

Conceptual Relationship between Information and Communication Technologies and Competitive Intelligence Activities

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ABSTRACT

This paper aims to describe the conceptual relationship between information and communication technologies (ICT) and competitive intelligence (CI) by emphasizing the role of ICT in support of knowledge processes specific activities relevant to the viability of the organization. Assessing the value and role of ICT to support CI activities requires an understanding of the relationship between the two. This study argues that starting from either the ICT or CI side to this relationship and linking to the other, as most studies do, cannot secure a fully adequate conception of ICT's value and role to CI. In such context the challenge is to find an appropriate approach in the relationship itself and use it as a possible pattern for developing an understanding of both ICT and CI. For this reason, the paper starts with a brief overview of CI function and continues with a review of the possible uses of ICT in the activities of intelligence. The third section of the study aims to analyze the relationship between ICT applications and CI function. Finally, this study describes a number of problems identified in the use of ICT applications to support intelligence activities within organizations and also it discusses possible solutions to resolve these deficiencies.

KEYWORDS: *competitive intelligence, information and communication technologies, intelligence, competitiveness, information*

JEL CLASSIFICATION: *D80, M10, M15, O30*

INTRODUCTION

Today, organizations operating in a global market, in a volatile, complex, dynamic and turbulent environment and they are facing with pressures of increasing global competition, the speed and impact of policy changes, the increasingly rapid development of technology, in general, and information and communication technologies, in particular. In such context, to ensure the viability of the organization, corporate management needs relevant, timely and intelligent competitive information and how to use and manage them. Organizations must collect and process in a strategic and organized way a huge amount of information

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about the environment (competitors, customers, suppliers, government, technology trends, ecological developments) in order to identify and define their business environment, to scan opportunities and threats constantly emerge, and to use this information in formulating and implementing its strategies. To deal with this challenge, more and more organizations have implemented CI function that generally aimed at producing and processing information about the environment of an organization with strategic goals (Kahaner, 1997, cited by Vriens, 2004) and that is a key factor to the viability of an organization (Achterbergh & Vriens, 2004). CI has always had a critical role in the process of knowledge creation (Calof, 2001, cited by du Toit, 2003). Due to the importance of CI function for the viability of the organization, in the literature there are many studies about the processes and purposes of CI function as about the use and importance of ICT in the CI applications. However, although it is widely recognized the important role of ICT applications for CI, it appears that the way for describing the relationship between ICT and IC is still quite confusing. In order to select appropriate ICT tools for CI, an organization must first understand the role of ICT in these activities which means to capture the relationship between ICT and CI activities and the opportunities ICT to support CI activities.

This paper aims to develop an approach in order to identify a possible connection between CI and ICT from a conceptual perspective. For this goal, followed directions of paper aimed to identify key concepts necessary for establishing approach, exploring the complexities involved in defining these concepts and conceptual understanding of the interrelationship between IC and ICT. Assessing the value and role of ICT to support CI activities requires an understanding of the relationship between the two. In such context the challenge is to find an appropriate approach in the relationship itself and use it as a possible pattern for developing an understanding of both ICT and CI. To understand the relationship between CI and ICT applications, the structure of the article is as follows: Firstly, we present a brief overview of the issues that concern CI function, followed by an overview of ICT applications that can be used to support this function. A third direction of this paper provide an approach to understanding the relationship between CI and ICT and also reveal some problems that may arise in the use of ICT applications for CI. Finally, some solutions to manage these problems are proposed.

