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THE USE OF COMPETITIVE INTELLIGENCE (CI) BY ESTABLISHED ORGANIZATIONS TO HELP ANTICIPATING, UNDERSTANDING AND RESPONDING TO DISRUPTIVE INNOVATIONS

Como a inteligência competitiva pode contribuir com organizações já estabelecidas na antecipação, compreensão e gestão de inovações disruptivas

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Abstract: Disruptive Innovations (DI) are those generated by new technologies that have the power to change the value proposition of a market and, even though they may begin appealing only to smaller clients segments. Eventually, they go upmarket and cause "disruption" challenging the leading established organizations. We believe that Competitive Intelligence (CI) can be used as a dynamic strategy and a structured process of acquisition, analysis, and dissemination of information and of knowledge creation to help these established organizations to better anticipate, understand and respond to the challenges of disruptive innovations in their industries. Through a theoretical essay based on a thorough literature review on the themes, we evaluated if and how IC can help these organizations. The study was justified mainly by the lack of previous works relating the two constructs (CI and DI), and we focused on the perspective of the established organization (incumbent) instead of the perspective of the disruptive companies (new entrants). We believe these discussions may benefit scholars in the fields of CI and Innovation and practitioners from different industries that are being or may be challenged in the future by this kind of innovation.
Key words: Competitive Intelligence, Disruptive Innovation, Weak Signals.

Resumo: Inovações Disruptivas (ID) são aquelas geradas por novas tecnologias que têm o poder de mudar a proposta de valor de um mercado e, ainda que comecem apenas em segmentos menores de clientes, eventualmente ganham o mercado principal e causam "disrupção" desafiando as empresas estabelecidas líderes. Pressupõe-se que a Inteligência Competitiva (IC) pode ser usada como uma estratégia dinâmica e um processo estruturado de coleta, análise e disseminação de informação e de geração de conhecimento para ajudar estas empresas estabelecidas a anteciparem, compreenderem e responderem melhor aos desafios de inovações disruptivas em suas indústrias. Por meio de um ensaio teórico baseado em extensa revisão bibliográfica sobre os temas, avaliou-se se e como a IC pode auxiliar estas organizações. A realização do estudo justificou-se principalmente pela escassez de trabalhos prévios relacionando os dois construtos (IC e ID) e optou-se pela ótica da empresa estabelecida (incumbente) e não das empresas disruptivas (entrantes). Acredita-se que estas discussões podem beneficiar estudiosos nos campos de IC e de Inovação e profissionais de diferentes indústrias que estejam sendo ou que possam ser futuramente desafiados por este tipo de inovação.
Palavras-chave: Inteligência Competitiva, Inovação Disruptiva, Sinais Fracos.

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INTRODUCTION

There are two sides of the debate regarding innovations: one that "vehemently argues the merits of innovating vis-à-vis customer feedback" and other that "argues that true innovation is created by singularly gifted visionaries who ignore customer input and instead manufacture innovation based solely on their prophetic vision for a better future" (Vlaskovits 2011, p.1). This second view may be exemplified by famous management anecdotes such as the Henry Ford allegedly (but never confirmed) quote "If I had asked people what they wanted, they would have said faster horses", or Steve Jobs famous Businessweek interview where he stated that "it's really hard to design products by focus groups. A lot of times, people don't know what they want until you show it to them" (Reinhardt, 1998).

There is a general belief that "big innovations" are more related to little creativity than to the organizational capacity of collecting and analyzing information about the market and the desires of consumers. Some of these innovations are being characterized by disruptive innovations as they allegedly have the power to "disrupt" industries. There are classic examples such as Sears Roebuck that on the 1960s was a flagship on the American retail market but lost its dominant position for not being able to adapt to the surge of discount retailers and home centers. Or, IBM on the technology industry that dominated the mainframe market of computers but lost its leadership with the emergence of minicomputers (Christensen, 1997). More recently, different technological innovations and new organizations so-called "disruptive" have been created especially influenced by the growth of the Internet. Some examples are: Netflix in the market of films and television; Whatsapp in the market of telecommunications; Uber in the market of transport; Waze in the market of GTS and Amazon in the retail market. Even though are all good examples of radical innovations they cannot necessarily be considered as disruptive ones. It is important to have a clear concept of disrupt innovation and differentiate it from other types of innovations (Dewar & Dutton 1986, p.1422). These authors defend that innovations vary according to the level of novelty and to the notion of "radicality". In this sense, radical innovations are those that present fundamental changes that represent revolutionary changes in technology.

Christensen, Raynor & McDonald (2015) reinforce the importance of clearly differentiating disruptive innovation a radical one since the strategic approach required to deal with each one is different. Disruptive innovations are those originated in low-end or new market foothold overlooked by established firms and change the value proposition in a market and sometimes have the power to supplant older technologies. Consequently, many successful established businesses end up failing. Christensen (1997, loc.123/4215) believes that "good management was the most powerful reason they failed to stay atop of their industries – precisely because these firms listened to their customers, invested aggressively in new technologies that would provide their customers more and better products of the sort they wanted, and because they carefully studied market trends and systematically allocated investment capital to innovations that promised the best returns, they lost their positions of leadership". Indeed, there are times when the wisest thing is not to listen to customers or to use internal information for decision making. But, that does not mean that organizations should not use Intelligence to help them anticipate and manage disruptive innovations. As stated by Paap & Katz (2004, p.22) disruptive technologies do not need to disrupt the success of the business as even though one "cannot predict the future, you can anticipate change and prepare for it by focusing on the drivers of technology".

