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COMPUTER SUPPORT FOR COMPETITIVE INTELLIGENCE

KOMPUTEROWE WSPOMAGANIE *COMPETITIVE INTELLIGENCE*

Abstract: The main aim of the article is to present a theoretically well-grounded discussion on Competitive Intelligence and its computing support. This article is an attempt to answer the following questions: (1) What is the idea of Competitive Intelligence and its computer support? (2) How to use the Competition Profile Matrix (CPM), Business Model Canvas (BMC), Resource Based View (RBV) and Industrial Organization (IO) in competition analysis? (3) What are their advantages for Computer Aided CI? The search for answers to these questions was conducted mainly on the basis of theoretical and empirical research.

Keywords: Competitive Intelligence, Competitive Profile Matrix, Business Model Canvas, Resource Based View, Industrial Organization.

Streszczenie: Głównym celem artykułu jest przedstawienie teoretycznie dobrze ugruntowanej dyskusji na temat Competitive Intelligence i jego wspomagania komputerowego. Niniejszy artykuł jest próbą odpowiedzi na następujące pytania: (1) Jaka jest idea inteligencji konkurencyjnej i jej wspomagania komputerowego? (2) Jak wykorzystać macierz profili konkurencji (CPM), kanwę modelu biznesowego (BMC), widok oparty na zasobach (RBV) i organizację przemysłową (IO) w analizie konkurencji? (3) Jakie są ich zalety dla wspomaganej komputerowo CI? Poszukiwanie odpowiedzi na te pytania prowadzone było głównie na podstawie badań teoretycznych i empirycznych.

Słowa kluczowe: Competitive Intelligence, Competitive Profile Matrix, Business Model Canvas, Resource Based View, Industrial Organization.

1. Introduction

In order to compete effectively in the global market, today's organizations are forced to undertake various activities aimed at obtaining and analysing a lot of information, describing not only the internal business processes of the organization, but also its environment. Competitive Intelligence (CI) can help to intelligently understand one's organization and its environment, especially in creating a competitive advantage in the market and making more effective decisions (Bartuś & Bartuś, 2016).

The purpose of this article was to try to answer the following questions: (1) What is the idea of Competitive Intelligence and its computer support? (2) How to use the Competitive Profile Matrix (CPM), Business Model Canvas (BMC), Resource Based View (RBV) and Industrial Organization (IO) in Competitive Intelligence and what kind of benefits are from computer aided CI? The search for answers to these questions was mainly based on theoretical and empirical research. First a critical review of the literature was carried out in order to recognize the subject of the Competitive Intelligence and its computer support. The Competitive Profile Matrix, Business Model Canvas, Resource Based View and Industrial Organization were then discussed.

The article provides valuable information on Competitive Intelligence itself and the possibility of extending its potential with the aid of computers. No such approach to CI has been found in the literature on the subject. Therefore, the article has great theoretical potential and offers the prospect of further innovative research in this area.

2. Competitive Intelligence

The origins of CI date back to the 1970s (Wright, Badr, Weiss, & Pickton, 2004). Despite the passage of many years, this concept has not been sufficiently explored, and moreover there is no agreement among the authors as to the interpretation of this term (Dishman, Fleisher, & Knip, 2003).

Dishman and others (2007) see CI as a process involving the collection, analysis and transmission of environmental information to improve strategic decision--making.

Calof and Skinner (1999) and Lubicia and Masarova (2014) believe that CI can be treated as a cognitive strategy of an organization, aimed at the systematic process of planning, collecting, analysing and disseminating information about the organization's environment that may effect its competitive situation and more accurate decision-making. On the other hand, Chawner (2001) considers CI to be an ethical collection process, analysing and disseminating information that anticipates and supports operational activities relating to the business environment, competitors and the organisation itself.

Other authors (Amarouche, Benbrahim, & Kassou, 2015) define CI as the process of research, collection and processing information about the organization's environment in order to prepare future activities of strategic nature. CI is interpreted in an interesting way by Priporas et al. (2005), wo believe that it can be considered as both a product and a process. In product terms, CI is understood as a useful set of data that can be used for competitive activities in a specific industry. While in the process view, CI refers to methodical data acquisition, analysis and evaluation aimed at developing competitive advantage through accurate decision making. McGonagle and Vella (2012) emphasize that CI is particularly helpful for senior managers in making decisions that may relate marketing, research and development, as well as investment tactics and long-term business strategies. Zangoueinezhad and Moshabaki (2008) interpret CI similarly. They consider CI to be the ability to collect, process, and sort information that can be used by different people on multiple levels of organizational management (Zangoueinezhad & Moshabaki, 2008).

