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Intrinsic motivation for knowledge sharing – competitive intelligence process in a telecom company

Fernando Carvalho de Almeida, Humbert Lesca and Adolpho W.P. Canton

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Abstract

Purpose – *Knowledge about competitive environments is a determinant factor for the success of a firm, as it may allow it to anticipate threats and opportunities in its market. This study aims to explore variables that enable or prevent an employee's intrinsic motivation to share knowledge. It studies the collection and sharing of information that may be a signal of future competitive moves in competitive intelligence (CI) processes.*

Design/methodology/approach – *Canonical correlation was used by utilizing survey data from a company. The study was based on the self-determination theory relating intrinsic motivation to behavior.*

Findings – *The study confirms the importance of different aspects motivating knowledge sharing behavior, such as information system's support, top management support and information feed-back.*

Research limitations/implications – *The study is limited to one company, respecting the limitations of a case study, but external validation was impossible to test. Findings showed a strong correlation of some variables with intrinsic motivation and are coherent with other studies in the knowledge sharing field.*

Practical implications – *Firms introducing knowledge sharing processes should pay attention to the importance of information system support. The relationship with people involved is also important, as in supporting their collaborations and giving feed-back to contributions. Sustaining intrinsic motivation seems a fundamental aspect to the process' success.*

Originality/value – *The study indicates the relation of different variables of motivation with motivation. It explores knowledge sharing in a CI process, an important process in firms nowadays. It shows important aspects that ensure continuity of knowledge sharing as informational feed-back and top management support. Canonical correlation was also used, a technique not frequently explored and useful to study correlation among groups of variables.*

Keywords *Motivation, Employee behavior, Competitive analysis, Knowledge sharing, Employee participation*

Paper type *Research paper*

1. Introduction

Knowing competitive environments is a determinant success factor of a firm. The fit between an organization and its environment is suggested to be the most significant predictor of organizational performance, and environmental scanning is the most effective way to achieve it (Zhang *et al.*, 2012).

Knowledge about the competitive environment may allow a firm to anticipate threats and opportunities in its market, bringing competitive advantage (Milne, 2001). An employee's motivation is seen as a key element for managers in knowledge sharing processes (Bock and Kim, 2002; Cabrera *et al.*, 2006, Milne, 2007; Pee and Lee, 2015). The importance of knowledge sharing to firms increases their interest in understanding how to encourage it among employees. However, individual factors that may motivate or undermine knowledge sharing are not quite understood. Tools such as reward systems are very insufficiently studied (Durmusoglu *et al.*, 2014), and the findings are inconclusive, showing equivocal

> **"Knowing competitive environments is a determinant success factor of a firm."**

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results (Al-Alawin *et al.*, 2007; Choi *et al.*, 2008; Bock *et al.*, 2005; Cabrera *et al.*, 2006; Lin, 2007; Wang and Noe, 2010; Chennamaneni *et al.*, 2012).

This paper aims to identify variables that enable or prevent the intrinsic motivation of employees to share knowledge in a firm (in this study, henceforth, denominated trackers).

The present study is developed in the context of a competitive intelligence (CI) process based on information collection and knowledge sharing when, in the view of the tracker, there is a signal of important future competitive moves in the environment. Knowledge sharing is a voluntary act (Amin *et al.*, 2011; Van den Hooff *et al.*, 2012). Motivation plays an important role in this act, and it cannot be obligatory, but results from an intrinsic motivation to share (Van den Hooff *et al.*, 2012).

This paper explores intrinsic motivation based on the self-determination theory (SDT; Deci and Ryan, 1985, 2000). SDT attests that intrinsically motivated behavior occurs when relating to certain tasks that lead the individual to feelings of competence (self-efficacy), autonomy and relatedness.

The following section presents a literature review concerning variables that may be related to the intrinsic motivation to share knowledge. It also includes a discussion about the CI process and knowledge sharing. Section 3 presents the study methodology; Section 4, the study results. Section 5 discusses the findings, and Section 6 presents the conclusions and limitations of the study.