Competitive Intelligence (CI), as pointed by (Sharp, 2009) takes a broad, objective and accurate view of "what business faces and what can derail or challenge your company… it considers all the elements that impact the company's success—customers, suppliers, distributors, substitutes, regulations, technology, the economy, other industries, demographics, culture/societal issues, and competitors".

Dishman & Calof (2008) believe that Intelligence is a process and that involves different dimensions: collection (different sources and methods for acquisition of information including environmental scanning), analysis (convert information into intelligence to generate action and for tactical and strategic decisions), communication (need to communicate results to those with authority and responsibility to act), process and structure (policies, procedures, and level of formality / informality to engage employees) and organizational culture / attention. We believe that Competitive Intelligence can be used as a dynamic strategy to help established organizations deal better with disruptive innovations. The CI process that involves collecting and analyzing information, predicting market movements and technology changes and providing early warnings can be used as an aid by these organizations to anticipate, understand and respond to disruptive innovations. These discussions can be useful for researchers and practitioners of management, innovation, and intelligence from different segments and industries.

Justification for Research

Even though the use of CI is not new in the management field, it needs to increase its relevance both in the academic and practitioners´ world. A recent study by (Gilad & Fuld, 2016) claims that only half of the companies use the Competitive Intelligence they collect. This becomes more critical as the business environment evolves as more dynamic, uncertain and complex fostering organizations to develop more capabilities on how to gather, process and use relevant information on the competitive environment for the decision-making processes. Because of their nature, disruptive innovations are difficult to understand and manage. In the beginning, they may not seem like a real threat and may be overlooked by managers. Disruptive products and services start with a worse performance than established ones and are appealing only to small pieces of the market. But, if the right information regarding this new technology is not being analyzed by the established organizations, there is an increased risk of blindness regarding the possibility of disruption. The new value proposition brought by entrants to the market may seem harmless to start with, but the situation changes as technology and market evolve.

Both fields of Competitive Intelligence (CI) and Disruptive Innovations (DI) have been individually widely researched. But, little has been studied on the connection between the two fields. For the construction of the Theoretical References of this study, we conducted a bibliometric research regarding articles that combined both CI and DI. We used the database WEB OF SCIENCE (from Capes Portal) setting a 20 years period (1997 to 2017) to search for all articles that included both CI and DI. When both terms were searched simultaneously on the title field, no article was found. We broadened the search accepting that the terms were also accepted in the topic of the articles. The system returned 8 (eight) articles being 3 (three) from 2017, 2 (two) from 2016 and 3 (three) from 2013. Since many articles use Business Intelligence (BI) instead of Competitive Intelligence (CI), we conducted a new search using this also new term. We found 3 (three) additional articles: 2 (two) from 2017 and 1 (one) from 2016. We ended up with 11 (eleven) articles that related CI or BI with DI as summarized in Figure 1.

Figure 1: Search criteria and number of articles found relating CI with DI

Database	Search Criterias	# of articles
WEB OF SCIENCE	Title: "Competitive Intelligence" AND "Disruptive Innovation"; Document Type: Article; From 1997 to 2017	0
WEB OF SCIENCE	Topic: Competitve Ingelligence" AND "Disruptive Innovation" Document Type: Article; From 1997 to 2017	8
WEB OF SCIENCE	Topic: "Business Intelligence" AND "Disruptive Innovation"* Document Type: Article; From 1997 to 2017 * additonal to the previous search	3
Total		**11**

Source: Elaborated by the authors

This article aims to put some light on this gap and, at the same time, tries to address how CI can be incorporated by organizations as an ongoing and dynamic strategy to help them manage potential disruptive technological changes that can dramatically influence their businesses. We believe that common sense has played a negative bias on spreading the notion that disruptive innovations are mainly based on intuition and the influential role of visionary leaders and are forged to entrepreneurial startups that are fast and aggressive to compete with established large organizations. Nevertheless, history has shown that disruptive innovations appear in a lot of different industries and that the organizations considered disruptive today may eventually establish and in the future, they can be challenged by new disruptive innovations. We think that Intelligence (and more broadly CI) can be an essential tool helping managers to efficiently anticipate, understand and manage potential changes that disruptive innovations can represent to their markets. These discussions may benefit not only academics and managers of CI and innovation but also managers who are working to understand the current ever-changing business landscape better.

Research Question and Objectives

We believe there is a positive relation between the use of CI strategies by established organizations with their capacity to anticipate, understand and respond to disruptive innovations. Therefore, our main research question is: Can CI help established organizations be better prepared to deal with disruptive innovations? The specific objectives of the study are:

1.Verify if there is a relation between the use of CI strategies and the capacity of organizations to anticipate and understand disruptive innovations in their industries;

2.Evaluate if CI strategies can help established organizations be better prepared to respond to the challenges of disruptive innovations;

3.Propose a framework with selected strategies on the use of CI to help managers deal with disruptive innovations;

We aim to achieve these objectives through a theoretical essay including a review of the relevant literature, comparison of theories and logical deduction to conclude.