1. LITERATURE REVIEW

1.1. Conceptual approaches: competitive intelligence and intelligence cycle

Competitive intelligence is a discipline whose importance is growing in business environment since 1980 when several companies in USA have introduced formal functions of business intelligence (BI). Like other economic concepts, CI concept has many approaches and definitions (Hughes, 2005, cited by Colakoglu, 2011). According to SCIP, the way in how companies define CI is very important for the evolution of its internal expectations. In such context, SCIP define CI as "the process of ethically collecting, analyzing and disseminating accurate, relevant, specific, timely, foresighted and actionable intelligence regarding the implications of the business environment, competitors and the organization itself". CI requires "knowledge and foreknowledge about global business environment that resulting in actions". Thus, CI can be treated as a process of enhancing the competitiveness of markets with a deep and ethical understanding of business competitors and its competitive environment. CI suppose a legal and ethical activity for collection and analysis of database information and other open legal sources regarding the capabilities,

vulnerabilities and intentions of business competitors and for controlled dissemination of intelligence to decision makers. At first glance, these definitions seem to refer to the same issues that concern the process of obtaining information, analyzing and using or disseminating them. Some differences regarding the central element of approach can be noted. Also, some definitions are focused on intelligence and other definitions on data, information and knowledge. Authors generally refer to two reasons for obtaining CI. The first reason is that CI contributes to the overall goal of the organization aimed at improving competitiveness and maintaining the viability of the organization. The second is the contribution of CI to activities necessary in an organization to achieve global purpose (decision-making or strategy formulation).

In the literature, usually are found two distinct approaches of the CI concept: as a product and as a process. In addressing CI as a product, the authors refer to data, information or knowledge obtained and used for strategic purposes. In the process view, CI is the process by means of which the intelligence product is obtained for making strategic decisions. The process view describes CI in a cyclical form containing four, five or six phases depending on the approach considered. Thus, the cycle is considered the intelligence business model with the highest level of abstraction. In the literature, most authors (Achterbergh & Vriens, 2002; Davenport & Prusak, 1998) addresses CI as process (intelligence cycle) which involves four stages: (1) determining the direction in which strategic information requirements are identified, (2) collecting necessary data that suppose on the one hand identifying available resources and on the other hand, accessing these sources and retrieving requested information, (3) analyzing information from a strategic perspective to determine their strategic relevance; (4) disseminating of intelligence for the use of it in making strategic decisions or to evaluate current strategic options, either for generating, comparing, selecting and implementing of a new options. According to U.S. Central Intelligence Agency (2002) (CIA), intelligence cycle involves five distinct phases as: planning and direction, collection, processing, analysis, synthesis and production, knowledge dissemination. Unlike the CIA's vision, in the U.S. Department of Defense view (U.S. DoD Joint Intelligence, 2007), intelligence cycle involves six categories of intelligent operations: planning and direction, collection, processing and exploitation, analysis and production, dissemination and integration, evaluation and feedback.

Despite of the considered approach, each intelligence cycle begins with the knowledge need (e.g. a established requirement, a special request, an urgent need in a crisis situation) expressed by named decision makers and consumers of intelligence and ends with providing the type of intelligence required. Although in the classic form, the intelligence process appears as a cycle, in fact, it represent a continuity of action with many feedback (reverse side) and feed forward (reactions in advance) that requires collaboration between customers, collectors, analysts through the intensely collaborative process of collection, processing, analysis and synthesis integrated to intelligent enterprise level.

1.2. Information and Communication Technologies for Competitive Intelligence

Due to the importance of CI function for the viability of the organization, in the literature there are many studies about the processes and purposes of CI function (Cook & Cook, 2000; Fuld et al., 2002, quoted by Achterbergh & Vriens, 2004; Kahaner, 1997 cited by Vriens, 2004; Vriens & Philips, 1999) as about the use and importance of ICT in the CI applications (Cheung & Li, 2011; Hernandez, Jimenez & Martin, 2009; Phan & Vogel,

2010; Shih, Liu & Hsu, 2010; Trkman, 2010). For example, Hendriks and Jacobs (2004) emphasize the role of intranet applications to support CI activities. Reid (2004) presents a way of using web link analysis to detect and to analyze hidden web communities, analysis which provides valuable knowledge about stakeholder communities. Vriens and Achterbergh (2004) approach the relationship between ICT and CI activities from the perspective of organization strategy formulation and suggest how simulation games applications can be used to support CI activities. Rouwette and Vennix (2004) propose one of the ways in which groupware tools can support CI activities, especially those for obtaining and analyzing intelligence. Other authors discuss about contribution of system dynamics applications to improving CI activities (Pala, Vriens & Vennix, 2004), about the ability of ICT applications to provide the necessary intelligence for performance management business (van der Kooij, 2004), or about how the spatial elements of data and information relevant to the organization (geographical information system) can improve decision making process in the field of CI activities (Hendriks, 2004). However, although it is widely recognized the important role of ICT applications for CI, it appears that the way for describing the relationship between ICT and IC is still quite confusing.

