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Comparison of Competitive Intelligence Models for Use in Knowledge-based Companies of Islamic Azad University

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ABSTRACT

Knowledge economics has increased attention to economic dimensions of higher education and introduce business concepts into the field of higher education management. The purpose of present study is to compare competitive intelligence models for the benefit of knowledge-based companies of Islamic Azad University in Iran. The research method is comparative qualitative using content analysis approach to determine similarities and differences among different models. The statistical population includes all competitive intelligence models that have been selected through theoretical sampling method. Using this method, the researchers selected models that can answer the research goals and questions. The method of data collection is document analysis and has been done by examining internet resources, information databases, books, articles, and academic projects. Findings show that despite two decades of research on the relationship between competitive intelligence and other organizational variables, model design and determination of its components is still in its infancy stage. Another research finding indicates an upward trend in the number of components of competitive intelligence in recent models.

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1. Introduction

The establishment of knowledge-based companies in Iran in order to commercialize research ideas and products was proposed in the early 2000s, and then in 2010 the law to support these companies was approved by Iran's Islamic Parliament. According to the definition provided in Article 1 of this law, knowledge-based institutions are private or cooperative companies, that aim to synergize science and wealth, develop a knowledge-based economy, achieve scientific and economic goals (including the development and application of inventions and innovations) and commercialization of research results (including design and production of goods and services) in the field of superior technologies and high added value, especially in the production of software (Iran's Islamic Parliament, 2010). One of the most important goals of these institutions was to reduce Iran's dependence on revenues from oil sales (Karami, 2020). It is now almost a decade since the establishment of knowledge-based companies. During this period, the number of knowledge-based companies - especially companies affiliated with academic centers and universities - has been growing significantly (more than 5,000 companies). Also, the sales of knowledge-based companies in 2018 reached about 90 thousand billion tomans (nearly $US21300000000) (Sattari, 2019). Despite this quantitative growth, knowledge-based companies face several major problems:

- Half of the companies are start-ups, most of which have either not sold products or do not know how to sell products.
- Government support for companies is very limited.
- While government agencies expect knowledge-based companies to have an organic and technological structure, they are caught up in a bureaucratic structure.
- The founders of companies have no knowledge of competing companies in their areas of activity (Raymand Service, 2019).

This situation has caused less than 2% of the country's macro-economy to be allocated to the field of knowledge-based economy and the penetration rate of technological products in 2019 (Qaderifar, 2019). According to the latest Customs Organization report, Iraq, Tajikistan, Germany and the United Arab Emirates are major customers of Iranian knowledge-based institutions. The total high-tech exports of these companies to Asia were about $ 51 million, to Europe about $ 25 million, to Africa about $ 1.4 million, and to South America about $ 400,000 (Rasooli Gandmani,

2017) which has a very small share in the country's export revenues. For this reason, Hosseini (2020), a member of the Economic Commission of Iran's Islamic Parliament, believes that problems of Iran's economy have overshadowed activities of knowledge-based companies. Salimi (2015), a member of the Education and Research Commission of the Parliament, also emphasizes that knowledge-based institutions have not had a proper progress rate.

This overview of the situation of knowledge-based companies shows that they have not been able to perform successfully in exporting and selling their goods - both nationally and internationally. However, not much research has been done to evaluate performance of these institutions. Siahsarani Kojouri (2017) and Siahsarani Kojouri, Zarei, Maleki Minbash Razgah, Azar and Feyz (2017) mention the two main problems of these institutions as low investment and unsustainable exports. Ronaghi and Ronaghi (2014) found that many founders and managers of knowledge-based institutions do not have accurate knowledge about their competitors at both national and international levels. These research findings show that knowledge-based institutions in today's highly competitive environment need to use new tools for decision making. One of these tools is competitive intelligence.