According to (Barson, 2002; Zangoueinezhad & Moshabaki, 2008), CI allows organizations to become more competent and aware of what is happening in their environment. As a result, organizations begin to see CI as a key element in making sound decisions, both strategic and tactical, used to help build and maintain competitive advantage in the marketplace.

Wright and Calof (2006) believe that the purpose of CI is to better understand customers, regulators (legal, economic) and competitors in order to create new opportunities in gaining sustainable competitive advantage. Therefore it can be assumed that CI is the process of monitoring the environment, aimed at supporting decision-makers in identifying emerging problems as well as in solving them. In other words, it allows to learn about and characterize the competitors, identifying the strengths and weaknesses of one's organization, its market position, and the competitors' behaviour patterns (Bose, 2008).

According to Sauter (2011) and Berner (2001), CI includes:
– competition monitoring and factors affecting the organization's environment,
– identifying important indicators/measures of the organization's operations and detecting trends and threats in the market,
– analysing various information to gain a better understanding of the organization,
– designing various indicators/measures to evaluate the organization's activities as well as those of its competitors,
– presenting information on the organization's environment.

However, besides the many potential benefits that the CI concept offers, there are many challenges in using it effectively in organizations. They include, in particular (Bergeron & Hiller, 2002; Liebowitz, 2006, Muller, 2007; Ranjit, 2008; Saayman et al., 2008):
– creating a participatory environment based on the involvement of both senior and lower management in the implementation of the CI idea,

– systematic collection, analysis of information coming from both inside the organization and its environment,
– developing analytical skills and abilities among the organization's employees, as well as its customers and other stakeholders,
– organizing promotional activities and training to introduce the idea of CI and the values the organization can achieve through its use,
– tool development to measure the value from using CI in organizations,
– setting aside funds for CI development.

The complexity of the concept of CI drives the exploration of CI design and application in organizations (Olszak, 2014). Several approaches can be encountered in the literature describing the process of designing and building CI. This process usually consists of the following stages (Taib et al. 2008): (1) planning and goal indication, which is the focus on matters of the highest importance to senior management; (2) gathering, which is the acquisition of information from a variety of internal and/or external sources; (3) analysis, which is converting information into desired intelligence that is useful in making strategic and tactical decisions; (4) communication, which is the development and transfer of the results of the process or CI project to the appropriate units so that they can make appropriate decisions based on it; (5) processes and structures that will ensure efficiency in implementation of CI.

The approaches to CI found in the literature do not provide guidance on the areas and methods of computer-aided CI. Furthermore, no attempt has been made to develop a comprehensive, holistic view of computer-aided CI. This situation may be due to several reasons. First, many of the issues, phenomena, and potentials related to CI resources and indicators are characterized by high complexity, individualization, and difficulty in determining the feasibility of their computer-aided design. Second, there is a lack of guidance on the design and use of comprehensive computer-assisted CI, and the subsequent study of the effects of its use.

3. Competitive Intelligence and its computer-aided support

In the literature one encounters the statement that technologies are an important part of a CI system, especially when they are used in the right way and measurably support CI. However, the identification and the use of specific technology should not be the only purpose of CI. Individual stages of the CI process define CI needs and point to the IT tools, resources, and their transformation into the right format. IT itself supports CI processes, especially in making information available inside the organization and storing it in a specific repository. However, the critical areas of IT use in CI are capturing and transforming data, collecting it in a CI repository, analysing it, and creating reports and making them available in the organization.

A computer-aided CI process mainly involves collecting, analysing and providing up-to-date and useful information and knowledge that is essential for managers and

all decision-makers to improve the competitive position of their companies (Cobb, 2003). The CI system provides the tools to transform raw information about the competitive environment into information and knowledge for strategic business decisions. Companies that understand this concept generate much more success in the marketplace than their competitors who do not understand the connection between environmental monitoring and strategic decision-making.

CI development, integration and application are used to enhance customer value (Fleischer & Blenkhorn, 2001). CI system development is an important process for any organization for several reasons: by gathering information about their competitors, companies can analyse their own skills and competencies, strengthen their own and predict the future behaviour and actions of their competitors in order to maintain or improve their market position. More importantly, the CI system creates comparative knowledge that enables companies to highlight their strengths, and enhance their competitors' weaknesses by differentiating the products and/or services offered in the marketplace (Cobb, 2003). Companies that increasingly implement deep environmental monitoring and invest in CI information systems to process and distribute data, sell their products better than their products than their competitors (Kumar, Subramanian, & Strandholm, 2001).