2. Research framework and hypothesis

2.1 Knowledge sharing and motivation

Different studies explore motivation and knowledge sharing behavior. Some studies examine behavior intention and others actual knowledge sharing behavior (Bock *et al.*, 2005, Chennamaneni *et al.*, 2012). Wang and Noe (2010) conducted a literature review, suggesting a framework relating knowledge sharing and motivated behavior and grouping researches into three categories:

1. *Oorganizational context*: management support, rewards/incentives, organizational structure, interpersonal, team and cultural characteristics;
2. *Individual factors*: education, work experience and personality; and
3. *Motivational factors*: perceived benefits and costs, justice and trust.

Different researches explored the relations of these categories with knowledge sharing intention and knowledge sharing behavior.

The complexity of the subject induces researchers to explore some of the aspects in different organizational contexts where different behaviors may occur, as well as different elements that may influence knowledge sharing behavior. Not all studies make the distinction between intrinsic and extrinsic motivations when studying knowledge sharing intentions or behavior (Welschen *et al.*, 2012; Pee and Lee, 2015).

Knowledge sharing is a voluntary behavior and can be encouraged but not demanded by managers (Kelloway and Barling, 2000). It can be seen as an "information behavior" that demands the effort and willingness to be aware and to interpret the information (Choo, 2016) and adds to the individual's perception and knowledge as to why it is important

(Durmusoglu *et al.*, 2014). Cabrera *et al.* (2006) consider that contributions to a knowledge sharing repository are voluntary acts, as it is impossible to monitor when an employee has a valuable idea that is worth sharing. Sharing this kind of knowledge can be closely connected to what is called organizational citizenship behavior, which is spontaneous and voluntary. It concerns helping, sharing, cooperating and volunteering. In such case, knowledge sharing provides uncertain rewards and is not motivated by explicit organizational rewards (Connelly and Kelloway, 2003).

2.2 Competitive intelligence and environmental scanning

The present study considers Daft and Weick (1984) and Choo's (2002, 2016) view of organizational learning and interpretation of the environment through information scanning and sense making. Learning evolves from information needs and seeking to interpret and create knowledge and then sharing and using knowledge through organization. CI can be defined as "an analytical process that transforms disaggregated competitors, industry and market data into actionable strategic knowledge about the competitor's capabilities, intentions, performance and position" (Bernhardt, 1994, p. 13). The concept of CI is related to the concept of environmental scanning that suggests a broader view of the organization's external environment (Choo, 2002). Through these processes, the organization senses, perceives, interprets and acquires knowledge, thus learning about the competitive environment.

The organization learns from the environment in three steps:

1. scanning (monitoring and data collection);
2. interpretation (giving sense to the data collected); and
3. learning in a cyclic process (Daft and Weick, 1984; Choo, 2002).

The collecting and sharing of information and knowledge depend on what Choo (2016) calls information behavior, which involves three clusters of activity:

1. perceiving information needs;
2. information seeking; and
3. information use.

Once information needs are perceived, information seeking begins and individuals look for information and change their state of knowledge. In the activity of information use, individuals select and process relevant information (Choo, 2016).

In an analog way, this study explores a CI process where the company studied follows these three clusters of activity. The present study focuses mainly on the second step, information seeking, where trackers seek and collect information and then acquire and share their new state of knowledge. Choo (2016) considers that information seeking can be conceptualized as a process of knowledge construction and is influenced by three kinds of variables: cognitive, affective and situational variables. Cognitive variables refer to mental structures people use to frame information needs and interpret information they find. Affective variable refers to people's feelings and emotional states. Situational variables constitute the pertinent context of the information-seeking task.

"Practitioners should pay attention to the implementation of information systems and knowledge bases, assuring an adequate support of information collection and sharing."

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"Managers should be very careful in using rewards as the consequences are not well understood in knowledge sharing activities."

2.3 Knowledge sharing in a competitive intelligence process

Information collecting and knowledge sharing in the CI process studied here is to be understood in the sense suggested by Choo (2002, 2016) and Daft and Weick (1984), where information is interpreted by trackers and, if considered important, shared within the organization. Information collection can also be understood here in the sense presented by Connelly and Kelloway (2003), where "knowledge sharing is a set of behaviors that involve exchange of information [. . .] contains an element of reciprocity" (p. 294). Knowledge sharing can be defined as individuals sharing organizationally relevant experiences and information with one another (Lin, 2007).

