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Designing the Competitive Intelligence Model for Organization

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Abstract

Theoretical background: These studies are motivated by three reasons: (1) the Competitive Intelligence (CI) approach is a critical factor in increasing the organization's ability to monitor and strengthen competitive advantage; (2) too little research has been done on the use of new management theories in the CI approach and (3) there is no research devoted to computer-assisted CI.
Purpose of the article: This study proposes a comprehensive framework for extending the CI's potential in the organization's activities and its computer-assisted support. The purpose of this article is to develop a new CI construction theory and propose a holistic, conceptual CI model, as well as carry out its initial verification.
Research methods: The comprehensive CI model is based on the following theories: (1) Resource-Based View (RBV), Industrial Organization (IO) and Business Model Canvas, which were used for CI design, (2) theories for measuring and validating CI implementation, i.e.: Competitive Profile Matrix (CPM), Industrial Critical Success Factors (ICSF) and (3) theories for integrated computer-assisted CI. The validation of the proposed comprehensive CI model was based on data on the opinions of SUV class users.
Main findings: The results obtained during the validation of the CI model show great importance for a comprehensive look at the topic of computer-assisted CI. This contribution is significant because in the literature there are no such studies and conclusions obtained from them. The results obtained and conclusions should be useful for all organizations that need to analyze competitiveness using a comprehensive CI model.

Introduction

Over the past three decades, a lot of research has been done on the use of CI in the organization, but the CI models and their design are not sufficiently considered. These surveys mainly focus on selected issues in the area of organization's competitiveness, such as tools for building an organization's competitiveness strategy, indicators for measuring/evaluating the competitiveness of an organization, tools for obtaining and analyzing data (mainly data mining). However, the issue of integrating the CI approach with business operations is still under-researched. There are also no attempts to build a comprehensive computer-assisted CI, and few scientific and business research are fragmented and scattered. Thus, there are no examples of how the CI should be computer-assisted and CI models used in building the competitive advantage of an organization on the market.

In addition, developing ICT technologies used in CIs need new business models that enable organizations to transform different resources (including data collected for CI) to improve their competitiveness. This requires from business models to become a subject to constant change, which will allow organizations to control their overall direction of development (Voelpel et al., 2005). In this sense, business models are constantly and spontaneously evolving systems, with their own structure and internal behaviors (Mason & Spring, 2011). Thus, the business model is an important element of building the organization's strategy (Chesbrough, 2006; Christensen & Raynor, 2000). It is particularly important to develop new business models that are dictated by changes in the market or internal crisis within the organization (Johnson et al., 2008, Meehan & Bascher, 2002).

Summarizing, this article contains a set of framework principles for developing CI in the area of business models and its computer support. This article proposes to develop a new CI construction theory and propose a holistic, conceptual CI model. The idea of the article is to try to answer the following questions: (1) What is the essence of CI and its IT-based support? and (2) How do you use Resource-Based View (RBV), Industrial Organization (IO), Business Model Canvas Competitive Profile Matrix (CPM) and Industrial Critical Success Factors (ICSF) in CI? The search for answers to these questions is mainly based on theoretical, methodological and empirical research. At the beginning, a critical review of the subject literature was carried out. Its purpose is to recognize the subject matter of CI and its computer assistance. Next, the aforementioned theories are examined in terms of their use in the construction of a comprehensive CI model. The proposed CI model has been tested in the Internet environment. The CI analysis was based on the opinions of customers from the automotive industry (opinions of users of SUV class passenger cars). The summary of this article presents and discusses theoretical input, practical implications and future directions of research.

Literature review

In order to compete effectively on the global market, contemporary organizations are forced to undertake various activities aimed at acquiring and analyzing many information describing not only the internal business processes of organization but also its surroundings. In order to get a smart insight into organization as well as its environment and also to develop competitive advantage in the market and more effective decision-making, the concept of Competitive Intelligence (CI) may prove helpful (Bartuś & Bartuś, 2016).

CI's origins date back to the 1970s (Wright et al., 2004). Despite the passage of many years, this concept has not been sufficiently explored, moreover, there is no agreement among the scholars as for understanding and interpreting the term (Knip et al., 2003). Karim (2011) claims that CI is a systematic process that allows for identifying competition's plans and intentions to obtain some advantage. This process involves collecting, processing, analyzing, and distributing any information about an organizations' external environment to top management and other decision makers. McGonagle and Vella (2012) define CI as a formalized but developing process that is used by managers to assess the evolution of their industry and the capabilities and behavior of their competitors as well as those who might be their competitors in future. Deichmann et al. (2007) perceive CI as a process that involves collecting, analysing, and disseminating information about the environment with the purpose of improving strategic decision-making.

Calof and Skinner (1999) as well as Lubicia and Masarova (2014) believe that CI can be considered a cognitive strategy of organization oriented towards a systematic process of planning, collecting, analyzing and disseminating information about organization's environment that may affect its competitive position and improve decision-making. In turn, Chawner (2001) believes that CI is an ethical process of collecting, analyzing and disseminating information that serves to anticipate and support operational activities related to business environment, competitors, and the organization itself.

Other authors (Amarouche et al., 2015) define CI as a process of exploring, collecting, and processing information about organization's environment in order to prepare potential strategic operations. Also Priporas et al. (2005) understand CI in a very interesting way. They believe that CI can be considered to be both a product and a process. In product terms, CI is understood as a useful set of data that can be applied in competitive activities in a particular industry. On the other hand, in terms of process, CI means methodical data acquisition, data analysis, and data evaluation aimed at developing competitive advantage by accurate decision-making. McGonagle and Vella (2012) emphasize that CI is particularly helpful for senior management in terms of decision-making related to marketing, research and development, as well as investment tactics and long-term business strategies. Likewise for Zangoueinezhad and Moshabaki (2008), CI is an ability to collect, process and sort information

that can be used by different people at many levels of organization management (Zangoueinezhad and Moshabaki, 2008).

According to Barson (2002) and Zangoueinezhad and Moshabaki (2008), CI allows organizations to become more competent and aware of what is actually happening in their environment. As a consequence, organizations view CI as a key element in making right decisions, both strategic and tactical. They use CI to support building and maintaining competitive advantage in the market. Wright and Calof (2006) believe that CI's goal is a better understanding of customers, regulators (legal, economic) and competitors in order to create new opportunities to gain a long-term competitive advantage. Therefore, it can be assumed that CI is the environmental monitoring process aimed at supporting decision-makers in identifying emerging problems and solving them. In other words, CI allows organization to identify and characterize competitors, recognize weaknesses and strengths of organization, its market position and patterns of competition behaviour (Bose, 2008).

According to Sauter (2011) and Berner (2001), CI includes:

– monitoring of competition and factors affecting organization's environment,

– identifying relevant indicators/measures of organization's activity and detecting trends and threats in the market,

– analyzing various information aimed at better understanding of organization,

– designing various indicators/measures to evaluate the activities of organization as well as its competitors,

– presenting information about organization's environment.

Table 1 presents the most important features of CI.

Table 1. The most crucial features of CI

CI idea	Author
Knowledge and foreknowledge about external operating environment	Sawka (1996)
Systematic process that allows for identifying competition's plans and intentions to get an advantage	Karim (2011)
Collecting and processing information	Amarouche et al. (2015), Dichman (2007), Chawner (2001), Calof and Skinner (1999), Lubucia (2014), Priporas et al. (2005), Zangoueinezhad and Moshabaki (2008)
Monitoring of competition	Sauter (2011), Berner (2001), Calof (2006), Chawner (2001)
Better understanding of customers	Calof (2006)
Key element to right decision-making	Barson (2002), Zangoueinezhad and Moshabaki (2008), McGonagle and Vella (2012), Wright and Calof (2006), Calof and Skinner (1999), Lubucia (2014)

Source: Author's own study.