2. Research Background

Today, organizations in the competitive environment of global economy whose managers and decision makers have a deep understanding and evaluation of their field of activity are familiar with the characteristics of growing markets, and have a true picture of market, customer, competitors, socio-political factors and technological developments. To achieve these characteristics, founders and managers of institutions must be equipped with competitive intelligence. The Society of Competitive Intelligence Professionals (SCIP) defines Competitive Intelligence as follows. "CI is a systematic and ethical programme for gathering, analyzing, and managing any combination of Data, Information, and Knowledge concerning the Business environment in which a company operates that, when acted upon, will confer a significant Competitive advantage or enable sound decisions to be made. Its primary role is "Strategic early warning" (Colakoglu, 2011, p. 1616). According to Heydari and Saeidi (2011), competitive intelligence is a systematic process that includes planning, collecting, analyzing and transmitting information. Of course, competitive intelligence is not a strange concept for managers because they have always tried to know what their competitors are doing (Hosseini, 2020). This concept has found its place in scientific fields since the 1980s. Also,

well-known industrial companies such as General Electric, Motorola, Microsoft, HP, IBM, AT&T, Intel, TriM, Xerox, Merchant, Coca-Cola and Chrysler all use competitive intelligent systems (Grant, 2015; Nazarpour, Sepahvand, & Masoudi Rad, 2016).

In fact, development of technology and growth of global trade has led to rapidly and constantly changing business environments. In this situation, managers can not rely on previous experience or personal intuition to make strategic decisions. Thus, company managers need information to ensure customer satisfaction. They need to have a lot of information about competing companies and market players and marketing skills (Kotler & Armstrong, 2010). Rouach & Santi (2001) mention three types of competitive intelligence: First, business intelligence in which the information of customers, suppliers, buyers and distributors is mainly collected and analyzed. Second, the intelligence of competitors, which requires continuous and systematic review of changes in the structure of competitors, new products, new competitors and evaluation of evolution of competitors' competitive strategy and issues such as their pricing and development policies. Third, technological intelligence deals with topics such as cost analysis, benefits of current and new technologies, predicting technologies that will disappear in the future, and technologies that will dominate market in the future. Of course, there are other categories. For example, social strategic intelligence that encompasses laws, taxes and finance, economic and political scope, and human resources. This type of intelligence focuses on observing and analyzing social behaviors (Dowling & Welch, 2004). However, the importance of the concept and function of competitive intelligence in modern organizations and institutions has led to the design of various models by various experts in management sciences and human resources. Numerous studies have also examined relationship among competitive intelligence and various organizational and behavioral variables in a variety of governmental, industrial, and commercial organizations and institutions. For example, Vidigal (2013) highlighted that Competitive Intelligence activities can contribute to a strategic alignment of the organization, that is, fulfill strategic planning guidelines, as well as serving as instrument to verify the effectiveness of their actions and performance in relation to the marketing efforts of the organization - such as feedback from customers concerning the image of the organization and their perception of the products and services offered. Hilterbrand (2010 as cited in Colakoglu, 2011, p. 1616) belives there are three main steps to achieving competitive intelligence, which are gathering information, extracting information and applying context to information. In addition, Colakoglu (2011) emphasized that successful CI practitioners are learning CI through actively listening, reading,

discussing and performing. Practitioners must possess specific competencies, knowledge, skills and abilities to effectively execute the sustainable intelligence cycle that successful CI practitioners are learning CI through actively listening, reading, discussing and performing. Practitioners must possess specific competencies, knowledge, skills and abilities to effectively execute the sustainable intelligence cycle.

In Iran, Aliqoli & Fatemi (2017) through examination of relationship among dimensions of competitive intelligence and effectiveness of marketing strategies of companies in an industrial zone showed that dimensions of competitive intelligence have a positive and significant role on effectiveness of marketing strategies. Ebrahimzadeh and Rajaei (2015) found intelligence competitiveness has a positive and significant effect on brand equity of companies. Osanloo & Khademi (2015) designing a competitive organizational intelligence model based on entrepreneurial awareness found that three factors affect entrepreneurial awareness, market sensitivity and market orientation capability on competitive intelligence in organizations. Moslah, Bahreinizadeh, & Dokohaki (2015) in examining effect of competitive intelligence on innovation in knowledge-based companies found that competitive intelligence has a positive and significant effect on innovation. Also, market intelligence has a positive and significant effect on all three types of innovation (technological, market and administrative). In addition, although the effect of competitors' intelligence on administrative innovation is positive and significant, the effect of competitors' intelligence on technological and market innovation has not been confirmed. Kalantarian, Baratimarnani, & Salavati (2012) highlighted that organizational learning has a positive and significant relationship with competitive intelligence (knowledge of market conditions, competitors, technology and society). Zangouinejad & Meshbaki (2009) revealed that information systems - as structural capital - have a significant relationship with competitive intelligence and competitive advantage of the organization. Tabarsa, Rezaian, & Nazarpour (2012) found that 66% of competitive advantage can be explained through structure of human intelligence. Also, knowledge strategies - with a detection coefficient of 40% and 48% - are the most important indicators affecting structural intelligence and human intelligence.