While CI offers many benefits to an organization, it also presents some challenges. Organizations (especially medium and small organizations) face a significant challenge in building and developing an effective CI program (Saayman et al., 2008). Some of these challenges include lack of training, lack of resources, and inability to provide convincing CI analysis results (Hesford, 2008). One study (Muller, 2007) identified and characterized the following challenges for CI infrastructure:

– Creating a participatory environment and CI awareness. This is an ongoing challenge. The study shows that most CI practitioners created contacts with senior management by distributing their results. These provided an excellent opportunity for CI practitioners to demonstrate the value that CI provides to the enterprise. Accordingly, although most people in the company knew that CI existed, but few participated or attended.

– Budgetary constraints. This seems to be a global reality, with budgets shrinking or growing over time, depending on economic factors.

– Management engagement and visibility. This remains an ongoing challenge, although most respondents reported regular contact with their senior management through their performance and many reported high levels of CI and increased management visibility.

– Staffing issues. Finding and maintaining the right skill set is another challenge. Outsourcing research or analysis increased for some respondents, while others sourced resources from other parts of the company.

– Demonstrating return on investment/value. Few companies measure return on investment in CI and demonstrating consistent value remains a challenge for CI units.

  –   Identification of critical information needs and effective and timely collection of
      relevant information. Effectiveness includes optimal use of internal sources of
      information and knowledge.
  –   Training and education in CI. Educational institutions offering CI courses are
      rare.

      As the results of published studies on IT use in CI show, the level and completeness
of IT solutions vary greatly. In some of the surveyed companies, databases are used
for CI purposes, mainly for storing and disseminating information. Otherwise the
use of other specialized software for CI purposes was not reported (Andreas, 2008).
Similar results were reported in other studies conducted in EU countries (Michaeli,
2004; Smith & Kossou, 2008; Stankeviciute et al., 2004; Tena & Comai, 2004, Wright
et al., 2004;). Some of the studies that confirmed the practical use of different software
packages to collect and disseminate information in terms of CI are the Japanese
companies (Sugasawa, 2004), and was also shown in the study of US companies
by Marin and Poulter (2004). The companies mentioned different groups of tools
and systems that are used by CI specialists in the area of information gathering and
analysis. Moreover, in the case of IT solutions supporting the CI process, there is no
integration of IT tools (data acquisition, data preparation, analysis and visualization
tools) with: Competitive Profile Matrix (CPM), Business Mo-del Canvas (BMC),
Resource Based View (RBV), Industrial Organization (IO). This is puzzling because
systems that analyse an organization's competitiveness provide critical information
support to the both tactical and strategic decision-making process. Thus, they should
be an indispensable tool in the modern competitive struggle on the market. With
this in mind, it seems reasonable to try to extend the CI process with its computer
support implemented in the areas of CPM, BMC, RBV, and IO.

3.1.   Competitive Profile Matrix (CPM)

In order to better understand the external environment and competition in an
industry, organizations are looking for a solution that allows them to collate and
compare market competitors. To accomplish such a task, it is useful to apply the
Competitive Profile Matrix (CPM). By identifying key competitors and comparing
them according to the industry's critical success factors (ICSF), the matrix allows to
assess the organization's position relative to the competition (Zimmerer, Scarborough,
& Wilson, 2008). Using the same ICSFs, the analysis in the CPM matrix identifies
the organization's strengths and weaknesses in direct comparison to its competitors.
ICSFs include both internal and external issues and are rated differently on a scale
of 1 to 4 based on their relative importance to the organization (1 – a major weakness,
2 – a minor weakness, 3 – a a minor strength, and 4 – a major strength). The same
method was used to evaluate the ICSF of competitors. Finally one should multiply
the weight by the score for each factor to get a weighted score, and then add up the
scores of the individual companies tested to get a total weighted score (Shanewaz,
Abu, Atiqur, & Aftab, 2014). Such calculations make it possible to identify areas for

improvement and those whose level should be strengthened. In addition, the CPM matrix becomes an excellent tool for integrating CI information in an accessible form, easy to interpret and share.

In the context of computer-aided CI, the CPM matrix was chosen as a template to act as a template for generating CI analyses and visualizations based on critical success factors (ICSF). The CPM suggests that organizations should solicit, collect, and analyse information about how their organization is perceived compared to competitors.