It is important to note that in the literature of knowledge sharing, there is no consensus on distinctions between knowledge and information. Many researchers use the terms knowledge and information interchangeably, seeing no practical utility in distinguishing knowledge from information in knowledge sharing research. The present study considers this perspective and considers knowledge as information processed by individuals, including ideas, facts, expertise and judgments relevant for individual, team and organizational performances (Bartol and Srivastava, 2002; Wang and Noe, 2010; Palo and Charles, 2016).

Calof and Skinner (1998, p. 5) define CI as:

> An actionable recommendation arisen from a systematic process, involving planning, gathering, analyzing and disseminating information on the external environment, for opportunities or developments that have the potential to affect a company or a country's competitive situation.

CI can deal with the treating of weak signal collection and interpretation to predict moves in the competitive environment (Gilad, 2004, 2012). Ansoff (1975) emphasizes on the importance for a firm to collect weak signals as a first symptom of strategic discontinuity for anticipating threats or opportunities. They are called weak signals, because they are sparse in the environment and ignored most of the time. They are of imperfect quality and are called weak signals not for the lack of importance but because of the difficulty of perceiving their importance (Mendonça *et al.*, 2012).

Weak signals are a kind of information that may suggest future moves from a competitor, a release of a new technology (Ansoff, 1975; Mac Donald and Williams, 1993), substitute products (Gilad, 2004), product releases (Lesca and Lesca, 2011) or a disruption in competitive environments (Schoemaker and Day, 2009).

Sharing weak signals considers a cooperative process of knowledge sharing through a network among employees in a collective intelligence process. A few organizations have developed knowledge management processes to deal with weak signals (Kaivo-oja, 2012).

Sharing weak signals is also a voluntary process, as it concerns attention; perception of the importance of the signal; and collection and interpretation of a piece of information which is fragmented, dispersed, unreliable and ambiguous, of which the meaning and importance is not clear or confirmed (Schoemaker and Day, 2009).

CI or environmental scanning is seen as a process divided into steps. Different authors present the process differently, depending on the aspects they want to emphasize on: collection, analysis and learning (Daft and Weick, 1984) or scanning, interpretation and learning (Choo, 2002) emphasize on the internalization of knowledge in the learning step.

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Schoemaker and Day (2009) emphasize on the processing of weak signals: scanning for weak signals, sense making, probing and acting. Lesca and Lesca (2011) consider targeting, tracking, transmission, collective selection, storage/knowledge base, collective sense making. knowledge sharing all starts in the scanning/tracking step (Schoemaker and Day, 2009; Lesca and Lesca, 2011) when trackers collect the weak signal, make sense of it (interpretation and sense creation) and share it as explicit knowledge. As suggested by the authors, collecting a weak signal is not just a matter of collecting it, but also interpreting it and turning tacit knowledge into explicit knowledge when the tracker describes the importance of a weak signal.

So, in the scanning/tracking step, knowledge sharing starts: trackers collect the signal into a knowledge base system and introduce comments about its meaning and their perceptions of its importance (Lesca and Lesca, 2011).

In the collective selection step, a collective intelligence process occurs when a group of trackers (Lesca and Lesca, 2011) or senior leaders (Schoemaker and Day, 2009) share their interpretation, knowledge and perception about the information collected.

2.4 Self-determination theory

2.4.1 Use of the self-determination theory in previous studies. There is a significant number of cognitive and behavioral approaches exploring motivated behavior, and many models and theories are proposed in psychology literature (Petri and Govern, 2013).

Many studies exploring motivated behavior are based on the STD (McAuley *et al.*, 1989; Ryan and Deci, 2000, among others), including knowledge sharing studies (Bock and Kim, 2002; Bock *et al.*, 2005; Gagné, 2009; Welschen *et al.*, 2012; Chen and Hsieh, 2015), and proved useful in predicting knowledge sharing and other voluntary behaviors (Gagné, 2009).

SDT distinguishes three motivational systems: intrinsic, extrinsic and amotivational. Intrinsic motivation originates from an individual's interest in the behavior itself. Extrinsic motivation originates and is reinforced by certain rewards (monetary, status and deadlines, among others) and amotivational is a perceived lack of control over an individual's own behavior (Zuckerman *et al.*, 1978).