In a brief conclusion, two important points can be achieved by examining the research findings: First, there is a correlation between competitive intelligence with various organizational and behavioral variables, and Second, different models have been designed to relate these variables and demonstrate competitive intelligence with various components. The designers of

these models have tried to identify components of competitive intelligence. Although models may seem inflexible and overly hierarchical, they are valuable in the process of action. In fact, models do not define boundaries, but can be used as maps to guide managers and planners of organizations. An important point that has led to present study is that different models emphasize on existence of different components for competitive intelligence. Therefore, in order to avoid founders and managers' confusion of knowledge-based organizations, the necessity of identifying them from a comparative point of view becomes clear. Also, review of previous studies shows that researchers in the field of human resource management have not compared the models to identify and determine their similarities and differences. In addition, the suitability of components of existing model with conditions of knowledge-based organizations has not been studied and analyzed so far. Also, due to the lack of an optimal model for competitive intelligence in knowledge-based institutions of the Islamic Azad University, it seems that the first step should be to compare available models to identify their similarities and differences. Therefore, the main purpose of present study is to compare competitive intelligence models and provide suggestions to policy makers of Iran's higher education system (with emphasis on status of knowledge-based institutions in the Islamic Azad University). Accordingly, research questions include:

- What are components of competitive intelligence in selected models?
- What are similarities and differences between models in terms of components?

3. Research Method

The research method is a comparative qualitative study based on content analysis approach to find similarities and differences among models. The statistical population included all competitive intelligence models and the research sample was chosen through theoretical sampling method. Using this method, researchers selected models that could answer research goals and questions. Completion of theoretical sampling was determined based on data saturation. This method is usually used in qualitative research when a new set of concepts is not obtained by reviewing new cases (Aspers & Corte, 2019). The researchers in the tenth model reached theoretical saturation. The method of data collection was Document analysis (through review of Internet resources, databases, books, journals, and academic projects). Thematic content analysis method was used to analyze the data.

4. Findings

This section consists of two parts: First, an overview of models (first question); Second, determining the similarities and differences among components of selected models (second question).

First: Overview of models

A review of research literature shows that despite importance of competitive intelligence and passage of more than two decades of designing this variable in academic fields and management of organizations, little effort has been made to determine its components and design a comprehensive model. Due to this fact, the most important competitive intelligence models that have been used in scientific research by international and Iranian researchers are introduced:

1. Deschamps and Nyak model (1995): This model was designed and introduced in 1995 and designers believe that competitive intelligence has three main components: a) market intelligence, which is responsible for preparing and presenting current and future trends, needs and preferences of customers to new markets; b) Intelligence of competitors, which is responsible for evaluating competitive strategy of competitors through continuous and systematic observation and review of changes in structure of competitors, new alternative products and new competitors; and (c) technological intelligence, which is responsible for analyzing cost-benefit of current and new technologies, predicting technologies that will disappear in the future, and technologies that will dominate the market in future (Deschamps & Nayak, 1995).
2. Rouach & Santi model (2001): This model, which was first introduced in the European Quarterly of Management, became one of the most famous models of competitive intelligence. Rouach and Santi added two new components of social and strategic intelligence to the three components of previous model. According to these two designers, institutions and organizations should also pay attention to issues such as financial and tax regulations, political and social issues and human-social resources. In addition, managers of organizations should not neglect the role of competitive selection, alert system, tactical information, and training and empowering of employees to increase role of competitive intelligence.