THEORETICAL REFERENCES

Innovations: Concepts, Types, and Graduations

According to Damanpour (1991, p. 556) different authors have been making distinctions between studies on the “diffusion” and “adoption” of innovations, as well as between studies of “innovating” and “innovativeness”. The author believes that: “an innovation can be a new product or service, a new production process technology, a new structure or administrative system, or a new plan or program pertaining to organizational member”. Tidd & Bessant (2015) agree that there are different concepts of innovation and that, many times, it is confused with invention. They propose the understanding of innovation as a long transformation process of ideas into reality and the eventual capture of value where the invention is only the first step.

They believe that an innovation can impact changes in four dimensions: product innovation (change in products and services provided by the organization), process innovation (change in the way products and services are created and offered), position innovation (changes in the context in which products and services are offered) and paradigm innovation (changes in the mental models related to how the organization positions its offers and the market in which it acts). The authors reinforce the importance of understanding the “level of novelty” of innovation to differentiate between a radical innovation (do something different) from an incremental one (do what is being done in a better way).

Disruptive Innovations

For a deep understanding of disruptive innovation, we will refer to Christensen (1997) where most of the concepts and definitions related to the theme were coined. Technology, in this context, is related to the process of transformation of inputs (i.e., labor, capital, materials, and information) in outputs (i.e., products and services of greater value) and innovation refers to changes in technology. The concepts of sustaining and disruptive technologies are different from incremental versus radical ones which are the ones more traditionally used. Sustaining are those new technologies aimed to improve the performance of established products and services (along the dimensions of performance valued by the market of mainstream customers) whereas disruptive technologies may result in worse performances in the short term but may evolve and be performance-competitive in the same market in the future. As explained by Christensen (1997, loc 175/4215): "disruptive technologies bring to a market a very different value proposition that had been available previously. Disruptive technologies underperform established products in mainstream markets. But they have other features that a few fringe (and generally new) customers value. Products based on disruptive technologies are typically cheaper, simpler, smaller, and, frequently, more convenient to use".

Managers from established organizations do not have rational incentives to invest in disruptive innovations as they are dependent on established customers and firm's investors (which make them focus attention, resources, and investments on sustaining technologies) and the small markets represented by disruptive innovations on the beginning will not generate the growth rates needed. These managers end up developing a system for "killing ideas" that are not aligned with their straightforward incentives. On the other hand, disruptive innovations bring to market a different value proposition (products tend to be simpler and cheaper yielding lower margins, they start being commercialized in emerging / smaller markets and main customers of leading firms do not want or need these technologies at the beginning) and thus are generally first adopted by smaller customer segments who tend to be less profitable. These characteristics make disruptive emerging markets difficult to analyze. Managers are used to gathering data, do analysis and plan in a sustaining context where information such as market size, growth rates, technology and environmental trends and needs of customers are relatively well known. Disruptive contexts and new markets, on the other hand, are much more uncertain and ambiguous with fewer information available.

Charitou & Markides (2003) believe that established organizations face more significant challenges to respond to disruptive innovations due to trade-offs related to their existing business and believes that if a company tries to compete in two different positions simultaneously, it may face significant inefficiencies and may risk lowering the value of current activities. This fact is in line with the concept of cannibalization on current sales and profits and the risk to disturb important established business relations describe by Teece, (2010, p.182). Through an extensive literature review related to disruptive innovations, Yu & Hang (2010) identified different organization perspectives on the reasons why established organizations do not respond when challenged by disruptive innovations. These include: Human Resources (senior manager´s professional abilities and incentives are not aligned with disruptive innovations, and middle managers prefer sustaining innovations as they bring more stability to their careers), Organizational Culture (it can halt the capacity of managers to respond even when they know a response is necessary), Resource Allocation (evaluation of disruptive projects using the same criteria of an existing business) and Organizational Structure (size and number of business units and the capacity of organizational to collaborate with external environment).

Recently, Christensen, Raynor, & Mcdonald (2015, p.46) called attention to the importance of getting right the concepts of disruptive innovation that according to them have been widely misunderstood: "the problem with conflating a disruptive innovation with any breakthrough that changes an industry's competitive patterns is that different types of innovation require different strategic approaches." And they complement stating that "the lessons we've learned about succeeding as a disruptive innovator (or defending against a disruptive challenger) will not apply to every company in a shifting market". Disruption describes the process where smaller companies (entrants) challenge incumbent firms by first targeting overlooked segments and eventually moving upmarket delivering the performance that mainstream customers require and thus creating disruption (Christensen, 1997).

Competitive Intelligence and Weak Signals

Brody (2008, p.13) believes that being Competitive Intelligence (CI) a developing field, it still lacks semantic stability for a solid terminology definition but that most definitions or descriptions indicate that CI is a process mutable over time (suggesting a boundary-spanning field). This is in line with Calof & Wright (2008) who, instead of trying to find a definition for CI, they explore the concept of CI from three different perspectives: the practitioner view, the academic view and the interdisciplinary view concluding that CI "involves the collection of information, internal, external and from competitors, but also from customers, suppliers, technologies, environments, and potential business relations" (Calof & Wright, 2008, p.723).