3.2. Business Model Canvas (BMC)

The term Business Model Canvas originated in the area of data and process modelling (Osterwalder, Pigneur, & Tucci, 2005). An organization's business model essentially explains how it creates value and how its various parts interact with each other and the environment (Magretta, 2002). Others (Osterwalder, Pigneur, 2010) consider that a business model is a conceptual tool that includes a set of parts and their interconnections, which makes it possible to present how a company makes money. The multiple meanings of the term are explained by the fact that at different stages the concept of BMC included many different economic factors, such as ways to create shareholder value, elements of industry regulation, and complex intra-group relationships. Therefore, when building an organization's business model, it is necessary to go back to analysing the competitiveness of the organization.

From the perspective of CI strategy and analysing the competitiveness of an organization, the Business Model Canvas (BMC) is interesting[1] (Osterwalder & Pigneur, 2010). BMC next to CPM is one of many useful business planning tools, which can be used to analyse the competitiveness of an organization in selected areas. The creators of BMC were A. Osterwalder and Y. Pigneur (Osterwalder, Pigneur, 2010), who assumed that the business model consists of nine fundamental areas that contribute to the financial income of an organization. These areas relate to the four main areas of business operations such as customer, product offer, infrastructure, and finance.

As already mentioned, the business model diagram consists of nine blocks depicting selected areas of the organization (Osterwalder & Pigneur, 2010):
– Customer Segment,
– Value Proposition,
– Channels,
– Customer Relationships,
– Revenue Streams,
– Key Resources,
– Key Activities,
– Key Partners,
– Cost Structure.

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[1] It is worth mentioning another similar method of business analysis, which is the Lean Canvas by Ash Maurya www.ashmaurya.com/2012/02/why-lean-canvas/.

Knowledge of the key areas of the organization's operations allows to prepare a strategy for evaluating them and comparing to the same areas against the competition. The Business Model Canvas was used to clearly analyse and illustrate the business method of the company.

In the context of computer-aided CI, the BMC gives guidance on what information an organization needs. The BMC concludes that organizations should capture, collect, and analyse information related to four major business areas: customer, product offer, infrastructure, and finance.

3.3. Resource Based View (RBV)

Competitive advantage, which translates into different levels of organizational profitability, is one of the main areas of strategic management (Barney, 1991; Porter, 1980). It can be seen as a high market position that translates into providing higher value to customers and/or ensuring relatively lower costs. This leads to a dominant market position and relatively better financial performance (Day &Wensley, 1988). RBV argues that the reason for differences in company profitability in the same industry is the company's internal capacity (Barney, 1991; Wernerfelt, 1984). According to the main idea of RBV, the most important resources of an organization's are those that can be called unique for it. There are valuable, rare, unique, and irreplaceable skills in an organization (Barney, 1991) that are capable of providing a company with a long-term competitive advantage, such as logistics, marketing, assembly, design and service. Emphasis is placed on the ability to pool available resources, create strategic opportunities for organizational growth, and achieve virtual monopoly positions in relevant markets (Hamel & Prahalad, 1994). In terms of organizations, RBV typically appears in the strategic management literature (Amit & Schoemaker, 1993; Barney, 1991; Mahoney & Pandian, 1992; Rumelt, 1984; Wernerfelt, 1984). RBV also appears in the management information systems literature (MIS) (Priem and Butler, 2001). It was developed to explain how organizations achieve sustainable competitive advantages, as recognizing and developing an organization's competitive advantage is one of the key requirements for its success. RBV combines internal (core competencies) and external (industry) perspectives on strategy. Resources are more broadly defined as physical (e.g. property rights, capital), intangible (e.g. brands, technological knowledge), or organizational (e.g. procedures or processes such as lean manufacturing) (Ouma & Oloko, 2015).

Today, two approaches to resource management have evolved from the original RBV. The first is the so-called traditional or structural variety and the second, the dynamic or process variety. The first assumes that organizations operate in markets with predictable behavioural parameters. Therefore, the combination of resources is determined not by the organization, but is enforced by the processes occurring in the market. The weak point of the classical approach is its static nature and its failure to answer the question of how the enterprise's resource support

can adapt to changes in the market environment. On the other hand, the second so-called dynamic or process approach takes into account the fact that internal processes affect the creation of resource combinations. In modern conditions, this variability is most relevant and allows for the analysis and estimation of business processes occurring in the organization. D.J. Teece and G. Pisano & A. Shuen (1997) suggested supplementing RBV with the method of "dynamic capabilities" and indicated the analysis and management of such components as competencies (capabilities) and organizational process. Dynamic capabilities of enterprises are important components of their competitiveness in market conditions. It is worth noting that they are largely determined by the available intellectual resources of the organization. Since these resources are heterogeneous in nature (Barney, 2001), the uniqueness of the firm is illustrated by the way resources are grouped to create capabilities (Amit & Schoemaker, 1993).