3. Gabber Model (2007): Hossam Gabber, a faculty member of Energy Systems and Nuclear Science in Canada indicated market competition, technology, innovation, customers' behavioral patterns, and the prediction of future trends as main subfactors of Competitive intelligence. He believes recognition of market competition, technology, innovation, customers' behavioral patterns, and the prediction of future trends is necessary for competition (Gabber, 2007). Organisations can use Competitive intelligence for such reasons as assessing a competitor's strategies, defining the customers' requirement, discovering and evaluating trends in the industry or identifying emerging new opportunities in the marketplace and accordingly offered innovative products and services to that effect (Gabber, 2007 as cited in Nte, Omede, Enokie &Bienose, 2020, p. 78).
4. Porter Model (2008): Harvard professor Michelle Porter, although in the late 1970s published an article in the Harvard Business Review examining the concept and role of intelligence in success of organizations and companies, but in following years and through design of a famous model (Porter's five forces), had a huge impact on academic space. The Five Forces Model is the strategy model or framework created by Porter describing how five industry forces affect an industry. The strengths of the competitive forces are determined by the key structural features of industries. Indeed, Porter five forces analysis is a framework that attempts to analyze the level of competition within an industry and business strategy development. These forces are: Threat of new entrants, bargaining power of customers (buyers), threat of substitute products or services, bargaining power of suppliers and industry rivalry (Porter, 2008).
5. Moshabaki and Zangouinejad Model (2008): In this model, the authors have presented a competitive intelligence model by examining existing theories through proving two hypotheses in a causal and correlative manner. The model has structural, technological / social and market dimensions that are positively correlated with each other and their synergy has an impact on competitive intelligence of organization. Also, in this model, the role of organizational intelligence and especially components such as planning and decision making, information technology and content factors are highly emphasized.
6. Beikzad and Eskandari (2009): These researchers investigated relationship between competitive intelligence and its prevalence among managers of small industries. According to them, the main dimensions of competitive intelligence are: business awareness, awareness of the situation of competitors, technological and technical awareness, and strategic and social awareness. The results of their research also show that there is a

significant relationship among competitive intelligence and industry development. In addition, business awareness has the greatest impact on development of industries among components of competitive intelligence.

7. Yap and Rashid Model (2011): Two Malaysian researchers in 2011 tried to show current status of comptitive intelligence (CI) practices in Malaysia, and how managers acquire and use CI from various sources. They select ten types of CI, including customer, competitor, supplier, technological, regulatory, economic, socio-cultural, human resources, global, and organisational. The findings of reseach reveal that the top three sources where CI is used in strategic decision making are customers, competitors, and newspapers and periodicals (Yap & Rashid, 2011).
8. Badizadeh and Polaki Model (2016): Two researchers from Qazvin Islamic Azad University of Iran tried to show which dimension of competitive intelligence – based on the type and size of institutes – can increase the ability to fight competing companies. By examining the research literature and status of high-yield companies, these two designers determine four components of competitive intelligence that are structural - organizational, social - strategic, technological and market. They also emphasize role of planning, human resources, basic research and innovation.
9. Aliqoli and Fatemi Model (2017): These two researchers of Islamic Azad University, according to the theory of the French School of Management, studied the main components of competitive intelligence in industrial towns in Northwestern of Iran. According to these two designers, the main components of competitive intelligence are: a) Marketing awareness: To map current and future trends of customers and their preferences, new markets and innovative segmentation opportunities, and profound changes in marketing and distribution. In this way, the information of customers, buyers, suppliers and distributors is collected and analyzed; b) Awareness of competitors' situation: To evaluate competitive strategy of organization in relation to changes in structure of competitors, their alternative product and newcomers to the industry; c) Technological and technical knowledge: To evaluate cost and benefits of current and future technology as well as predict future technology through basic and applied research, processes, norms and patents; and d) Strategic and social awareness: including laws, financial, tax, political, economic and social issues and manpower.
10. Siahsarani Kojouri et al. Model (2017): These researchers at Semnan University of Iran tried to examine situation of knowledge-based companies through a combined study by

conceptualizing and prioritizing components of competitive intelligence. They presented a new model through interviews with experts as well as analysis of previous models considering social and political conditions of Iran. This proposed model has 8 components of market, financial, technical, managerial, legal, human, political, and competitors. They also consider the lack of managerial intelligence to be the most important weakness of Iranian knowledge-based companies.