However, potential benefits offered by the CI concept might imply significant challenges for organizations in terms of effective use of CI. They especially include (Muller, 2007; Saayman et al., 2008; Bergeron & Hiller, 2002; Liebowitz, 2006; Ranjit, 2008):

– creating participatory environment involving the commitment of both senior management and lower-level employees in the implementation of CI,

– collecting and analysing systematically information coming both from the inside of organization and its environment,

– developing analytical skills and abilities among employees of organization as well as its customers/clients and other stakeholders,

– organizing promotional activities and trainings that approximate the idea of CI and the assets/values that organization can achieve through its application,

– developing tools for measuring the value of CI in organizations,

– finding financial resources for CI development.

The complexity of the CI idea prompts to deepen knowledge on the design and application of CI in organizations (Olszak, 2014). In subject-matter literature, several approaches (models) can be found describing the CI design and development process.

The most popular model of CI development in subject-matter literature is the concept proposed by Taib et al. (2008). For the CI development, the authors distinguish the following stages: (1) planning and establishing a business objective, that is focusing on matters of the highest importance for senior management; (2) collecting, i.e. obtaining information from various internal and/or external sources; (3) intelligent information analysing and processing, which is useful when making strategic and tactical decisions; (4) communicating, i.e. developing and transferring the data analysed to relevant departments so that the departments are able to make appropriate decisions on the basis of data possessed.

The model (Garcia-Alsina et al., 2016) focuses on the cycle of creating intelligence and the role of indicators in its measurement. The model consists of the following phases:

– detection phase – refers to the identification and collection of information needs of organization. This phase proposes the use of three indicators to measure intelligence: (a) organizational procedures to identify information needs and update and/or verify the sources used; (b) the use of information sources according to identified needs; (c) channels used to obtain information,

– information organisation and storage – the indicators proposed in this phase are: (a) integrated procedures for managing information within organization; (b) technologies available to support information management,

– dissemination phase – contributes to the integration of information in order to discover previously unknown trends, relationships and links between data, as well as their dissemination. In this phase, the following indicators are analysed: (a) which channels, both formal and informal, should be used in communication and dissemination of information; (b) what products and information services are offered by organizations; (c) how information products and services are available to all members of the organization,

– interpretation and analysis of the information phase – four indicators are recommended: (a) the use of information products and services that add value to or-

ganization; (b) the use of channels for the dissemination of information products and services; (c) the existence of departments and organizational structures enabling sharing, interpretation and analysis of information; (d) using analytical tools to discover new knowledge,

– intelligence generation phase – is helpful in exploring which structures are responsible for the decision-making process and any actions aimed at generating intelligence. In turn, the CI construction model proposed by Campos et al. (2014) covers such phases as strategic phase, tactical phase, and operative phase. The authors draw attention to the important role of ICT in supporting individual phases.

During the strategic phase, organizations focus on defining business objectives that enable the implementation of key actions aimed at improving decision-making. This phase applies to both business strategy and ICT strategies. The tactical phase concerns all actions necessary to introduce the strategy formulated in the first phase. It includes in particular: planning, searching and selecting information, validation and analysis of information, as well as its interpretation and dissemination. The last phase refers to the description of business processes and their implementation.

When examining the proposals of CI models presented, it should be stated that they do not define in a comprehensive and exhaustive way how best to design and implement the CI concept in organizations and what ICT tools use to support it. The aim of this study is to elaborate a new CI development theory and to propose a holistic conceptual CI model as well as carry out its initial verification.

Research methods

I propose to base the development and implementation of CI in organizations on the following theories: (1) Resource-Based View (RBV), Industrial Organization (IO) and Business Model Canvas applied in designing CI, (2) theories for measuring and validating CI implementation, i.e.: Competitive Profile Matrix (CPM), Industrial Critical Success Factors (ICSFs), and (3) theories for integrated computer-assisted CI.

Resource-based view

Theory of Resource-Based View (RBV) highlights the importance of organization's resources as well as the ability to absorb, combine, configure, reconfigure and create on this basis strategic organizational development opportunities (Hamel & Prahalad, 1994; Rumelt, 1984; Mahoney & Pandian, 1992; Amit & Schoemaker, 1993). In RBV theory, the essence of information resources is emphasized involving the need for the continuous and systematic acquisition, collection, analysis and discovery of new knowledge from available sources of information (Wade & Hulland, 2004). The ability to acquire and reconfigure organization's resources, including information resources,

is recognized as a key competence and ability of organization (Wernerfelt, 1984; Barney, 1991; Olszak et al., 2018). According to the concept of Barney (1991), only rare, unique and irreplaceable resources and skills may provide long-term competitive advantage for organization. As for the CI development, it is worth paying attention to two approaches in RBV theory: traditional (structure-oriented) and dynamic (process-oriented). The former assumes that organizations operate fairly in a stable environment. On the other hand, the latter approach assumes that organizations' environment and their resources are variable and have an impact on business processes. Therefore, the dynamic capabilities of organization turn out to be elements of key importance (Teece et al., 1997), demonstrated by constant monitoring of the organization's environment, rapid absorption of information, their combining (grouping) into unique configurations and their corresponding instrumentation (Barney, 2001; Amit & Schoemaker, 1993; Ouma & Oloko, 2015; Day & Wensley, 1988). Thus, RBV theory provides a lot of hints relevant for the CI development. It primarily provides organization with ideas for managing and disposing information resources and discovering new knowledge (generating intelligence) that can be used to create competitive advantage.

Theory of industrial organization

For the CI development, it is necessary to explore organization's surroundings and mechanisms that drive this environment. Thus, Industrial Organization (IO) theory appears helpful (Tirole, 1988; Clougherty, 2006). It illustrates how the structure of market influences the strategy and decision-making in organizations. It also explains the functioning of markets and industries, ways of competing and interacting that take place in the market (price competition, product positioning, advertising, and research and development [Brown, 2002]). The SCP (Structure-Conduct-Performance) approach is further development of IO theory. Accordingly, the effectiveness of organization (including its competitiveness) reflects the structure of market, the organization's behaviour, and the impact of production on product quality (Tung et al., 2010). The RBV refers to the organization's interior and intelligent configuration of organization's resources (including information resources), whereas IO focuses on the analysis of environment (customer service, suppliers, competitive products).

Business model canvas

From the point of view of developing a CI strategy in organization, Business Model Canvas (BMC) brings a new insight (Osterwalder & Pigneur, 2010; www1). The term "BMC" was coined in the area of data and process modelling (Osterwalder et al., 2005). It explains how organization creates value and how its parts interact with each other and the environment (Magretta, 2002). Osterwalder and Pigneur (2010)

believe that BMC is a conceptual tool that includes a set of tools aimed at enhancing competitive advantage, increasing profit and creating value of an organization. BMC is the tool useful for planning business activities that can be used for CI. BMC refers to four main business areas such as: customer, offers, infrastructure and finances, which are used to compare with the competition. They include in particular: Customer Segment, Value Proposition, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partners and Cost Structure.

To put it another way, the BMC model facilitates analysing and evaluating organization and its competitors according to the same aspects.

Competitive profile matrix and industry's critical success factors

Critical Success Factors (CSFs) and Competitive Profile Matrix (CPM) are theories helpful in assessing and measuring key success factors of the CI implementation. CFS investigate both internal and external factors that influence a success (Zimmerer et al., 2008). Usually they vary according to particular industry and sector (examples of critical success factors are presented in Table 2).

Table 2. List of CSFs

Market share	Union relations	Power over suppliers
Product quality	Skilled workforce	Access to key suppliers
Clear strategic direction	Location of facilities	Efficient supply chain
Customer service	Production capacity	Supply chain integration
Customer loyalty	Added product features	On time delivery
Brand reputation	Price competitiveness	Strong online presence
Customer satisfaction	Low cost structure	Effective social media management
Financial position	Variety of products	Experience and skills in e-commerce
Cash reserves	Complementary products	Management qualification and experience
Profit margin	Level of product integration	Innovation in products and services
Inventory turnover	Successful product promotions	Innovative culture
Employee retention	Superior marketing capabilities	Efficient production
Income per employee	Superior advertising capabilities	Lean production system
Innovations per employee	Superior IT capabilities	Strong supplier network
Cost per employee	Size of advertising budget	Strong distribution network
R&D spending	Effectiveness of sales distribution	Product design
Strong patent portfolio	Employee satisfaction	Level of vertical integration
New patents per year	Effective planning and budgeting	Effective corporate social responsibility programs
Revenue per new product	Variety of distribution channels	Sales per outlet
Successful new introductions	Power over distributors	Parent company support

Source: (www2).