2.4.2 Intrinsic motivation. Intrinsic motivation involves performing an activity and engaging in it for the sake of the activity itself rather than for external rewards (Yan and Davison, 2013, p. 1146).

Intrinsic motivation is needed for employees to share tacit knowledge in the workplace (Ko *et al.*, 2005; Osterloh and Frey, 2000), and it "enables the generation and transfer of tacit knowledge under conditions in which extrinsic motivation fails" (Osterloh and Frey, 2000, p. 540). Employees share knowledge when they are intrinsically motivated (Bock *et al.*, 2005; Lin, 2007; Israilidis *et al.*, 2015).

Intrinsic motivation was intensively studied in psychology (McAuley *et al.*, 1989). Recent empirical studies consider the impact of intrinsic motivation on knowledge sharing (Yan and Davison, 2013; Pee and Lee, 2015), and it appeared to be an important key factor in explaining knowledge sharing. (Welschen *et al.*, 2012; Wasko and Faraj, 2000). Ko *et al.* (2005) studied knowledge transfer between project consultants and clients on enterprise systems implementations, concluding that intrinsic motivation was a key factor in knowledge transfer during implementation. Yan and Davison (2013) explored intrinsic motivation factors as enjoying helping others and sense of self-worth due to knowledge sharing contribution. Oh (2012) explored intrinsic motivation as self-enjoyment, self-efficacy, altruism and social engagement in knowledge sharing in online environments.

SDT proposes that intrinsically motivated activities are those that provide psychological satisfaction of three innate needs: competence (self-efficacy), autonomy (internal *locus* of control) and relationship (Gagné, 2009; Ryan and Deci, 2000).

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Needs for satisfaction lead individuals to be intrinsically motivated to perform activities and behaviors that bring feelings of fulfillment for those three needs.

2.5 Intrinsic motivation to share knowledge and study's hypothesis

Intrinsic motivation of employees to share knowledge is measured here through an intrinsic motivation inventory (Ryan, 1982), tested in many different studies (Ryan, 1982; Deci *et al.*, 1994, among others). An adapted form of Deci's intrinsic motivation inventory was used, as shown in Table I, to access trackers' motivations to participate in the CI process and share knowledge.

Exploring the literature related to intrinsic motivation and knowledge sharing, different variables are suggested or tested concerning the increase or reduction in intrinsic motivation of an individual to develop a certain task. The present study explores the existence of correlation between these variables and the intrinsic motivated behavior to share weak signals and knowledge about a competitive environment. Hypotheses are proposed to be tested in an empirical study (Table II). In the present study, as mentioned before, knowledge is considered as information processed by individuals (Bartol and Srivastava, 2002; Wang and Noe, 2010; Palo and Charles, 2016).

2.5.1 Importance of the competitive intelligence process to understand the competitive environment. An individual's motivation to develop an activity is related to the perceived value and importance of the activity for him or her (Choo, 2016; Deci and Ryan, 1985, Livian and Louart, 1993). Welschen *et al.* (2012) found that a favorable attitude toward knowledge sharing is correlated to the meaningfulness of the activity for the individual. It was also observed that the perception of impact (importance) of the activity is positively correlated with knowledge sharing. Sié and Yakhlef (2009) found that the more experts value their expertise, the more willing they are to share their knowledge.

H1. The tracker's perception of importance of the CI process to the company to better understand its competitive environment is positively correlated with the tracker' s intrinsic motivation (Qs01)

2.5.2 Information technology support. An information system may support the sharing process of weak signals. Such was the case in the company subject to the present study. Once trackers identified a weak signal, they were able to introduce it in an information system and share it with others in the company. Information systems have significant importance in knowledge sharing (Hendrics, 1999). Cabrera *et al.* (2006) and Chennamaneni *et al.* (2012) found that there is a positive correlation between the perception of availability and ease of use of facilitating tools, technology and knowledge sharing. King and Marks (2008) found a positive correlation of ease of use of a knowledge management system and sharing effort. Lee *et al.* (2006) found a positive correlation between IT service quality and knowledge sharing levels. Van den Hooff *et al.* (2004) found that computer-mediated communication indirectly influenced knowledge sharing through the individual's commitment to the organization.