In the next section, similarities and differences of the models in terms of type and number of components are explained.

Second: Similarities and differences among components of selected models

To compare competitive intelligence models, we first examine structures or components that make them up. Table 1 shows the names of the designers, type and number of components. Since the first decade of the new millennium, researchers' attention of field of management to design competitive intelligence models has been on the rise. Of course, compared to the multiplicity and variety of models related to other management variables, the number of competitive intelligence models is less. However, out of 10 models of the present study, 5 models have been prepared by Iranian researchers which show the growing interest in this phenomenon in developing countries such as Iran. In addition, the data in Table 1 show that as we move away from the first years of the 2000s, the number of components of the models has increased from 5 components (Rouach and Santi, 2001) to 10 components (Yap & Rashid, 2011).

Table 1. Distribution of models by year of design, number and type of components

No.	Name of Model	Year of design	No. of components	Components
1	Deschamps and Nyak	1995	3	Market, competitors, technology
2	Rouach and Santi	2001	5	Market, competitors, technology, social, strategic
3	Gabber	2007	6	changes' entity and market, competition, technology, innovation, customers' behavioral patterns, and the prediction of future trends
4	Porter	2008	5	Threat of new entrants, Bargaining power of customers (buyers), Threat of substitute products or services, Bargaining power of suppliers Industry rivalry
5	Moshabaki & Zangouinejad	2008	3	Structural, technological / social, market
6	Beikzad & Eskandari	2009	4	Business awareness, competitors' awareness, technological and technical awareness, and strategic and social awareness
7	Yap and Rashid	2011	10	customer, competitor, supplier, technological, regulatory, economic, socio-cultural, human resources, global, and organizational
8	Badizadeh and Polaki	2016	4	Structural - organizational, social - strategic, technological and market
9	Aligoli and Fatemi	2017	4	Business awareness, awareness of competitors, awareness Technical technology, social strategic awareness
10	Siahsarani Kojouri et al.	2017	8	Business awareness, awareness of competitors, awareness Technical technology, social strategic awareness

Table 2 shows the similarities and differences of competitive intelligence models by basic components:

Table 2. Comparison of competitive intelligence models by basic components

Model/ Component	Deschamps & Nyak	Rouach &Santi	Gabber	Porter	Moshabaki & Zangouinejad	Beikzad & Eskandari	Yap & Rashid	Badizadeh &Polaki	Aligoli & Fatemi	Siahsarani Kojouri et al.	No. of component
Market	*	*	-	-	*	*	-	*	*	*	۷
Competitors	*	*	*	*	-	*	*	-	*	*	۸
Technology	*	*	*	-	*	*	*	*	-	*	۸
social	-	*	-	-	*	*	-	*	*	-	٥
Strategic	-	*	*	-	-	*	-	-	*	-	٤
Innovation	-	-	*	-	-	-	-	-	-	-	۱
Structural	-	-	-	-	*	-	*	*	-	-	۲
Customer	-	-	*	*	-	-	*	-	-	-	۳
Threatening new	-	-	*	*	-	-	*	-	-	-	۳
products Bargaining	-	-	-	*	-	-	*	-	-	-	۱
human resources	-	-	-	-	-	-	*	-	-	*	۲
Legal	-	-	-	-	-	-	*	-	-	*	۱
Political	-	-	-	-	-	-	-	-	-	*	۱
Global	-	-	*	-	-	-	*	-	-	-	۲

Analysis of data related to selected models represents 14 components to competitive intelligence that have been considered by designers and authors. Also, some designers have used components in combination, which have been avoided to be present in the above table. The results of structural analysis of various models can be expressed as a list:

- The greatest degree of similarity between models is in emphasizing on role of two components of competitors and technology. These two components are present in 8 models.
- The market is the third common component among 7 competitive intelligence models.
- The greatest degree of difference between models is assigned to the components of innovation, bargaining power of suppliers, legal and political, which are considered separately in only one model.
- Components such as social, strategic and customer are moderately considered by model designers.
- Most models are designed according to the situation of commercial organizations and institutions.