CPM, on the other hand, illustrates the possibility of assigning weights to individual success factors and making various comparative analyses based on them (Table 3).

Thanks to the use of ICSF, the CPM matrix analysis allows for identification of organization's strengths and weaknesses in relevance to its competitors. Shanewaz et al. (2014) presented the detailed methodology for developing CPM matrices (Table 3). This matrix, in an accessible form, allows for indicating business areas that need improvement and reinforcement. In addition, the CPM matrix is the easily accessible tool used to integrate various information on organization and its competitors. The tool is easy to interpret and share with various stakeholders.

Table 3. Competitive Profile Matrix (CPM)

CPM							
		Company A		Company B		Company C	
Critical Success Factor	Weight	Rating	Score	Rating	Score	Rating	Score
Brand reputation	0.13	2	0.26	3	0.39	1	0.13
Level of product integration	0.08	4	0.32	3	0.24	1	0.08
Range of products	0.05	3	0.15	1	0.05	2	0.10
Successful new introductions	0.04	3	0.12	3	0.12	3	0.12
Market share	0.14	2	0.28	4	0.56	4	0.56
Sales per employee	0.08	1	0.08	2	0.16	3	0.24
Low cost structure	0.05	1	0.05	3	0.15	4	0.20
Variety of distribution channels	0.07	4	0.28	2	0.14	2	0.14
Customer retention	0.02	2	0.04	4	0.08	1	0.02
Superior IT capabilities	0.11	3	0.33	4	0.44	4	0.44
Strong online presence	0.15	3	0.45	3	0.45	4	0.60
Successful promotions	0.08	1	0.08	2	0.16	1	0.08
Total	1.00	–	2.44	–	2.94	–	2.71

Source: (www2).

The theories described above are important approaches that explain how to design CI. The RBV approach indicates which resources for the organization are important, even unique and how to manage them. In turn, IO theory facilitates identification of factors that affect the behaviour of organization in the market, while CPM proposes indicators for analysing and rating the competitiveness of the organization, and identifies new areas for exploring competitiveness of organization (e.g. the main business areas in BMC).

Integrated ICT instrumentation for supporting CI

When analyzing the concept of CI, it is hard not to notice that it requires a solid and integrated support from ICT. This support should be directed in particular at:

– flexible communication between all stakeholders of the organization. Particularly, groupware and idea mapping tools (Inspiration, MindMapper, MindManager, Axon), discussion forums and wikis (Wikipedia, Wiki) are recommended here,

– quick access to many information resources that can be a source of many inspirational ideas. In this operation, various types of search engines enabling to explore various information on the Internet (Ask, Bing, Google) and dedicated search engines, e.g. for patents databases, publication databases, job adverts databases, can prove helpful,

– effective collecting, archiving of data in various repositories (Hakansson & Nelke, 2015). It works especially for databases, data warehouses, data mat, patent databases, library databases, social networks, Wikipedia, and Wiki,

– intelligent data analysis. The following are particularly helpful here: Data Mining, Text Mining, Web Mining, Opinion Mining, Sentiment Analysis, Event Detection. They make it possible to discover connections between data, and, in particular, to discover new knowledge,

– sharing knowledge and expert evaluations. This is recommended for: management desktops, cloud computing, groupware systems, discussion forums.

Results

In this subchapter I propose comprehensive approach to the CI development which consists of five stages: (1) defining the CI strategy in organization, (2) identifying strategic sources of information and ways of collecting them, (3) developing intelligent data analysis and discovering new knowledge (4) learning and knowledge sharing, (5) developing the strategy of applying knowledge discovered (Figure 1).

Stage I – defining the CI strategy in organization

Defining the organization's strategy in the field of CI and linking it with business objectives should be considered one of the most important steps in the entire CI design process. It is worth emphasizing that the use of the CI concept in organization makes sense when the organization is interested not only in the passive registration of events but, above all, in their interpretation in a broad context and discovering new knowledge about markets, competition and the environment. The most important motivations for the development of CI include the transition from the instinctive, intuitive decision-making process into an objective approach based on the analysis of facts, indicators, attempts of forecasting the company's development, market situation, analysis of behaviour of customers, suppliers, and competition. At this stage, organization should define its business objectives and priorities in order to transform them in the best possible way into the CI strategy. When defining the CI's organizational development strategy, it is necessary to present ideas about possible and desirable states of its development in the future. This fact implies the need to follow and take into account the general trends in the markets. This also involves monitoring the close/immediate and distant environment of organization, especially

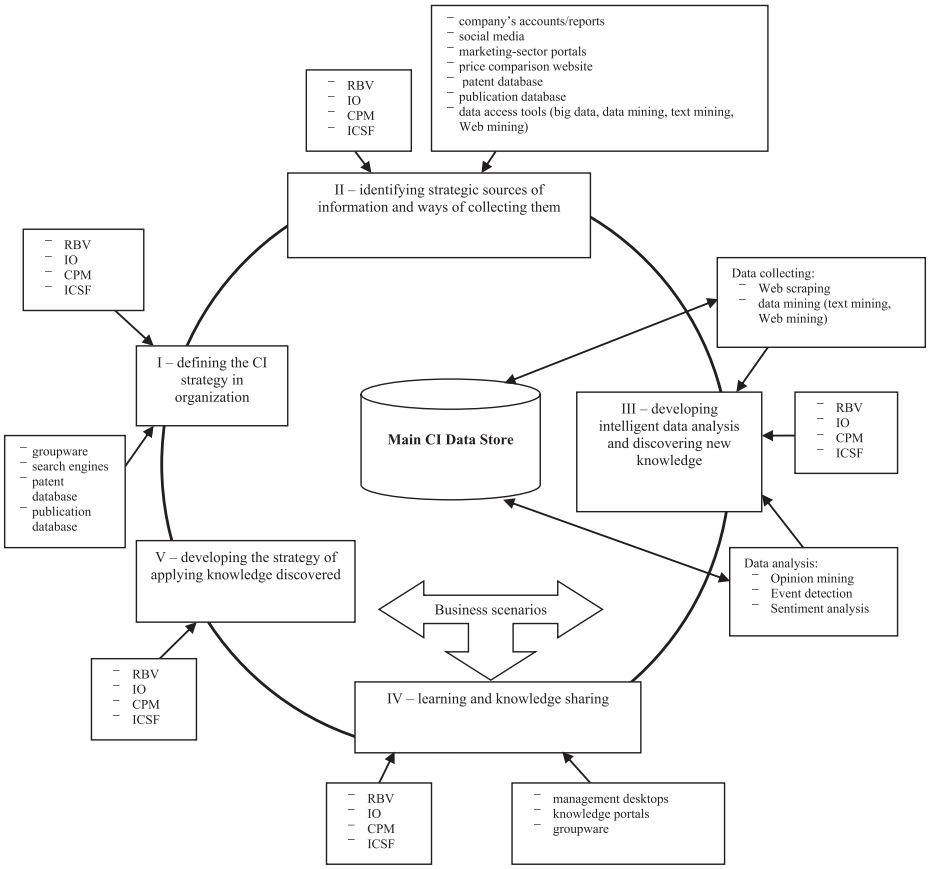

Figure 1. Comprehensive model of CI

Source: Author's own study (cf. Bartuś & Bartuś, 2016).

fiscal policy, business cycle and competition. Therefore, the organization's objectives within CI should be focused mainly on:

– competition – establishing the position of organization towards different players (closer and distant competition), multi-attribute competition research,

– products and services – defining the position of the product/service in relation to the current market offer, benchmarking, the possibility of launching new products/services in the market (defining the market depth and width),

– customers and clients – researching current customer needs, forecasting their behaviour and market preferences, customer loyalty,

– suppliers – identifying current and potential suppliers, forecasting their behaviour and market preferences, surveying suppliers' loyalty,

– public institutions – cooperating with public institutions (universities, public administration offices) and the development of corporate social responsibility,

– legislation – tracking of legal acts and regulations, both domestic and international.

