of needs assessment and identifying the information needed in this process in the universities. In addition, information needs identification system may also be designed. In this regard, using various data collection methods such as surveys, interview, observations along with needs assessment models such as risks-based approach (RIBA) can be of great help.

Further research may be done on universities using other qualitative approaches such as phenomenology and phenomenography, as well as studies on university staff working in a competitive intelligence process. Testing the concepts revealing the observed data through quantitative methods and the use of a questionnaire tool can also be considered in future research. In this case, more complete results are collected about the university managers' information needs, the extent of their information needs, the sources and channels of information and how much they are used.

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