According to research literature, component analysis and type of organization or company in which the model is tested for first time, all models can be divided into three groups: organizational-oriented, market-oriented and combination. In designing organization-centered models, the emphasis is on position of variables such as human resources, employees, customers, strategies, innovations, management and law. Market-based models insist on fundamental role of components such as market, competitors, technology, social, political, suppliers and new products in competitive intelligence. In the third case, we are dealing with models whose designers have paid attention to both characteristics of organization and business components. According to these definitions, Table 3 shows belonging of each model to three groups:

Table 3. Classification of models based on the main orientation of the components

General orientation	Models
Organization-oriented	Yap & Rashid/ Badizadeh &Polaki
Market oriented	Deschamps & Nyak/ Rouach & Santi/Porter/ Beikzad & Eskandari /Aligoli & Fatemi
Combination	Gabber/ Moshabaki & Zangouinejad / Siahsarani Kojouri et al.

Data analysis shows that most competitive intelligence models consider business components. In fact, in older models, researchers and writers focused mainly on the impact of factors that contributed to greater profits. Subsequent studies have shown that fundamental changes must take place within organizations and institutions in dimensions such as management practices, staff training and human resources, strategies and decision-making methods. The

studies of individuals such as Gabber, Moshabaki & Zangouinejad and Siahsarani Kojouri et al. focused on simultaneous role of market and organization and variables such as foreign competitors, social characteristics, political and legal system.

5. Conclusion

The aim of this study was to gain a deeper insight about concept of competitive intelligence with respect to existing models for benefit of founders and managers of knowledge-based institutions and companies of the Islamic Azad University of Iran. Knowledge-based institutions and companies in Iran do not have a long history and therefore their development and progress requires more time. Although quantitative growth of these institutions indicates potential capacity of Iran's human resources to produce knowledge-based products, production without sales can be nothing but a waste of resources. Many studies in Iran have shown that these companies mainly and simultaneously face two major problems. The first problem is lack of ability of these companies to have an active presence in international and national markets. In fact, in the international dimension, Iranian companies are not able to actively participate in the global market, mainly due to political problems with the U.S. The second problem is related to the challenges related to lack of accurate knowledge of internal and external competitors, technological limitations, and insufficient management skills.

According to these points, the findings of present study can be examined. The first research finding points to the scarcity of competitive intelligence models compared to other new variables in the field of human resources management. The second research finding indicates the design and implementation of competitive intelligence models for factories and commercial companies, while it is difficult to find a model that is designed according to the nature of knowledge-based institutions. The third finding reveals the quantitative growth of research related to competitive intelligence and the expansion of components. The fourth finding highlights expansion of model designers' insights towards components involved in competitive intelligence and generalization of these components from business components to organizational and extra-organizational components (social and international). Another finding related to the models is increasing role of factors such as international market, political and legal systems, and emergence of new competitors - influenced by the growth of modern technologies. Based on findings, it is suggested that the founders and managers of knowledge-based companies identify and strengthen methods of anticipating opportunities and evaluating threats in the market. This is possible through the

use of experienced managers who are familiar with market's trend for the sale of knowledge-based goods. Research scrutiny also includes a warning to executives that the dimensions and complexities of competitive intelligence are increasing as time goes on. High intelligence - in addition to designing systematic processes- requires information about market, current and new competitors, new products and political and social conditions of society.

Another suggestion is for managers and founders of knowledge-based companies to pay attention to the realities of Iranian society. The sale of intellectual products should not be limited to national borders; however, success within the country can be the first step to enter the international market. Improving the quality of products combined with competitive intelligence can sometimes overcome political and social barriers. The present researchers tried to provide a comprehensive understanding of this issue by comparing competitive intelligence models. In fact, this study can be considered as the first comparative study on competitive intelligence models conducted in Iran, however researchers could not find similar research in other countries. Researchers also faced limitations. The first limitation was the small number of competitive intelligence models. The second limitation is lack of models related to knowledge-based companies, which limited the generalizability of models. Despite these limitations, the researchers hope that the findings of present study can be used by other researchers around the world.

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