The various techniques are helpful in developing the CI development strategy in organizations, e.g. Metaplan session, SWOT analysis, balanced BSC scorecard, Broekkstra's dynamics model, Nolan level model, McFarlan's strategic map, value chain analysis, analysis of key success factors and Porter's 5 forces analysis.

Stage II – identifying strategic sources of information and ways of collecting them

Identification of strategic data sources and their acquisition should have systemic and systematic character in the organization. These activities should be aimed at seeking information about customers, products, markets, competitors and suppliers. When identifying data sources, organization should specify:

– data attributes that organization wants to acquire,

– primary and secondary sources as well as internal information resources (data from ERP, CRM, SCM systems, Big Data tools, Data Mining) and external sources (social media, open repositories, public databases, corporate portals).

More and more often, valuable information is obtained from price comparison websites, fun-pages from social networks, discussion forums, web-journals, websites of customer and competitors. In particular, most popular are opinions of experts and users on various products, services and technologies, information on the activities of various companies, including competition (e.g. patents, cooperation agreements, job advertisements). Public databases (e.g. governmental institutions), various reports (financial reports, reports of companies, reports of experts and public organizations) have become an important source of information for organization. Data gathering from such repositories can be implemented:

– automatically – through tools: web scraping, data mining (web-based mining) and agent technologies (Olszak & Bartuś, 2013; Bartuś & Bartuś, 2014),

– traditionally – with the participation of employees who search for data from reports, explore reports of joint-stock companies, expert opinions, opinions from social media, queries/surveys to customers, suppliers, co-operators, employees.

The data obtained in this way is remembered in various repositories, e.g. data bases, data warehouses, which are further objects of various explorations and analyses.

Stage III – developing intelligent data analysis and discovering new knowledge

The third stage concerns intelligent data analysis of intelligent processing of collected data and creation of discovering new knowledge. The analyzes should focus mainly on: identifying the competitive position of the organization on the market, its products, market segmentation, testing the strength of competition and testing the loyalty of

customers and suppliers. Text mining techniques, especially Event detection, Opinion mining, Sentiment analysis (Table 4) prove to be particularly helpful at this stage.

Table 4. Types of analysis – Event detection, Opinion mining, Sentiment analysis

Analysis type	Characteristics	Type of information acquired	Author
Event detection	Focuses on identifying information about events. These are mainly attributes describing the event, i.e. type, time, place, participants and date. The ED process is composed of three stages: event topic reasoning, event property extracting, and similarity comparison	(1) list of people who are involved in an event, (2) content of the event, (3) time framework of the event, (4) which content (e-mail, forum post, blog post, comment on social media) are crucial, which of them initiated the discussion, (5) the way users are organized into groups (e.g. membership in a discussion forum, users commenting on a blog entry, users discussing content included in a social profile) and (6) how the event evolved in time (e.g. the level of users activity at the stage of appearance of an entry regarding the event/degree of activity of users at the time of the occurrence of the event	Choi et al. (2006, 2005), Clemons et al. (2006), Amarouche et al. (2015)
Opinion mining	User opinion mining	– polarization – defines the mood (whether is positive or negative) and the status of subjectivity (concerns the distinction between subjective and objective statements) – attitude – refers to the type of assessment expressed in the text ("bad", "sad", "bored", "beautiful", "thick", "high", "intelligent", "coward", "funny") – identification and assessment of the polarization of moods related to the topic under consideration (e.g. a company, brand or product)	Amarouche et al. (2016), Basari et al. (2013), Croft and Lafferty (2013), Ding et al. (2008)
Sentiment analysis	Sentiment analysis refers to the process of identifying opinions. Research as part of the analysis of moods can be divided into: – topic detection – understanding the general range of moods as well as the stimuli that affect these moods – product features – support access to detailed information in order to find a problem and, in the long-term perspective, to improve products – reputation management – relates to identifying consumer trends and identifying what levels of user feedback will affect the reputation of sellers as well as the time at which sellers must respond and take action as part of reputation management	– it allows the producer of a product to find out how consumers perceive purchased products and how they evaluate them in comparison to competitors' products	Das and Chen (2007), Hussein and El-Din (2016), Pawar et al. (2016), Liu (2010), Tang et al. (2009)

Source: Author's own study.

At this stage, it is also recommended to develop various business maps and scenarios, benchmarking, signal analysis, and brainstorming. The following are helpful in this respect: PESTEL (political, economic, social, technological, environmental, legal) model, Porter's five forces model, event timeline analysis (ETA), or SWOT (strengths, weaknesses, opportunities, threats).

Stage IV – learning and knowledge sharing

The fourth stage involves learning and disseminating the obtained results of analyzes. The analyzes carried out present particular activities and processes taking place in organization and its surroundings from a completely new point of view. Many analyzes may turn out to be incomprehensible to operational staff and managers. Therefore, all reports should be provided with a clear interpretation. At this stage, knowledge and ideas should be shared between employees, clients and all stakeholders of organization. All their comments and suggestions should be highly appreciated. Also, managerial dashboards play a large role at this stage as they facilitate comparing and monitoring key success factors. Each scenario illustrating the results of potential decisions is valuable. It should allow organizations to follow different variants of events and to predict and assess any consequences of taking action.

Stage V – developing the strategy of applying knowledge discovered

The last stage, i.e. the strategy of using the knowledge discovered, refers to the application of new knowledge in organization in order to improve its competitive position. This stage is inextricably linked to monitoring and controlling the actions taken. This is a particularly difficult stage, because it requires great determination, change management skills as well as innovative attitude on the part of organization. This stage may indicate the entry of organization with a product on a new market, alliance with new suppliers, or opening up to niche customers. These are significant changes in the operations of organization which should be properly managed and, above all, the need to introduce them should be emphasized. The techniques such as balanced scorecard (BSC) or activity-based costing (ABC) prove to be helpful at this stage.

The proposed model places great emphasis on the integration of key issues for the development and implementation of CI in organisations. Among them, one should point out, above all, a constant search for new data sources, their intelligent analysis, discovering new knowledge and its skilful application in decision-making. Table 5 summarises the particular components making up the comprehensive CI model and their relationship to key management theories as well as ICT tools.

Table 5. The conceptual CI model within management theory and ICT tools

Stage of conceptual CI model	Benefits of (RBV, IO, CPM, CSF, BMC)	Result/Objective of activity	Tools
Stage I	Resource-based view (RBV) facilitates the identification and assessment of information resources in the context of analyzing competitiveness of organization. RBV provides knowledge about types of resources available and useful in CI. Industrial Organization (IO) helps to indicate how the organization's environment and market structure affect the strategy and decision-making by organizations. This allows organizations to direct the CI strategy to a specific area of the organization's business. As regards Competitive Profile Matrix (CPM), the matrix, by identifying key competitors and comparing them according to industry critical success factors (ICSF), allows the CI strategy development upon specific factors and against identified competitors. Business Model Canvas (BMC) helps to define the CI strategy based on an analytical business model.	1. Developing the CI strategy and its main assumptions based on a business strategy. 2. Defining the area that will be affected by CI competitiveness. Therefore, CI objectives should mainly be targeted at: • competition – establishing the position of organization in relation to various actors (closer and distant competition), multi-attribute competition research, • products and services – determining the position of the product/service compared to the current market offer, benchmarking, possibility of introducing new products/services to market (determining the market depth and width), • clients – analysing current customer needs, forecasting their behaviour and market preferences, customer loyalty survey, • suppliers – identifying current and potential suppliers, forecasting their behaviour and market preferences, survey of suppliers' loyalty, • public institutions – cooperating with public institutions (schools, public administration offices) and the development of corporate social responsibility, • legislation – tracking legal acts and regulations, both domestic and international.	From management theory: Metaplan session, SWOT analysis, BSC balanced scorecard, Broekkstra's dynamics model, Nolan level model, McFarlan's strategic map, value chain analysis, critical success factors analysis and Porter's five forces analysis. From ICT: Group work tools, search engines: Internet, patent databases, publication database
Stage II	RBV facilitates the identification and assessment of information resources in the context of downloading data in accordance with the needs of analyzing organization's competitiveness. RBV provides knowledge about efficient management of critical CI resources. IO allows organizations to indicate what areas of the organization's environment generate useful information thanks to which potential sources of resources to be collected are identified.	1. Searching sources of CI-relevant information and its selection. 2. Characterizing information sources. Collecting information on information sources and saving them in the form of metadata. 3. Selecting/creating tools for downloading data from the Web. 4. Developing/reconfiguring the CI raw data store. 5. Developing a scenario for accessing and downloading CI data. 6. Testing download. 7. Producing data for downloading and supplying the CI raw data store. 8. Testing completeness and correctness of data collection. 9. Saving metadata from the process of downloading data from the Web.	From ICT: 1. Tools that perform Web queries from: a) company reports b) social media c) industry portals d) price comparison websites e) patent databases f) scientific publication databases