On the other hand, Sharp (2009, p.37) takes a more definite position by actually defining CI as "knowledge and foreknowledge about the entire business environment that results in action". According to the author, knowledge refers to understanding the past and connecting to new information, foreknowledge (insights that encompass market changes, indications, predictions, forecasts, and estimates for what is to come) and the awareness of a full range of components or factors that can impact the success of the business. Her proposed "Competitive Environment" puzzle encompass twelve different dimensions to assess the competitive landscape (customers, prospects, suppliers, distributors, competition, substitutes, technology, demographics, culture, economy, industry and government relations and other industries). Agarwal (2006, pp. 309-310) believes that CI is a type of Knowledge Asset (KA) "knowledge regarding markets, products, technology, and organizations that a business owns or needs to own and which enable its business process to generate profits, add value, etc." and that Knowledge Management (KM) "process where the firm identifies, analyzes, and makes uses of its Knowledge Assets (KA)" includes CI.

Foresight is an important theme in IC as it refers to the organizational capacity to project the future. According to Rohrbeck, Battistella, & Huizingh (2015, p.2) "Corporate Foresight is identifying, observing and interpreting factors that induce change, determining possible organization specific implications, and triggering appropriate organizational responses. Corporate foresight involves multiple stakeholders and creates value through providing access to critical resources ahead of the competition, preparing the organization for change, and permitting the organization to steer proactively towards a desired future".

Ansoff (1975) calls for the need of anticipatory information on opportunities and threats – i.e., weak signals (vague pieces of information that are different from historical information used to extrapolate future scenarios based on the past). Blanco, Caron-Fasan, & Lesca (2003, p.82) details the nature of these weak signals: anticipatory (potential future events that may affect the organization), qualitative (do not consist of quantitative or factual data), ambiguous (not certainties but clues and traces), fragmentary (fragments gathered by various environment scanners that taken separately are insignificant) and of various presentations (not homogeneous and taken from different sources). Ansoff (1975, p.22) believes that being able to respond to weak signals is paramount to deal with strategic surprises: "sudden, urgent, unfamiliar changes in the firm's perspective which threaten either a major profit reversal or loss of a major opportunity" and manage market discontinuities.

Nevertheless, he believes that traditional planning and forecasting processes and systems are not able to deal with strategic surprises as they overly need the input of information that is available early enough (to plan in advance) and be adequate to estimate the impact to the firm. But when a surprise originates in alien technology, unknown competition, new political coalition or new economic phenomenon, simple extrapolation will not suffice, and managers will need to choose between working with more vague information (imperfect knowledge) or wait for information to become more specific (but risking being too late on the decision-making process). He calls for a graduated response through amplification and response to weak signals whereas firms´ responses should be unfocused when information is still vague to increase strategic flexibility and to prepare the company for a direct attack of the opportunity or threat once the information becomes more precise. Firms have two options: the capability for after-the-fact responsiveness (crisis management) or acting before-the-fact, minimizing thus the probability of strategic surprises.

Gilad (2004, loc. 94/2904) follows Ansoff (1975) in that "surprise plays a significant role in decision processes". He believes that managers tend to ignore early signs related to surprise creating "blind spots" – which become critical sources of failures in the judgment and decision and a major reason why organizations are surprised. It is not easy and clear (especially on the beginning) to identify surprises, and this may be responsible for creating "industry dissonance" (when a company strategy no longer fits market reality). He claims that companies need to think about risks systematically as risk is created by uncertainty and uncertainty is created by change. Therefore, identification of change is at the core of the assessment of potential risks, and he calls for identifying change drives (events or variables that drive the evolution of industries). Even though change drivers differ from industry to industry, he cites four main classes: (1) new technology or science (2) new regulations or other governmental / political action (3) new social / demographic trends (4) new competitive behavior. He calls for the implementation of early warning systems to prevent surprises. This is an ongoing process of identification of risks that furnishes indicators to the intelligence monitoring systems which should be able to alert managers to take action and provide feedback. Ben Gilad (2004) believes that the monitoring of risks should be a collective (not individual) process, coordinated among different people, planned by the organization and integrated into the planning process – and calls for a monitoring network (using internal and external resources).

Competitive Intelligence and Disruptive Innovations

As we try to correlate a CI strategy with superior capabilities of managing disruptive innovations, we follow Agarwal (2006) in that CI plays a vital role on organizational decision making and that the key is the process to turn raw data into valuable information, from valuable information to strategy and from strategy to action. This is in line with the results of the study conducted by Badr, Madden, & Wright (2006) with CI managers in the European pharmaceutical industry that suggests that CI is not only useful but also crucial to the strategic decision-making process. But, the main question remains: is a CI strategy important for the decision-making processes and capabilities of organizations that are being faced with disruptive innovations? According to Paap & Katz (2004, p.13), organizations in today´s hypercompetitive world "have to understand and learn to manage the dynamics of innovation that underlie both disruptive and sustaining innovations". Even though they acknowledge it is difficult to recognize new technologies that can be disruptive they elaborate on different strategies that may be used:

•Understand when and how technologies are adopted can help anticipate future technology introductions.

•Understand the dynamic of innovation and substitution and the reasons that new technologies emerge to attend unmet needs.

•Not ignore customers (current or potential) but do not focus only on what they ask for but on what they need;

•Not abandon old technology just because it appears mature but at the same time not focus only on how current technologies can be used to address emerging drivers;

•Implement processes that help anticipate and manage changes including collect intelligence on changing needs, technologies, customers, and competitors.