H2a. The importance given to the information technology support is positively correlated with a tracker's intrinsic motivation (Qs02a)

Table I Intrinsic motivation inventory

Variable	*Question*
Qse01	I've enjoyed doing this activity
Qse02	I would describe this activity as very interesting
Qse03	The competitive intelligence meetings are very interesting
Qse04	I think this activity is quite enjoyable
Qse05	I think this activity is very boring

Source: Adapted from IMI – Ryan (1982)

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Table II Hypothesis about tracker perception and other elements and intrinsic motivation to share knowledge

Hypothesis	*Hypothesis description*	*Variable/Question*	*Element of motivation*	*Related reference in the literature*
H1	The perceived importance of the CI process for the company to better understand its competitive environment is positively correlated with a tracker' s intrinsic motivation	Qs01 – I think that collecting is important because it allows the company to better understand its environment	Importance and value of the CI process	Deci and Ryan (1985), Livian and Louart (1993), Welsch *et al.* (2012), Choo (2016)
H2a	The importance given to the information technology support is positively correlated with a tracker's intrinsic motivation	Qs02a – an information system to collect is important to the competitive intelligence process	Information technology support	Hendrics (1999), Choo (2016)
H2b	The perception of ease of use of the information system supporting the CI process is positively correlated with a tracker's intrinsic motivation	Qs02b – it is very easy to transmit the information collected	Information technology support	Hendrics (1999), Cabrera *et al.* (2006), Lee *et al.* (2006), King and Marks (2008), Chennamaneni *et al.* (2012)
H3	The perception of learning with the CI process is positively correlated with a tracker's intrinsic motivation	Qs03 – I've been learning a lot with the CI process	Competence and learning	Bock and Kim (2002), Lin (2007), Cabrera *et al.* (2006); Lin *et al.* (2009)
H4	Informational feedback is positively correlated with a tracker's intrinsic motivation	Qs04 – I see that the information that I contribute is taken into account	Information feedback and recognition	Ryan (1982), Ryan and Deci (2000), Hal1 (2001), Bock and Kim (2002), Gagné (2009)
H5	The perceived degree of uncertainty in the market is positively correlated with a tracker's intrinsic motivation	Qs05 – the uncertainty degree in the market where my company develops its business is high	Perceived degree of uncertainty	Kefalas and Schoderbeck (1973), Boyd and Fulk (1996), Daft *et al.* (1988), Choo (2002), Stewart *et al.* (2008)
H6	The perceived understanding of the CI objective's process is positively correlated with a tracker's intrinsic motivation	Qs06 – the objectives of the process are clearly explained	Information about the process and its reasons	Lesca, Caron-Fasan (2008), Frank (1989), Cabrera *et al.* (2006), Gagné (2009)
H7	The importance given to rewards is negatively correlated with a tracker's intrinsic motivation	Qs07 – I consider the reward for collecting performance very important	Rewards	Gagné (2009), Ryan and Deci (2000), Hendrics (1999), Gilad (2004), Cabrera *et al.*(2006), Al-Alawi *et al.* (2007), Choi *et al.* (2008), Bock and Kim (2002), Bock *et al.* (2005), Gilad (2004)
H8	The perception of support of top management to the CI processes is positively correlated with a tracker's intrinsic motivation	Qs08 – top management supports my participation in the CI process	Top management support	Connelly and Kelloway (2003), Lee *et al.* (2006, 2016)
H9a	The perception of proximity of the employee with the other employees involved in CI process is positively correlated with a tracker's intrinsic motivation	Qs9a – I am very close to those involved with the competitive intelligence process in the company	Relationship needs	Wasko and Faraj (2000), Deci and Ryan (2000), Cabrera *et al.* (2006), Al-Alawi *et al.* (2007), Zhang and Jiang (2015)
H9b	The perception of interaction with the CI responsible is positively correlated with a tracker's intrinsic motivation	Qs9b – the CI process leader interacts a lot with me	Relationship needs	Deci and Ryan (1982), Cabrera *et al.* (2006), Zhang and Jiang (2015)

H2b. The perception of ease of use of the information system supporting the CI process is positively correlated with a tracker's intrinsic motivation (Qs02b)