Stage of conceptual CI model	Benefits of (RBV, IO, CPM, CSF, BMC)	Result/Objective of activity	Tools
Stage II	As regards CPM, by identifying key competitors and comparing them according to ICSF, the matrix can be used to indicate what type of data is needed to analyze competitiveness of organization and competitors as well as other market players according to specific ICSFs and identified competitors. BMC allows organizations to indicate possible areas for analyzing competitiveness based on the analytical business model.		2. Data access tools: a) Big data tools b) Data mining (text mining, Web mining), i.e. Opinion mining, Sentiment analysis, Event detection c) API d) dedicated tools e) authoring tools
Stage III	RBV at this stage prompts to create unique resources, namely CI data analyzed. Within the uniqueness of analyzes and the results obtained from them, competitiveness of RBV organization may emerge, providing knowledge about efficient management of critical CI resources. At this stage, the RBV provides guidance on how information resources and knowledge discovered should be compared with each other. The RBV indicates the relationship between information resources and competitive advantage, providing a useful way to measure the strategic value of information resources. It is helpful to indicate how knowledge just discovered can improve, among other things, the organization's performance, sales, customer relationships and the position of organization on the market. IO allows organizations to indicate what areas of the organization's environment generate useful information, thanks to which potential sources of resources to be collected are identified.	1. Data analysis in terms of: a. Organizations: • the organization's position compared to the best organizations on the market • the organization's position compared to its competitors on the market • the position of competitors on the market • indication of the advantages and disadvantages, strengths and weaknesses of the competition b. Product: • the product position compared to the best products on the market • the product position compared to competitors' products • the position of the competition product on the market c. Customer d. Suppliers e. Co-operator	From management theory: scenarios, road maps for business success, benchmarking, signal analysis, PESTEL model (political, economic, social, technological, environmental, legal), the five forces analysis (FFA), event timeline analysis (ETA), brainstorming, patent databases, scientific publication databases. The following methods are most frequently used for the analysis of strategic opportunities: SWOT (strengths, weaknesses, opportunities, threats), critical analysis of success factors and CPM, event timeline analysis (ETA) From ICT: Data analysis: Opinion mining, Event detection, Sentiment analysis

Stage of conceptual CI model	Benefits of (RBV, IO, CPM, CSF, BMC)	Result/Objective of activity	Tools
Stage III	As for CPM, by identifying key competitors and comparing them according to ICSF, the matrix can be used to indicate what type of data is needed to analyze competitiveness of organization and their competitors as well as other market players according to specific ICSFs and identified competitors. BMC allows organizations to indicate possible areas for analyzing competitiveness based on the analytical business model.		
Stage IV	RBV prompts to convert CI knowledge acquired into innovation development. The ability to use creatively this knowledge is essential. Such skill is essential for the development of competitive advantage. At the same time, attention should be paid to the importance of the speed of reallocation of resources to locations and areas where they can achieve the highest value. IO enables organizations to indicate how the acquired CI knowledge can be put into activities in specific areas of the organization's environment thanks to which organization will be able to influence the environment. A regards CPM, the matrix, through its analytical form, allows sharing aggregate information about organization's competitiveness with selected competitors according to ICSF. BMC allows organizations to compare the results of analyzing competitiveness with specific areas (elements) of the business model.	Many analyses may turn out to be incomprehensible to operational employees and managers. Therefore, all reports should be provided with a clear interpretation. At this stage, knowledge sharing between employees should take place. All their comments and suggestions are valuable.	From management theory: KPI, development of a set of scenarios that should allow the results of potential decisions to be considered. From ICT: managerial desktops thanks to which one can easily compare and monitor KPIs, knowledge portals, groupware tools.

Stage of conceptual CI model	Benefits of (RBV, IO, CPM, CSF, BMC)	Result/Objective of activity	Tools
Stage V	RBV prompts to convert CI knowledge acquired into innovation development. The ability to use creatively this knowledge is essential. Such skill is the key to creating a competitive advantage. At the same time, attention should be paid to the importance of the speed of reallocation of resources to locations and areas where they can achieve the highest value. IO enables organizations to indicate how the acquired CI knowledge can be put into activities in specific areas of the organization's environment thanks to which organization will be able to influence the environment. As regards CPM, the matrix, through its analytical form, allows organizations to develop new CI strategies and to influence changes in the areas described by ICSF. (BMC) allows organizations to compile the results of analyzing competitiveness with specific areas (elements) of the business model and make specific changes in them.	This is a particularly difficult stage because it requires great determination, change management skills and innovative attitude on the part of organization. Determination concerns, for example, the product launch to the new market, or withdrawing from the current market, ventures with new suppliers, opening up to niche customers. These are significant changes in the operations of organization which should be managed properly and, above all, should convince about the need to introduce them.	From management theory: The following tools might be fund useful: balanced scorecard (BSC), activity-based costing (ABC).

Source: Author's own study.

Discussions

The conceptual CI model developed has been pre-verified. For this purpose, the automotive market was selected which, according to various sources (Wu, 2019; Manello & Calabrese, 2019; Pavlínek, 2019; Reimers et al., 2019; Małys & Przybylski, 2016), belongs to the most developing and competitive markets in the world. The company's maintenance in the automotive industry requires not only advanced research in the field of modern technologies but also careful analysis of customer feedback. To analyze reviews/opinions of car users edited on various forums and portals, it is important to upgrade car sales of the particular brand as well as develop CI.

This article analyzes and demonstrates how organizations from the automotive market, analyzing user reviews, can effectively develop their CI. On the example of analysis of feedback from 320 users (opinions were collected from various automotive portals) about SUV (sport utility vehicle) models, the CI development process for a selected organization is presented. This feedback referred to: (1) overall/general rating of a given SUV model, (2) engine operation, (3) transmission/gearbox operation, (4) chassis, (5) bodywork, (6) driving comfort, (7) visibility, (8) service ergonomics, (9) efficiency of ventilation/AC and heating, (10) space size for driver and passengers, (11) car silencing, (12) operating costs, (13) price attractiveness (quality / price ratio), (14) operational reliability, (15) faults, (16) fuel consumption. Opinions contained a comment/review written by a car user and rating of individual elements or features of the car expressed on a scale of 1 to 5.

In this study, I limited myself to examining competitiveness of a particular product, which is a SUV class car based on BMC together with its value proposition and a CPM matrix. The model verification, in accordance with the proposed stages of the conceptual CI model, was carried out on the example of a selected brand offering SUV cars. As part of CI's operations, the author undertook to recognize the position of products of this brand in relation to the competing products and to research the preferences of customers. Bearing in mind the wide range of the SUV market, this research is limited to four competing models including SUV class car makes (SUV A, SUV B, SUV C and SUV D).

Stage I – defining organization's strategy within CI

The first stage of the comprehensive CI model defines a CI strategy for organization producing and selling SUVs. Applying the guidelines of the CI model at the first stage of determining the CI strategy, the author postulates that:

– CI's goal is to test and monitor the perception level of a selected SUV class car model based on market characteristics. More specifically, the analysis concerns:

a) feedback from the SUV by customers,

b) research on organization's competitiveness on the market.