According to Paap & Katz (2004, p.19), the planning process should be mainly focused on the needs of consumers: "if technology planning is to anticipate disruptive technologies, it must not start with technology but with needs, and assess how current and future customers will evolve into different generations of drivers". Christensen et al. (2015, p.51) believe that theory may help managers only to decide what direction to take on making decisions: "it is rare that a technology or product is inherently sustaining or disruptive. And when new technology is developed, disruption theory does not dictate what managers should do. Instead, it helps them make a strategic choice between taking a sustaining path and taking a disruptive one".

Gilad (2004) suggests the use of scenarios tools as a risk identification method when working with change drivers of industries. After making a list of potential change drivers managers can hypothesize about the possible directions, they will take in the future but without the necessity of mapping out all possibilities as two or three may suffice. Phaal, Farrukh, & Probert (2003) advocate for the use of the Technological Roadmapping (TR) technique. This is a structured approach to explore and communicate effectively the evolution and development of markets, products, and technologies.

This technique may be used to support long-range planning helping organizations to face turbulent environments by presenting a method to monitor technologies that have the potential to become disruptive. Hughes (2017) believes that scenario tools are very dependent on the judgment and beliefs of experts regarding the future and that forecasting methods should incorporate tools and techniques of Big Data for not becoming obsoletes. He concludes that predictive models will become agiler and less costly increasing the understanding of emerging technologies. Carayannis et al. (2017) believe that organizations should completely change its perspectives on intelligence and knowledge when dealing with Big Data since it brings impacts in different dimensions: variety (information may come from different sources), speed and volume of data. According to the authors, organizations should institutionalize processes of on-going learning and enhance its ability to use Information Technology as well as committing the acquisition and systematic analysis of qualitative and quantitative data.

As presented (Paap & Katz, 2004, p.16): "it is important to recognize that technology substitution occurs only when there is both an unmet need in a dominant driver and the current technology is incapable of competitively addressing it". To assess the potential of an innovation, (Dereli & Altun, 2013) suggest the "quick innovation intelligence process" which involves evaluation of trends of different technologies, evaluation of commercial potential, evaluation of the imitation potential by competitors and a grouping / prioritization process of candidate technologies (by analyzing the correlation of the three evaluations cited).

Christensen et al., (2015, p.51) state that "empirical findings show that incumbents outperformed entrants in a sustain innovation context but underperformed in a disruptive innovation context". Two reasons are cited by the authors to explain this phenomenon: (1) company´s propensity to change is profoundly affected by the interests of customers (2) the focus on existing customers becomes institutionalized making difficult for managers to shift investments to disruptive innovations. Vecchiato (2017) agrees that the beliefs of managers about the needs of consumers are important to understanding why established firms are reluctant when faced with disruptive innovations. He believes that due to imperfect and simplified representations of the business environment, much more based in historical experiences than on knowledge of the current environment, managers develop mental models and strategic beliefs that impact their capacity to assess the situation and make decisions when faced with disruptive innovations.

Teece (2010, p.182) ads that incumbents are reluctant to adopt an innovation because of the cannibalization effect: "when incumbents are constrained in this way, the pioneer of a new business model may enjoy a considerable period of limited competitive response. Notwithstanding these constraints, competition is likely to be vigorous because other new entrants, similarly unconstrained by incumbency and cannibalization anxieties, will be equally free to enter." This is also analyzed by (Christensen, 1997) as a potential reason why established firms delay the adoption of new technologies. In his opinion, the fear of cannibalization can become a self-fulfilling prophecy when these established firms wait until this technology is commercially mature to respond.

Charitou & Markides (2003) conducted an empirical study to present five types of possible response of established companies when faced by disruptive technologies: (1) Continue focusing and investing in the current business (by differentiating disruptive technological innovations that completely substitute the previous technology from strategic disruptive innovations that do not have the potential to control the whole market), (2) Ignore the innovation (since the new way of doing business may be related to different consumers, to a different value proposition and to new capacities and competences that the organization does not have), (3) Attack back (the incumbent decides to create a new disruption by creating a new disruption and fighting back the disruptive companies), (4) Adopt the innovation (play both games at the same time) and (5) Adopt the innovation completely and scale it (bring it to a mass market).

METHODOLOGICAL PROCEDURES

The main objective of this article is to contribute to the theories of CI and disruptive innovations by creating new discussions that can be incorporated in both and on the correlation of both fields of knowledge. But, what is a theory? Svensson (2013, p.468) believes that "theory in behavioral sciences such as business research is about simplification of reality – i.e., inherent complexities and dynamics". Glazier & Grover (2002, p.319) describe the theory as a "generalization that seeks to explain relationships among phenomena". Glaser & Strauss (1967) have cited different objectives for formulating a theory in sociology among of them: enabling prediction and explanation of behavior, to be useful in theoretical advance and to be usable in practical applications, prediction, and explanations (to give the practitioner understanding and some control of situations).

According to Torraco (2004, p.178) "theory building can be considered as a research process to creating theory" and historically there were three main paradigms for building theory: positivistic (more traditional approaches to knowledge creation), naturalistic (need to explicit the theoretical logic and conceptual reasoning including techniques such as phenomenology, ethnography, case study research, grounded theory and social construction research) and multiparadigm perspectives (alternative strategies including multiple paradigms for theory building).

Svensson (2013, p.469) believes that "theory building refers to a cumulative process, organizes insights and knowledge gained in a subject area from substantiations and contributions and organizes measurement and structural properties of variables and constructs". The author characterizes studies on theory building in: original studies (differ from previous studies), replication (try to replicate previous studies) and validation (aimed to validate previous studies). (Wacker, 2008) proposes guidelines for "good" theory building based on the properties of theory:

•Definition: conservative (no renaming of concepts), parsimonious (short definitions) and unique (only one concept in the definition).