According to Vriens (2004), to accomplish properly activities included in the intelligence cycle, an organization should implement the so-called "intelligent infrastructure" consisting of 3 parts: (1) a technological part which include the ICT applications and infrastructure (hardware, software and communications technologies) that support the intelligence cycle stages, (2) a structural/organizational part referring to organization structure based on the definition and allocation of CI tasks and responsibilities, (3) a human resources part aimed at selecting, training and motivating personnel involved in intelligence activities. The challenge for organizations is to find balanced mix of measures for technological, structural and human resources to build and maintain infrastructure intelligence (Hannon, 1997, quoted by Vriens, 2004; Kahaner, 1997). In his view, Vriens (2004) suggests that the role of ICT for CI or CI Systems (CIS) is to support making strategic decisions, and also the unstructured organizational tasks. Since CI tasks and activities are often unstructured or have a high degree of structure, ICT applications for CI can be used at all levels of an organization: the operational, tactical and strategic level. As Rouibah and Ould-ali (2002) cited by Vriens (2004) stated, the CI instruments can be considered as a collection of electronic tools that support strategic decision making and its can be dispersed at different levels of management and support intelligent structured and unstructured activities.

2. RESEARCH METODOLOGY

2.1. Scope and objectives of the research

The basic methodological approaches selected for the research were literature review and comparative analysis of a representative 20 studies from the management literature.

The study was designed to address two very straightforward research questions:

1. What the role of ICT tools in the CI process can be?
2. How the relationship between CI and ICT applications is approached?

The goal was to explore the nature of the relationship between CI and ICT applications based on studies in management literature.

2.2 The relationship between CI and ICT applications

In the literature, many authors (Davenport, 2000; Hendriks & Jacobs, 2004; Vriens 2004) have studied the relationship between CI and ICT applications and have emphasized the important role of ICT in supporting CI processes. According to Hendriks and Jacobs (2004), the studies about the relationship between CI and Information Systems support can be classified into four categories according to the attention paid to the technological components and CI behavior within the relationship and connection between them. The first class of studies are mainly focused on the technological component and on the possible benefits of IS support for obtaining and analyzing vast amounts of data. Commonly, these studies approach the CI behavior as a black box. The second class of studies examining influence of ICT tools on CI behavior and how ICT applications may lead to new forms of CI behavior. The third class is focused on studying the conditions and circumstances that may affect the relationship between technological component and CI behavior. A fourth class of these studies provide new insight into the relationship between CI and Information Systems support, the deeper understanding of the central role of CI behavior conducting the process design of these technologies.

Results of research based on comparative analysis of the above studies have shown that ICT tools for CI can be grouped into four main categories according to their contribution to one or more stages of the intelligence cycle (Vriens, 2004) and according to specificity of the ICT applications. **Table 1** shows the categories of ICT for CI which in depending on specificity of the ICT tool, can be classified in general applications used in the intelligence cycle (such as the Internet, used in the collection and dissemination of intelligence) and in specific applications dedicated for one or more activities in the field of competitive intelligence (such as intranet, applications, BI).