– CI initiators who need to do market research in terms of surveying customers on the usage of SUV class involve:

a) research and development department where CI make it possible to verify the assumptions according to which the car was designed and built against the opinions of its users,

b) marketing department which thanks to CI is able to prepare better for new campaigns, e.g. by examining customer feedback to current activities and comparing them with the practices implemented so far,

c) CI analyst who coordinates and implements CI tasks.

– recipients of CI results involve: R&D department and marketing department,

– effects of CI involve: proposition of value according to BMC, ICSF (i.e. product quality, customer loyalty, customer satisfaction), CPM matrix with appropriate weights provided for selected ICSF, and graphs resulting from modelling and analysing social networks (social network analysis, SNA – Gephi) that demonstrate the dependencies between particular ICSFs.

The pre-build assumptions for CI strategy based on the Business Model Canvas (BMC) defined the so-called value proposition. According to the BMC guidelines, it should answer the following questions: What is the value for our clients? What will they pay for? What is the key factor to them? Therefore, the value proposition includes:

a) universality of a high quality car,

b) product quality – overall rating of SUV car,

c) customer satisfaction with an accurately priced product: Customer satisfaction – value for money,

d) desire to own a SUV as a status symbol: Customer loyalty – (would) buy again / (would) not buy again.

The advantages of the BMC value proposition defined this way are the aggregation of the benefits that customer gains with the product (overall SUV rating), including the quality rating of the product (SUV) in relation to its price, and customer loyalty in comparison to the competition. Customer loyalty is expressed by the declaration of buying the same product again (the same SUV car model). Analysis of the value proposition will indicate the similarities and differences between what the selected organization offers (a SUV) and what its competition offers. It will also enable the organization to find out about the position of the selected product (SUV class car model) in relation to the wide market offer.

Bearing in mind the postulate of the value proposition, the CPM matrix was developed. It contains three areas of the product rating defined in the CI strategy in terms of what is offered to customers. These areas will answer the following questions in the CPM:

1. What are features, capabilities and characteristics of particular make of SUVs?
2. Why do customers prefer SUV A than SUV X or *vice versa*?
3. What are the unique selling propositions of particular SUV makes?

In addition, appropriate weights have been assigned to each ICSF. This was implemented by CI initiators (research and development department, marketing department, and CI analyst) who, in the course of team discussions, defined the order of ICSF and their weight values. For SUV users, car versatility is predominantly important, therefore, the first factor in the matrix is universality and high quality of SUV, i.e. widely understood product quality, namely the overall SUV rating. Therefore, this criterion was assigned the highest weight (0.5). The second position was desire to own a particular SUV, as a symbol of user's status and attachment to the brand expressed in customer loyalty – would buy again / not buy again. This criterion was of the second highest weight (0.3). The third position was customer satisfaction with the product (SUV) assembled properly and priced accurately, understood as customer satisfaction – value for money. This criterion received the lowest weight (0.2). The final form of the CPM matrix is presented in Table 6.

Table 6. CPM matrix with selected ICSF

CPM									
		SUV A		SUV B		SUV C		SUV D	
Industrial Critical Success Factor	Weight	Rating	Score	Rating	Score	Rating	Score	Rating	Score
Product quality – overall product rating	0.5								
Customer loyalty – buy/not buy again	0.3								
Customer satisfaction – value for money	0.2								
Total	1								

Source: Author's own study.

Stage II – identifying strategic information sources and acquiring information

This stage is inextricably linked to the first stage. It provides information about strategic sources of information for organization from the point of view of developing its CI strategy. The identification of potential and especial strategic data sources and their acquisition should have a systemic character in organization. These activities should be focused on seeking information about potential customers, improved products and services, new markets, original supply chains as well as current and future competition. On the basis of the assumptions from the first stage, mainly from the CPM matrix developed with selected ICSF (product quality, customer loyalty, customer satisfaction), the author undertook to search for strategic sources of information which turned out to be industry-specific Internet portals, Internet search engines, also public databases and competition reports referring to various preferences of customers, e.g. preferred SUVs, type and operation of the engine, type of gearbox, work of the chassis, visibility, ergonomics, ventilation and heating,

spaciousness and quietness in car, costs of car maintenance and operation, car price in relation to quality ratio as well as the most common types of faults, type of fuel and its consumption. Data acquisition was carried out automatically using the Web scraping tool. Due to the large variety of data presented on websites, it was necessary to clean files from errors manually. Data collected in this way, containing user feedback on selected SUV makes, was finally saved as a CSV file, which allows free viewing, copying, importing into analytical tools. The CSV format also made it possible to top up CI data repository (CI Main Store). Along with the data that go to the main repository, metadata is collected, e.g. a link to single page from which data was collected and the date of their collection.

Stage III – intelligent data analysis

Data collected on customer preferences regarding SUVs have been subject to detailed analyzes. Based on the CI strategy determined in the first stage, the following has been developed:

1. CPM matrix with ICSF factors determined in the first stage (i.e. product quality, customer loyalty, customer satisfaction):

a) with the determined order of ICSF (i.e. product quality, customer loyalty, customer satisfaction) (Table 7),

b) with an altered order of ICSF (i.e. customer satisfaction, customer loyalty, product quality) (Table 8).

2. Graphs resulting from modelling and social network analysis (SNA).

According to the postulates of the CI strategy (stage I), data from the acquired data was used for in-depth analyses: SUV make and car model, product quality – overall product rating, customer loyalty – buy again / not buy again, customer satisfaction – value for money.

CPM Matrix

The rating values for particular SUVs were determined basing on a tabular summary of user opinions, based on which the percentage share of individual feedback on specific SUV car make was calculated. For the percentage from Table 7, the following rating was assigned: a) for the "Buy again" option, Rating 4 had the highest percentage, whereas Rating 1 had the lowest percentage, b) for the "Not buy again" option, Rating 1 had the highest percentage, whereas Rating 4 had the lowest percentage.

The above methods of valuing the weights were repeated for two subsequent calculations regarding the remaining ICSF: customer loyalty and customer satisfaction.

Table 7. Tabular summary of the number of SUV user reviews

SUV make	1.0 Overall	2.0 Overall	3.0 Overall	4.0 Overall	5.0 Overall	Total	%	Rating
Buy again			3	93	168	264		
SUV A				25	40	65	84%	3
SUV B				24	56	80	88%	4
SUV C				20	24	44	79%	2
SUV D			3	24	48	75	78%	1
Not buy again	6	8	31	11		56		
SUV A		2	9	1		12	16%	3
SUV B	3	2	4	2		11	12%	4
SUV C			8	4		12	21%	1
SUV D	3	4	10	4		21	22%	1
Total	6	8	34	104	168	320		

Source: Author's own study.

Table 8 illustrates the resulting CPM matrix in the context of three attributes: overall rating of the car's model, customer loyalty (declaration whether one would purchase the same car model of a given mark once again, or not), and the quality of the car's model in relation to its price. The determined factors with designated weights were supplemented by the calculated rating. The comparison of the results of all ICSF factors allows organizations to determine what are the strengths and weaknesses of the tested car models of a particular brand, and how they position themselves in relation to the remaining competition. In the example under consideration, SUV B (Score = 4) has the highest rating regarding all three factors (product quality, customer loyalty, customer satisfaction). Therefore, the SUV B manufacturer should foster these areas, trying to maintain their good position. The second place is taken by SUV A (Score = 2.5), and its weaknesses which should be definitely improved is the "product quality" factor as well as the remaining factors (customer loyalty, customer satisfaction – weight 3). The example of SUV D (Score = 2.0) seems quite interesting as its users rated the product quality factor really high (weight 3), whereas customer loyalty (weight 1) and customer satisfaction (weight 1) were rated rather low. The lowest rating in the CPM was assigned to SUV C (Score = 1.2). Details are presented in Table 8.