•Domain: generalizability (concepts can be generalized to populations or other situations) and abstractness (void of time and space requirements).

•Relationships: fecundity (explain current phenomena but also offer areas for new research), internal consistency (consistent with logic), parsimony (fewest relationships and minimum statistical techniques) and substantive (simplest explanations).

•Predictions: falsifiability (logical explanations of unlikely results).

The decision to adopt a theoretical essay for this article was made as we believe that it is the more adherent to the achievement of the proposed objectives. It was taken into account that the theoretical essay requires a methodological exposition of the themes researched and of the propositions and original conclusions reached after the study of a particular theme (Medeiros, 2014). Another characteristic of the theoretical essay is described by Alvesson & Karreman (2000) which is that it consists on the combination or union of two constructs, which had not yet been related regarding common themes between them. According to Medeiros, (2014, p.2) the essay should present aspects inherent to the "critical spirit" of the authors, as well as the originality of the subject. According to Meneghetti (2011), the essayists must make a reflection, get involved and have an analytical capacity and critical skills on the construction of the relations of the theoretical essay; thus, providing a dialogue between the different epistemologies, mainly due to the nature of the experimentation. On this basis, we aimed in this article to contribute to the themes of CI and disruptive innovation on a theoretical level. We conducted a literature review and comparison of themes in the two areas with the objective of fostering new reflections and discussions regarding the relationship between these two constructs. In this, we follow Webster & Watson (2002) in that a review of the relevant literature is fundamental to create a firm foundation to advance knowledge and facilitates theory development. As this research is based only on theoretical review of the literature, it brings several limitations as the findings were not empirically tested and thus the concepts discussed in this article should be validated in a real-life setting.

DISCUSSION / RESULTS

As we try to contribute to the fields of CI and DI, we will present discussions and results relating them to the specific objectives of the article:

•There is a relation between the use of CI strategies and the capacity of organizations to anticipate and understand disruptive innovations in their industries.

•CI strategies can help established organizations be better prepared to respond to the challenges of disruptive innovations.

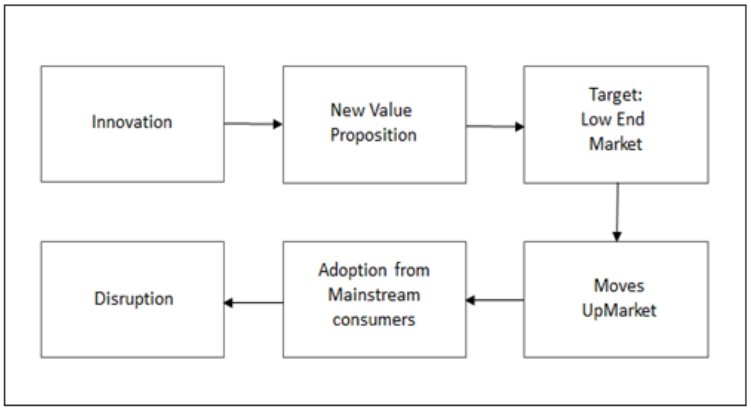
•Framework with selected strategies on the use of CI to help managers deal with disruptive innovations.

There is a relation between the use of CI strategies and the capacity of organizations to anticipate and understand disruptive innovations in their industries

Disruptive innovations start like many other innovations and, as stated by (Christensen et al., 2015, p.50), some succeed, and some don´t: "not every disruptive path leads to a triumph, and not every triumphant newcomer follows a disruptive path". There is a process in which a technological innovation has the power to become a disruption and it does not happen from one day to the other. After an innovation occurs it first needs to prove itself viable to market: i.e., it needs a value proposition (to appeal to a target of consumers) and a business model (even if it is a simple one, the entrant organization bringing the disruptive innovation needs to establish itself in the marketplace). In the beginning, disruptive innovation will lure mainly low-end consumers (target market whose needs are overlooked by established organizations) before it can move upmarket.

Nevertheless, industry disruption will occur only when mainstream consumers start adopting the innovation. Important also to underscore that on the beginning of the process the technology of the innovation has some inferior value features compared to mainstream products but as technology evolves the disruptive innovation may develop and frequently incorporate enhanced features that will habilitate it to move upmarket. One of the reasons why this might eventually happen, according to Christensen (1997, loc.195/4215) is because technologies can progress faster than market demand: "disruptive technologies that may underperform today, relative to what users in the market demand, may be fully performance-competitive in the same market tomorrow". Figure 2 attempts to illustrate the disruptive innovation process described.

Figure 2: Process of Innovation creating a disruption



Source: Elaborated by authors based on (Christensen, 1997)

So, we believe that managers should be able not only to anticipate technological innovations with the potential to disrupt their industries but also, by understanding the disruption process, they should be able to manage it more properly. As presented by (Gilad, 2004), organizations need to identify change drivers as a way to assess risks systematically. We believe that by monitoring each stage of the process, companies can make the most appropriate and timely decisions on the best actions to take. We follow (Ansoff, 1975) that, on the beginning of the process information is vaguer, and managers need to deal with imperfect knowledge but, as the process moves forward and the technological innovation becomes more consolidated, information becomes more specific. Therefore, organizations can minimize strategic surprises by using CI to prepare themselves before the fact (i.e., the possibility of a technological innovation becoming a disruptive one) and by fully understanding how the disruptive innovation process unfolds they can respond appropriately.