Table 1. Major categories of ICT tools for CI

Nature of ICT tool	
General tools	Specific tools
The Internet	The Intranet
Groupware Applications	System Dynamics software
Databases	Specific CI applications
Data mining tools	BI applications

Source: made by author

The Internet has a central role under general applications used to support CI activities and it seen as the most important information resource for CI which has received the most attention in the literature (McCurgle, 2001, quoted by Vriens, 2004). As **Figure 1** suggest, the Internet can be used in many ways to support activities of the intelligence cycle' four stages, with a particularly role in determining the direction and the collection activities. As a source of CI, the Internet is an additional source of information, but at the same time it is an effective tool of sharing and disseminating information for decision makers. For example, the section on the main page and the sections of organizations websites dedicated to press conferences and reports provide information about various products and services of them, about the production line and their innovation capability, intentions and future plans. **Table 2** summarizes the most important applications included in the category of general instruments used to formulate strategic information requirements (e.g., Groupware

applications) and for information analysis (e.g., software supporting dynamic systems; Intranet applications) or for storing and disseminating CI results (e.g., Microsoft applications).

Direction	Collection	Analysis	Dissemination
<ul style="list-style-type: none"> • Intranet • Extranet • e-mail • Databases 	<ul style="list-style-type: none"> • Search engines • Tools for outsourcing (online databases) • Web robots (agents) • Tools for text-analysis (automatic indexing algorithms) • Tools for Monitoring Changes on the Web (alerting services) • Tools for Collecting Data about the "Electronic" Behavior of Internet Users (software applications) • Internet Tools for Collaboration in Search Activities (e.g. intranet) 	<ul style="list-style-type: none"> • Intranet • Extranet • e-mail • Databases 	<ul style="list-style-type: none"> • Intranet • Extranet • e-mail • Databases

Figure 1. Internet applications used within the intelligence cycle

Source: made by author

Table 2. General ICT Tools for CI

Direction stage		Analysis stage		Dissemination stage	
supporting specific methods for identifying, storing and disseminating strategic information needs	Software supporting system dynamics	supporting specific methods used in analysis	SD software for simulation	Applications that support the presentation of the intelligence	Standard drawing packages
	Software supporting, identifying or visualizing CSF's or Key Intelligence Topics		Applications supporting war-gaming or scenario analysis		Microsoft Office applications
supporting the process of identifying strategic information needs	Groupware application (Group Systems)	supporting the process of analysis	Applications supporting the storage and dissemination of the analysis results	Applications that support transmitting reports throughout the organization	Microsoft Office applications
			Specific groupware applications		Standard drawing packages
			Specific Intranet applications		

Source: authors

Specific ICT applications for CI usually appear in the form of various software packages or software intelligence and are designed to support one or more activities of the intelligence cycle, as can be seen from **Figure 2**. As Fuld et al. (2002) cited by Vriens (2004) suggests on the basis of numerous analyzes performed on these applications, the role of these packages and software for CI activities is to support data collection, reporting and disseminating intelligence, workflow and collaboration, not to drive the CI process. According to the author, no application can deal with all the intelligence cycle stages adequately and no application can really manage qualitative analysis, but it can support CI analysts in their work. This statement seems to confirm the opinion of other authors on the fact that ICT applications can't replace human intelligence activity because CI activities mainly reflects people's work and ICT tools is designed to facilitate these activities, not replace them.