Table 8. The resulting CPM matrix – initial ICSF setup

CPM									
		SUV A		SUV B		SUV C		SUV D	
Industrial Critical Success Factor	Weight	Rating	Score	Rating	Score	Rating	Score	Rating	Score
Product quality – overall product rating	0.5	2	1	4	2	1	0.5	3	1.5
Customer loyalty – buy again / not buy again	0.3	3	0.9	4	1.2	1	0.3	1	0.3
Customer satisfaction – value for money	0.2	3	0.6	4	0.8	2	0.4	1	0.2
Total	1	–	2.5	–	4	–	1.2	–	2

Source: Author's own study.

However, in the event of changing the order of priorities for success factors (changing the weights) it may turn out that, with the same unit results, the inclusion of weights (column weight) will modify the order of products classified in the last two places. Downgrading the product weight position from 1 to 3 (weight = 0.2), and upgrading customer satisfaction from 3 to 1 (weight = 0.5) resulted in higher values for SUV C (upgrade to third place with the score of 1.5) and lower values for SUV D (down to fourth place with the score of 1.4). Details are presented in Table 9.

Table 9. The resulting CPM matrix – modified ICSF order

CPM									
		SUV A		SUV B		SUV C		SUV D	
Industrial Critical Success Factor	Weight	Rating	Score	Rating	Score	Rating	Score	Rating	Score
Customer satisfaction – value for money	0.5	3	1.5	4	2	2	1	1	0.5
Customer loyalty – buy again / not buy again	0.3	3	0.9	4	1.2	1	0.3	1	0.3
Product quality – overall rating	0.2	2	0.4	4	0.8	1	0.2	3	0.6
Total	1	–	2.8	–	4	–	1.5	–	1.4

Source: Author's own study.

The results indicate that the subjective rating of the team using the CPM matrix, as to the weights for particular ICSFs, may affect the order of results and the value obtained for competitiveness of the tested products. Therefore, as proved in this example, it is recommended that the reviews/opinions of various experts should be taken into account when setting the final weights. The team using the CPM matrix should define ICSFs and their weights in accordance with the strengths and weaknesses of organization and improve its ratings in the most important industries.

Graphs resulting from modelling and social network analysis (SNA)

Analyzes carried out in the form of graphs (SNA analyzes) allowed us to explore competitiveness of a selected SUV class car model compared to similar competing products. The analyzed data should be properly visualized. For this purpose, the Gephi tool was used. Figures 2, 3, 4 show customers' reviews on car brands including the following attributes: Product quality – overall rating (Figure 2), customer loyalty – buy again/not buy again (Figure 3), customer satisfaction – value for money (Figure 4). In the graph, the nodes represent SUV car make and the selected attribute of their rating. The thickness of the edge of the graph indicates a high or low rating of a particular car make. The analysis of the results obtained in the form of graphs supplement the tabular form of the CPM matrix.

Figure 2, resulting from the SNA analysis, is the visualization of the relationship between SUV car makes (A, B, C and D) and their product quality overall rating.

The graph shows that users most often rate the product as a whole very high (168 ratings) and high (104 ratings). However, the lowest value (6 ratings) and low values (8 ratings) come from users of SUV A and SUV D.

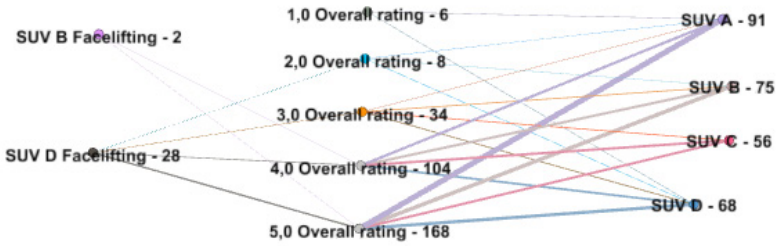

Figure 2. Product quality criterion – overall rating

Source: Author's own study.

Figure 3 is the visualization of the relationship between the SUV car brand (A, B, C and D), and the declaration on the repurchase of the car (customer loyalty – buy again / not buy again). The graph shows that SUV A and SUV B users most often declared willingness to repurchase the car. However, most of the declarations for no repurchases refer to SUV D.

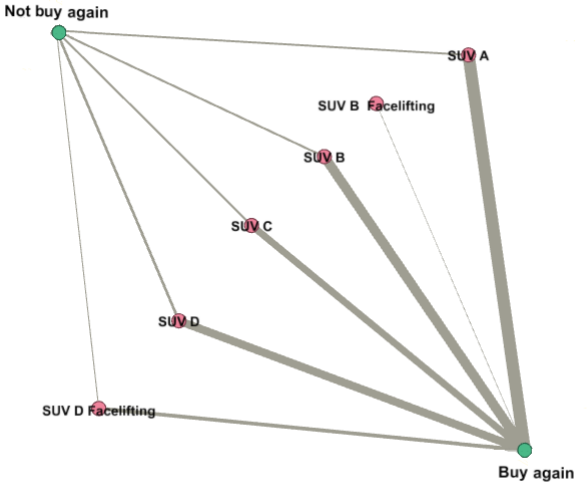

Figure 3. Customer loyalty – buy again/not buy again

Source: Author's own study.

Figure 4 is the visualization of the relationship between the SUV car brand (A, B, C and D), and the value for money (customer satisfaction – value for money). It can be

seen in the graph that for SUV B there is the highest number of 5.0 ratings, then a few of 4.0 and 3.0 ratings, and there is no the lowest (1.0) rating. The remaining SUVs have both very high ratings (5.0 and 4.0) and the lowest (3.0, 2.0 and 1.0) ratings.

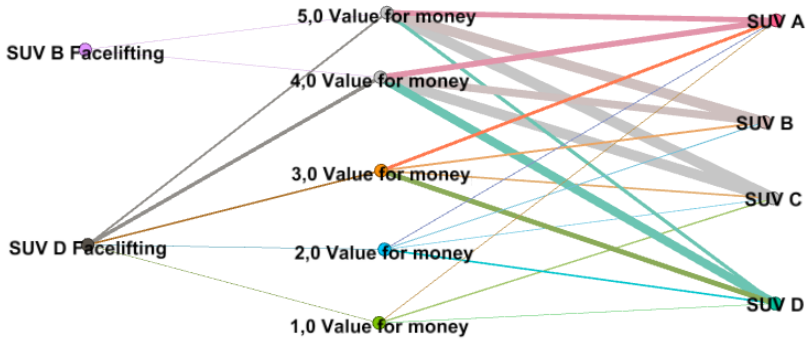

Figure 4. Criterion of customer satisfaction – value for money

Source: Author's own study.

These dependencies show the new importance of the so-called value propositions in the SUV car competitiveness survey under CI. The results obtained indicate that users of SUV B (low-medium class) rate the product very high; as a whole, they score the price-quality ratio very high and mostly declare their willingness to purchase it again. However, for SUV D (upper middle class) users rate the whole quite high (rating for the second place with the weight of 3). However, the other factors (and in particular customer satisfaction – value for money) are rated quite low for all cars reviewed. We may conclude that SUV D users are able to pay for the product more than for other cars in this class, but in return their expectations are also higher.

At the end of stage III it is worth noting that some of the results of the analyses may turn out to be incomprehensible to operational employees and managerial staff. Therefore, all reports should have a simple form of presenting information. They should use both data compiled in the form of interesting matrices (e.g. CPM matrix) as well as the form of a graph with appropriate labels (e.g. labels with data, as in Table 8). If it is required, afterwards they should be provided with appropriate commentary serving as a clear interpretation of data.

Stage IV – learning and knowledge sharing

At this stage, the results of CI analyzes and conclusions drawn from them should be shared between CI stakeholders. Due to the effectiveness of using the results and conclusions from CI analyzes, all their comments and suggestions may be valuable.

For this reason, management dashboards play a large role, thanks to which it is easy to compare and monitor KSFs (key success factors). The model proposes to develop a set of CI scenarios that should allow the results of potential decisions to be studied (realistic, optimistic and pessimistic, or alternative and emergency scenario). The development of several CI scenarios allows organizations to follow different variants of events and estimate the consequences of making specific decisions. In addition, they prompt organizations to familiarize themselves with the new CI analysis results which in the scenarios are put into practical activities. Therefore, in order to specify new assumptions, the core/key CI scenario was developed (Table 10) on the customer perception of selected SUV models and the examination of organisation's competitiveness in relation to its competitors' offer. This scenario contains the answers to the following questions:

1. How do clients rate the product as a whole compared to the competition?
2. How do customers rate the quality of a SUV class car to its price?
3. How does the customer loyalty, expressed by the declaration to re-purchase the same car model, compare to the competition?