In the context of computer-aided CI, RBV orientates organizations to acquire, collect, and analyse a variety of unique information resources to build an organization's competitive strategy. Its special feature is the search for valuable and difficult to imitate resources and the evaluation of their strategic value, mainly in terms of CI. If the resource approach that is RBV focuses mainly on knowledge then it provides guidance on how and why organizations should develop access to these intangible resources, allowing them to be combined and transformed into CI knowledge.

3.4. Industrial Organization (IO)

For the analysis of organizational competitiveness, the market structure and the way it functions carries a lot of valuable information. From the theoretical point of view of the subject under study (CI), this issue can be considered from the perspective of the Industrial Organization (IO) theory (Tirole, 1988). Moreover, the industrial organization (IO) theory is concerned with how market structure affects organizations' strategy and decision-making. The meaning of 'Industrial' in 'Industrial Organization' is not the same as a typical industrial organization, and should be broadly interpreted. The industrial organization is involved in the functioning of markets and industries, particularly how firms compete and what the market interactions are: price competition, product positioning, advertising, and research and development. The most important issues in IO are the structure of the market and the conditions under which it operates and how they affect the decisions and behaviour of the organization, in line with the idea that "behaviour depends on the context in which it occurs" (Brown, 2002). An extension of this approach is the so-called SCP paradigm, Structure-Conduct-Performance (Brown, 2002). According to the SCP model, an organization's performance (and consequently its competitiveness) is the result of the organization's market structure and behaviour and "various aspects of market performance such as production efficiency, advanced technology, product quality, and profit rate" (Tung, Lin, & Wang, 2010).

The approaches to organizational resources in RBV and IO differ significantly. RBV mainly covers an organization's interior, its internal characteristics and their non-tangible, specific strategic resources, which are not perfectly mobile (hard to acquire from the environment, hard to sell as they are unlikely to be needed by other organizations) and therefore heterogeneous. Industrial Organization, on the other hand, focuses on the external environment of the organization. IO describes environmental conditions that favour high levels of organizational performance. IO assumes that organizations in the same industry (Industrial) (e.g. heavy industry or tourism) have identical strategic resources. What is more, these resources are highly mobile, which allows them to be easily acquired and sold, and therefore they exhibit characteristics of homogeneity. It is this approach to the resources and external environment of an organization operating in a specific industry that coincides with the assumptions of CI, which multi-facetedly (e.g. product competitiveness, customer service, delivery) analyses the competitiveness of an organization relative to its environment.

In the context of computer-aided CI, Industrial Organization (IO) can be used to understand how the market structure and conditions affect organizations' strategy and decision-making. Collecting and analysing this type of information can support the analysis of an organization's competitiveness in the industry in which it operates.

4. Conclusion

The Competitive Intelligence computer support approach proposed in this article enriched with the RBV and IO theory, teh BMC business model and CPM enhanced with industry critical success factors, is an interesting and useful concept in this area.This approach integrates the functionalities of extracting data, analysing it, and creating reports according to CI needs along with these theories to extend the range of capabilities of computer-aided Competitive Intelligence. These characteristics appear to be critical for CI. Organizations should respond quickly to signals from their environment by fast identification, analysis and dissemination of CI results within the organization. It is mainly in the computerization of the proposed theories success factors should be looked for in the area of CI, such as:

– Competitive Profile Matrix (CPM) acting as a template for generating CI analysis and visualization based on critical success factors (ICSF),
– Business Model Canvas (BMC), focused on finding and processing information about the organization's core business areas (customer, product offer, infrastructure, and finance),
– Resource Based View (RBV) directs organizations to acquire, collect and analyse a variety of unique information resources to build the organization's competitive strategy,
– Industrial Organization (IO) to understand how market structure and conditions affect organizations' strategy and decision-making.

In conclusion, it should be emphasized that the proposed computer support of Competitive Intelligence needs to be further verified and tested. This article makes the theoretical contribution to the field of science of computer-aided CI. The results broaden the current vision of designing and using CI to build an organization's competitive advantage. On the basis of the described computer support of Competitive Intelligence, organizations can compare their competitiveness on the market in terms of products and services, and develop a higher position on the market.

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