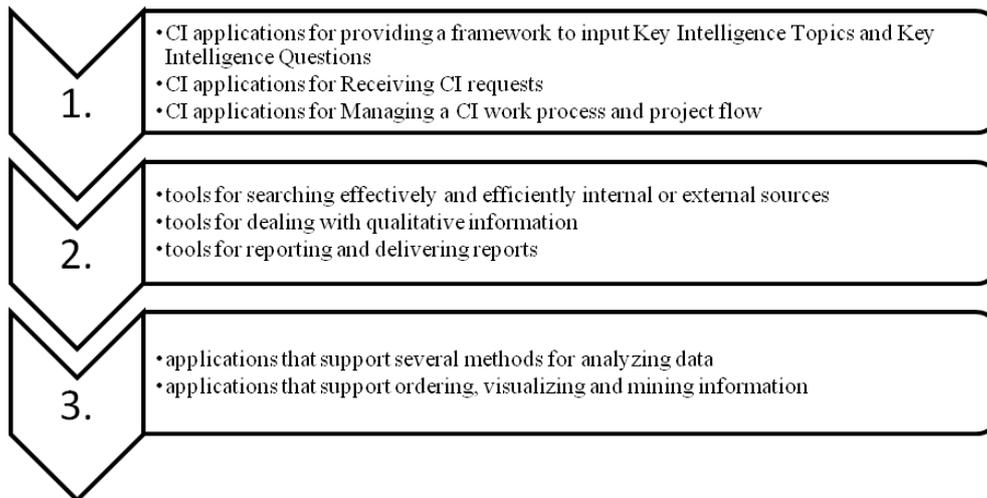


Figure 2. Specific ITC applications for CI

Source: authors

2.3. The role of BI specific applications for CI activities

In the managerial literature and practice is recognized the fact that BI applications and technologies have a special place in large category of specific ICT tools for CI, because of their major contribution to the development of means and methods of data mining and to the knowledge and use of them effectively in order to obtain competitive advantage. A comprehensive definition of the BI concept is given by Waltz (2003), in which view, BI refers to the acquisition, organization, analysis and reporting of internal (operations within the organization) and external (environmental) factors allowing the decision makers to achieve objectives in a more rapid, efficient and accurate way. Another strategic approach of the BI concept is also provided by Wixom and Watson (2010), which defines BI like "a broad category of technologies, applications, and processes for gathering, storing, accessing, and analyzing data to help its users make better decisions". BI system contributes to "intelligent exploration, integration, aggregation and a multidimensional analysis of data originating from various information resources" (Olszak & Ziemia, 2007). Thus, information from different sources is integrated into a centralized database which

provides intelligence in the right form, at the right location and at the right time, for strategic planning and enhanced decision support.

Based on the above definitions, we can conclude that BI system includes a range of applications and technologies used for collecting, accessing and analyzing data and information about an organization's operations and performance, in scope of a comprehensive knowledge of the factors that can affect on and for a better making decisions process in order to increase organization competitiveness.

In managerial practice, the term "business intelligence" is sometimes approached as a synonym for competitive intelligence or data warehouse and tools associated and that because of the fragile boundaries of BI and CI fields. A first argument to differentiate these two concepts is that the BI Anglo-Saxon generic term brings together three main activities (Ursăcescu, 2009) such as CI, intelligent market and intelligent surveillance. A second argument to clarifying this confusion is highlighted by the different nature of the information characteristics concerned of BI and CI activities. If CI aims to qualitative analysis of external information, BI is focused on internal and quantitative analysis. In other words, the main objective of BI is the effectiveness of an organization through analysis of its internal factors such as business operations (metrics on sales, production, internal operations), customer relationship management, sales force, electronic commerce and supply chain management.

In the software industry, BI system can be approached both from a static or traditional perspective and also from a dynamic or operational perspective. While static BI present historical information to users for analysis and reporting, dynamic or real time operational business intelligence provide information about business operations in a range from milliseconds to a few seconds after the business event and compares current business events with historical patterns to detect problems or opportunities automatically. Strategically, dynamic BI enables organizations to develop a proactive behavior by identifying threats and initiate corrective actions to adjust the rules for optimize business processes, which justify the current trends in software industry for adding operational BI to the static BI toolbox. Based on the analysis and comparison of historical data and knowledge created in the organization, BI can provide answers to key issues of the organization and supports the decision-making process to resolve such problems. Collection and analysis processes of this information enables understanding of business trends, strengths and weaknesses, and analyzing competitors and market situation, and so can be considered a strategically important diagnostic tool for organization.

BI architecture is defined by range of technologies and solutions that include data warehouse, data marts and federated data solutions and it comprises three major components such as reporting, data mining, and predictive analytics. BI technologies range from executive information and decision support systems, to query and reporting tools, online analytical processing (OLAP), data warehouses and analytical tools for data mining. Within these BI applications, data warehouses is considered a valuable CI tool for organizations which contain both quantitative analysis of internal information and can also be used for relevant external data storage and updating. The main effects of BI system implementation at company level is reflected in the form of intelligence products resulted from analysis of internal factors, products that can be used in analysis business performance, in improvement and reengineering and also in the strategic planning process.