To anticipate and understand the future potential of emerging technologies, organizations can use different tools such as: scenarios (Gilad, 2004), Technology Roadmapping (Phaal et al., 2003) and the "quick innovation intelligence process" (Dereli & Altun, 2013). With the growth of Big Data, it is essential that organizations can incorporate it in their CI strategies aligned with resource investments in Information Technologies (Hughes, 2017) and Carayannis et al. (2017).

CI strategies can help established organizations be better prepared to respond to the challenges of disruptive innovations

Ansoff (1975) calls for a graduated response when dealing with a surprise originated by factors such as an alien technology. This process seems to be adequate to deal with innovations that may or may not present themselves disruptive in the future. He believes that there should be an amplification of response to weak signals: i.e., unfocused when information is still vague to provide flexibility of the company and prepare it for the future and a direct attack once information becomes more precise. To capture and analyze these weak signals organizations need to understand the dynamics of innovations and, as proposed by Paap & Katz (2004) there are different strategies that can be used to understand technology adoption and anticipate future technology introductions. These include understanding the reasons these technologies emerge (unmet needs), assessment of customer needs and implementation of processes on collecting intelligence on changing needs, technologies, customers, and competitors. We believe that having a solid CI strategy can strength management capabilities to deal with disruptive innovations for different reasons:

•Being Aware. Managers need to be aware of the risks that disruptive innovations can represent to their businesses and that if action is not taken in a timely and appropriate fashion, it may be too late when an attack is finally made. Having a CI process that helps assess risks and anticipate changes in the market landscape and, at the same time, monitor entrant movements in each stage of the innovation process should make managers more aware of the real situation being faced.

•Being Informed: It is very difficult to assess if an innovation has the power of becoming disruptive but, the only way to anticipate and manage it is to have appropriate information that provides managers real market and business inputs before it is too late. As pointed by Makadok & Barney (2001, p.1636) "if firms do not collect the information they need to assess their strategic situation accurately, it is very unlikely that they will be able to make profit maximizing strategic choices".

•Being Knowledgeable: Once acquired and developed, information should become organizational knowledge. As pointed by (Agarwal, 2006, p.310) "an effective Knowledge Management strategy will capture the existing CI in a firm and allow for its analysis and use." Companies are more prepared to deal with disruptive innovations as they understand not only the market information being supplied by CI but also, how this information correlates with the disruptive innovation process and what are the risks and chances of new technologies and innovations to disrupt their businesses. This is the stage where managers should be most prepared to make difficult, but necessary, decisions and course of actions to defend their businesses. We believe that, as managers are more knowledgeable of the situation they should be able to make better decisions to act in the best interest of their organizations for the specific changes (threats and opportunities) brought by Disruptive Innovations.

As presented by Charitou & Markides (2003) there are different response strategies that an incumbent organization can use to deal with disruptive innovation. We believe that the best response should take into account not only the disruptive technology itself and the new entrants challenging the established company but also internal organizational perspectives of the incumbent (Yu & Hang, 2010) and economic factors influencing the decision-making process (Teece, 2010).

Framework with selected strategies on the use of CI to help managers deal with disruptive innovations

We follow (Paap & Katz, 2004) in that to anticipate disruptive technologies one must start with needs of customers and not with the technology itself. So, the first question that managers should be asking is: What is the basic need that we are meeting? For example, in the case of a telecom company the basic needs are communication and connection and in the case of the TV business, it is the need for entertainment. When a new technology appears, managers should them ask: in which attributes is this new technology better attending the needs of consumers (or a specific segment of consumers) and in which attributes is it doing a worse job?

We should account for the fact that even though on the beginning the new technology may have attributes that appeal only to a small segment of consumers, this technology will probably evolve faster than consumer demands and will eventually meet the needs of mainstream consumers as it will incorporate other relevant attributes. Following the two examples of telecom and TV industries:

1.The basic need is the same for both fixed and mobile phones (communication and connection), but mobile phones did a better job on offering mobility to consumers even though it was very expensive and its technical quality was worse than the fixed phone on the beginning.

2.The basic need attended is the same by an Open TV channel, a Pay TV operator or an on-demand digital service like Netflix. But, Netflix was able to offer the additional attributes of on-demand viewership and more available content than Open TV or Pay TV. On the other hand, one must acknowledge that on the beginning the offering of Netflix was more limited regarding available titles and there were quality and connections issues due to technological and infra-structure limitations. Nevertheless, as technology evolved Netflix was able to grow and become a major player in the TV industry by challenging incumbent Open TV and Pay TV organizations.

At this point, it is interesting to do a check on the innovation process depicted in Figure 2 to assess in which stage of the disruption technology process the industry is:

•Is the new technology only still a technology or has it been proved viable by an entrant organization?

•Does this entrant have a business model (including a solid value proposition)?

•Was this entrant able to capture consumers? What kind of consumers (segment)?

•What is the real risk does this new technology currently presents to our business considering the current business landscape?