Table 10. Core CI scenario

Action	Description
Problem identification	Competitiveness analysis of a selected SUV class car according to all attributes available in the original source (the website from which the data is downloaded).
Identification of the scenario environment	Analysis of customer feedback on a selected SUV and comparison with selected competitive SUVs.
Identification and documentation of desired objectives	(a) identification of strengths and weaknesses of the selected SUV class car, (b) list of strengths and weaknesses of the selected SUV class car in two CPM matrices (with equal weights for the same ICSF)
Identification of participants in the scenario	(a) marketing dept., (b) R&D (c) CI analyst
Identification of ICTs involved in the project	(a) Internet resources, (b) Web scraping tools, (c) resources in CSV files, (d) repository CI Main Store with meta-data, (e) CPM matrix, (f) social network analysis (SNA) with Gephi graphs
Identification and documentation of the participant	(a) marketing dept. and R&D: (1) building assumptions for the CI strategy: analysis of competitiveness of the selected SUV class car, (2) determination of areas and indicators for CI analysis: car brand, buy or not buy, overall, engine, transmission, chassis, visibility, ergonomics, ventilation and heating, spaciousness, quietness, maintenance costs, price vs. quality, minor defects, serious defects, fuel type, fuel consumption, (b) CI analyst: conducting analyzes and developing a report on analyses
Further action plan	(a) dissemination of results, (b) preparation of updates for the CI core scenario

Source: Author's own study.

For stage IV – learning and sharing knowledge – www portal was developed and used. It is a place of discussion and exchange of opinions, their reviewing and categorizing (e.g. assigning by employees to the category of research and development, or promotion and marketing) among CI's stakeholders and other employees. Thanks

to its functionalities, the portal provides knowledge sharing and exchanging between CI analyst, marketing department and R&D department. The portal developed for the verification of the original CI model on the example of SUV class cars includes both a discussion forum, a wiki as well as CI's desired functionalities (CI dashboard, analysis results, and CI charts and graphs) (Figure 5).

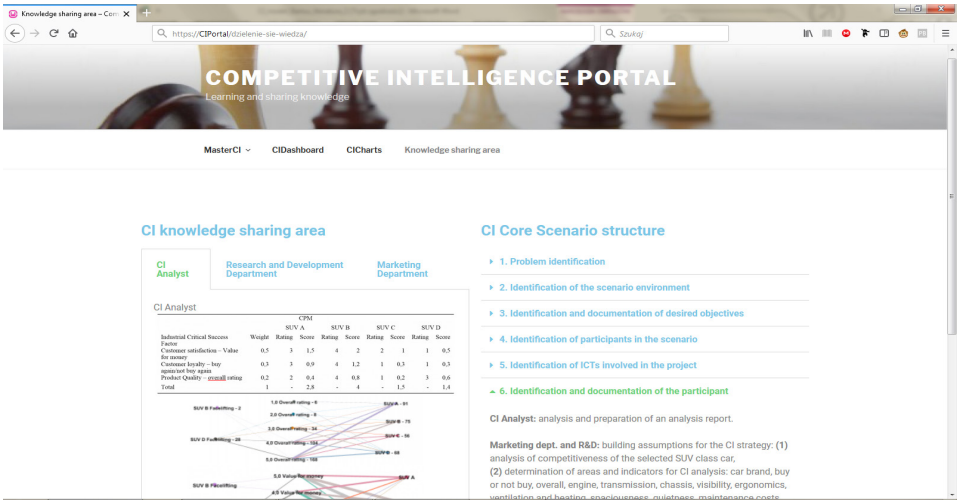

Figure 5. Portal for sharing CI knowledge in the automotive industry

Source: Author's own study.

The functionalities of the CI portal have been divided into areas: (1) division into employees participating in CI tasks (CI knowledge sharing area – division into tabs: CI Analyst, Research and Development Department, Marketing Department) and (2) CI Core Scenario structure. They allow portal users to familiarize themselves with content published by main CI stakeholders. In addition, the portal allows for commenting/reviewing and adding own suggestions in the relevant edit fields located in both the CI Knowledge Sharing area and the CI Core Scenario. This web portal facilitates dissemination of knowledge coming from current CI analyzes and its development.

Stage V – strategy of applying the discovered knowledge

The last stage, i.e. use of knowledge, refers to the use of knowledge discovered in the activities of organization. It involves further monitoring and controlling the operations undertaken. They may concern, for example, opening up to niche customers, modernizing the product, launching the product into a new market, or alliance with new suppliers. This is a particularly difficult stage because it requires great de-

termination, change in management skills and innovative attitude from organization. In this research, the CI's accumulated knowledge confirmed the reasonability and usefulness of analyzing customer feedback on selected SUVs and comparing them with selected competitive cars in the same class.

Conclusions

Both theoretical and practical studies indicate that CI is a complex issue. So far, it has not been possible to develop the comprehensive CI development model. The study proposes such a comprehensive approach to develop CI.

The CI model, developed and validated, is the complete and integrated hybrid that takes into account the organization's needs and the potential of ICT tools in the area of CI. These features seem crucial for organizations from the point of view of CI. The proposed model assumes developing the CI strategy on the basis of IO and RBV theory and tools supporting business operations (BMC, CPM, ICFS). The strategy is needed to explore and retrieve data from various data sources (including websites, e.g. customer reviews, industry reports). Thanks to this, CI is able to collect a lot of information about products offered by organization and its competitors as well as the opinions of users about the former and the latter. Organizations can quickly respond to the opinions and attitudes of current and future customers, and analyze swiftly the organization's competitiveness. The presented example of the use of the comprehensive CI model is pre-validated and requires further research. However, it is now possible to make its initial assessment which showed both its strengths and weaknesses.

Undoubtedly, the strengths of the comprehensive CI model include:

– incorporation of many theories and tools in the CI process such as: Resource-Based View (RBV) and Industrial Organization (IO), Business Model Canvas, Competitive Profile Matrix (CPM), modelling and analysing social networks (SNA) and graphs (Gephi),

– necessity of efficient and automated acquisition of data from selected Internet resources,

– combination of various resources in the central Main Store repository,

– possibility of efficient CI analysis based on critical data collected from industry websites,

– presentation of CI data analysis in a user-friendly form, i.e. the CPM matrix and the visualization of inter-domain relations in Gephi.

However, the comprehensive CI model showed also some weaknesses, including:

– need to develop indicators helpful in the validation of the computer-assisted CI model,

– need for further validation in various CI areas and various industries.

The paper makes a theoretical contribution to computer-assisted CI in several areas. First of all, in the paper it was confirmed that the CI capabilities and its use

in business and development directions are a little-known field of research. Therefore, this study is an important contribution to CI literature through the proposed integration in a comprehensive CI model and theory, i.e.: (1) Resource-Based View, Industrial Organization and Business Model Canvas, which were used to design CI, (2) measurement theories and validation of CI implementation, i.e.: Competitive Profile Matrix, Industrial Critical Success Factors and (3) theories for integrated computer-assisted CI. Secondly, the paper shows how CI should be integrated with the proposed theories and ICT tools to support individual stages of the model and tasks implemented under the CI. Thirdly, the knowledge gained during the validation of the CI model shows that the CI approach is a critical factor in increasing the organization's ability to monitor and strengthen its competitive advantage.

The research carried out and presented in the paper also gives an empirical contribution to extending the knowledge on CI's potential in the organization's activities and its computer-supported approach. The results obtained during the validation of the CI model show great importance for a comprehensive look at the topic of computer-assisted CI. This contribution is significant because in the literature there are no such studies and conclusions obtained from them. The results obtained and conclusions should be useful for all organizations that need to analyze competitiveness using a comprehensive CI model.

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