3. FINDINGS AND DISCUSSIONS

In our opinion, the four classes of studies about the relationship between CI and ICT have an essential contribution to understanding the complex relationship between ICT and CI, but they share a common deficiency. All studies approach the technological components and CI behavior component as entities that influence each other, but are conceptually independent. This means that it may be possible to design a technology independently from conception of CI behavior and vice versa. These studies examine the relation between ICT and CI as an external relationship rather than internal or conceptual relationship, implying a poor relationship approach and that because the current or potential CI behavior is the function that defines the technology to be applied and vice versa.

Although the range of ICT tools to support the activities of the intelligence cycle is varied, practice in organizations suggests that there are still many problems in their use.

A major challenge that most organizations facing is derived from the overemphasis of the role of ICT applications in obtaining intelligence and from their lack understanding of how these technologies should be used. An example in such context can be of those organizations that implement a CI unit, often consisting of a single person who has the role of monitoring results obtained from an online database. In such practical example, the concept of ICT applications for CI means the implementation and use of data warehouse with quantitative analysis tools. Technology is treated as a unique and important way to produce intelligence, which can lead to an unjustified sense of control (through the availability of online databases, search engines and data warehouses) or to overconfidence in ICT tools to achieve CI. The sense of control is unjustified because for several reasons. First, the number of electronic sources (websites) attached to the Internet is to larger and their content is continuously changing that no search engine cover all of them. Second, the human intelligence- an important source of intelligence which can't be accessed directly through ICT applications - is neglected.

Overconfidence in ICT tools can derive from a weak belief that all intelligence activities can be automated. A solution for these deficiencies could be the reconsideration of the role of ICT applications for CI, what means that organizations must understanding the fact that the ICT tools are only a part of the whole infrastructure of intelligence and the need to achieve a balance between technological, human and structural components of this infrastructure. A second solution is the belief formation that ICT applications contribute primarily to obtain data and information which to be transformed into intelligence must be put in proper context. That fact indicates the reality that the direction and analysis activities still remain for human intelligence. Another difficulty in using ICT applications to support CI activities is the information overload due to the many sources available on the Internet. In such context, a solution would be to establish a clear direction for information collection activities and to use properly searching and mining tools, so that the Internet should not become "the intelligence-highway to hell".

CONCLUSIONS

For a proper selection and use of ICT tools supporting the CI process, organization needs to know what is the CI function, what the role of ICT tools in this process can be and to analyze the relationship between ICT tools and CI processes. All of these issues is discussed in this paper.

The two CI approaches treat the CI as a product, in the sense of relevant strategic information about the environment, and CI as a process viewed like an intelligence cycle with four stages: direction, collection, analysis and dissemination of intelligence. The main goal of CI process is to provide CI like a product used in making strategic decisions.

In this paper we discussed four major categories of ICT applications for CI activities (internet, general applications, specific applications, BI applications) and the relationship between them and the activities of the intelligence cycle. Although ICT tools is a real support for CI activities, producing intelligence remains a specific human activity, because human resources is the only "machine" able to put data from ICT applications in an adequate strategic perspective.

ICT is a valuable part of the intelligence infrastructure and offers many opportunities for support and performance intelligence activities. However, in practice many organizations faced with a great difficulty in properly use of ITC tools and in good understanding of the relationship between ICT and CI. To facing these problems, organizations should properly select and implement ICT applications for CI and knows the possibilities of these applications to provide internal and external data to support intelligence activities. It should also support organizations in their efforts to appropriate use of ICT for intelligence activities and understand their role in intelligence activities.

The major contribution of this paper is to bring more conceptual understanding of the relationship between ICT applications and CI activities in terms of mutual relationship between them, having the confidence that researching of this topic will be continued and developed.

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