Managers need to be aware that, even though the new technology may not appear to be disruptive in the beginning, it can evolve and become disruptive in the future. This is why it is crucial for organizations to be able to evaluate the future commercial potential of new emerging technologies. As we move forward with our proposed framework, we keep following Paap & Katz (2004) in that it is also paramount to assess how current and future customers will evolve. We believe that the key is being able to correlate the trends of technology with needs of consumers. As it is very challenging to project these uncertain patterns, we propose the use of scenario tools to assess change drivers, and we designed a bi-dimensional matrix to correlate the expected changes correlating technology and consumers development. Figure 3 depicts this matrix.

Figure 3: Matrix of change scenarios in technologies and consumer trends

		Consumers Trends	
		Scenario 1	Scenario 2
tecnology trends	Scenario 1	Potential Risks (1,1)	Potential Risks (1,2)
	Scenario 2	Potential Risks (2,1)	Potential Risks (2,2)

Source: Elaborated by authors

Even though our focus is on the correlation between consumers and technology trends as the main change drivers, other dimensions can be used as well if they have the potential of impacting the competitive landscape. We believe that Sharp´s "Competitive Environment" puzzle may be a useful framework to assess relevant information within the twelve dimensions of the competitive landscape and that managers should be capable of deciding, which are more impactful for their specific industries challenges. For example, in the case of the TV industry, the dimension of "other industries" (i.e., the telecommunication industry and broadband infrastructure) became an important consideration that fostered the growth of digital networks and on-demand services such as Netflix. As telecom technology became cheaper and faster, they helped on-demand services to grow by providing better consumer experience.

Managers cannot expect to have all the information regarding the change drivers and we agree with Gilad (2004, loc. 911/2904) that "if a company waits until everyone is certain about the direction of change in its environment and its effect, it is a sure candidate for the dissonance failure´s Hall of Fame." So, not only CI analysis but also management decisions must be made in environments of uncertainty. At all points of collecting, processing and analyzing information managers must have a clear vision of the stage in which technology is related to the innovation process.

The kinds of information and the decision-making criteria are not the same when an innovation is at its early stages compared to when there is an entrant with an actual business model, value proposition, and existing consumers. It is clear that the level of uncertainty and the amount of information available for managers vary as innovation evolves and as it starts to become a commercial reality. We believe that the use of graduated responses with the amplification of response as proposed by Ansoff (1975) may seem to be adequate in this case. This suggests that using CI to anticipate and understand potential disruptive innovations should be an on-going dynamic process.

As pointed by Christensen et al. (2015), the role of management is very conflicting as disruption theory does not dictate what they should do. We believe that even the best CI process will be innocuous in helping anticipate and understand disruptive changes if organizations do not have the support of leadership. We follow Gilad (2004, loc. 2556/2904) that "when it comes to an early warning at the attitude toward strategic intelligence, a leader´s influence almost always extends to his entire executive team as well." The support of top management becomes even more important considering the incentives and biases of established organizations of focusing on existing customers and more profitable lines of business. These behaviors become institutionalized in the organization, and it is very difficult to face reality even when a great amount of information is available – so, the role of leadership is paramount to take the organization in the right direction. We also believe that the fear of cannibalizing existing businesses, cited by Teece (2010) plays an important role in the complex response process faced by managers of established organizations.

Even if there are enough information and sound evidence of the risks that a disruptive innovation can represent to the organization, managers still have to consider the potential cannibalization of current sales if they decide to change their business model to embrace the disruptive innovation. On the other hand, if no action is taken, the entrants may enjoy an important period of limited competition, and this is probably when they will be able to grow and refine their technology (enhancing key attributes to meet mainstream consumers demands), consolidate their business model and move upward to mainstream consumers. As pointed by Christensen (1997, loc.700/4215) "when established firms wait until a new technology has become commercially mature in its new application and launch their own version of the technology only in response to an attack on their home markets, the fear of cannibalization can become a self-fulfilling prophecy".

FINAL CONSIDERATIONS

Based on the findings, we believe that CI can be an important aid to managers of established organizations on predicting and acting in the face of Disruptive Innovations. Disruptive Innovations should be understood as a process and not as a one-time event that affects industries. Therefore, if managers have relevant information and appropriate tools they should be more capable of anticipating and understanding disruptive technologies in their market by detecting weak signals and by trying to predict the future commercial potential of technological innovation with different techniques. Even though it is very challenging for an incumbent to respond to emerging disruptive innovation in their markets, there are strategies that can be followed and that need to be integrated into the decision-making process.

Since information is vaguer on the beginning of the disruption process and becomes more specific when it unfolds, managers can choose a strategy of graduated response whereas different sorts of actions are being taken depending on the amplification of weak signals. We proposed a simple framework that correlates the need for customers (current and futures) and how they might change over time with the expected trends in technology (change drivers). This framework is intended to help managers assess actual risks in different projected scenarios. Finally, we proposed that CI should be used as an ongoing and dynamic process by incumbent organizations with the support and leadership of top management.

As already discussed in the methodological procedures, this study has several limitations related to the research process used. As we decided to do a literature review to contribute to the theories of CI and DI, we were not able to conduct an empirical test of the concepts proposed. It is clear that these concepts still need to be validated in an actual business environment. We believe that this may be an opportunity for future research. The discussions and results of this study may be beneficial for both practitioners and academics of CI and Innovation. We also believe these themes will be more correlated and contemporary as business environments become even more dynamic and complex and organizations need to be more prepared to deal with Disruptive Innovations that can dramatically change their industries.

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