2.5.3 Competence and learning. As indicated in the SDT, as long as an activity increases the feelings of competence (self-efficacy), the individual feels intrinsically motivated to engage in the activity (Ryan and Deci, 2000). Individuals with high self-efficacy are more willing to share their knowledge (Bock and Kim, 2002, Cabrera *et al.*, 2006; Lin *et al.*, 2009). Self-efficacy is individuals' judgment of their competences and capabilities to deal with different realities and to organize and execute actions to attain required performances (Bock and Kim, 2002). It represents the "judgment of one's capability to accomplish a certain level of performance" (Bandura, 1986, p. 391). Cabrera *et al.* (2006) suggest that training also contributes to build an employee's self-efficacy. The feeling of learning with the CI process may generate a feeling of competence and self-efficacy, leading to an intrinsic motivation to participate in the CI process.

H3. the perception of learning with the CI process is positively correlated with a tracker's intrinsic motivation

2.5.4 Informational feedback and recognition. Many studies have examined the influence of positive feed-back on intrinsic motivation, showing that it increases intrinsic motivation considerably (Ryan, 1982) as it increases the feelings of competence and the feelings of autonomy (Ryan and Deci, 2000). It also increases the relationship quality between the individuals and their managers, satisfying relationship needs (Gagné, 2009). If individuals perceive that knowledge sharing will improve their relationship with other employees, it will positively influence attitudes regarding knowledge sharing (Bock and Kim, 2002). People are more willing to share knowledge if it is appreciated and if they perceive that their knowledge will be used (Hall, 2001).

H4. Informational feedback is positively correlated with a tracker's intrinsic motivation (Qs04).

2.5.5 Perceived degree of uncertainty. Uncertainty is considered a good predictor of the environmental scanning intensity (Boyd and Fulk, 1996; Choo, 2002). The higher scanning activity the chief executives showed, the greater they perceived uncertainty (Daft *et al.*, 1988). This relation was also observed for entrepreneurs in India and in the USA (Stewart *et al.*, 2008) and for top-level hotel executives (Jogaratnam and Wong, 2009). Kefalas and Schoderbek (1973) found that managers working for an organization with a dynamic environment will spend more time on external information acquisition than those working in a stable environment.

H5. The perceived degree of uncertainty in the market is positively correlated with a tracker's intrinsic motivation (Qs05).

2.5.6 Information about the process and its motivations/objectives. The lack of communication and understanding may be a barrier in implementing knowledge management systems (Cabrera *et al.*, 2006). It may be a factor of a project's failure, especially in CI processes (Lesca and Caron-Fasan, 2008). Individuals normally tend to overestimate the consequences and impacts of changes in process implementations. In this case, unfounded resistances will emerge. For this reason, it is important that the objectives of the process changes are clearly explained – for example, when introducing a new technology (Frank, 1989). In addition to that, providing information about the process supports the need for competence (Gagné, 2009).

H6. The perceived understanding of the objectives of the CI process is positively correlated with a tracker's intrinsic motivation (Qs06).

2.5.7 Rewards. Rewards usually come as material benefits such as bonuses, promotions or others (Wei *et al.*, 2009), albeit not necessarily monetary incentives (Cabrera *et al.*, 2006). There is no significant research on reward effectiveness in knowledge sharing activities (Milne, 2007; Durmusoglu *et al.*, 2014), and studies that can be found are inconclusive. Some researches show positive relations (Al-Alawi *et al.*, 2007; Choi *et al.*, 2008), some

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show a negative relation (Bock and Kim, 2002; Bock *et al.*, 2005) and others show no significant influence (Chennamaneni *et al.*, 2012; Lin, 2007). In fact, when an individual is receiving a reward to perform a task, it was observed that an individual's perceived *locus* of causality shifts from a more internal to an external *locus* of causality. Previous researches show that expected tangible rewards made contingent on task performance undermine intrinsic motivation (Deci, 1975).

Gilad (2004) also attests the failure in offering incentives to salespeople to report activity in the competitive environment.

H7. The importance given to rewards is negatively correlated with a tracker's intrinsic motivation (Qs07).

2.5.8 Top management support. The failure or success of organizational activities in general or activities in the CI process is related to the leaders' and the superiors' support involved in the process. Trust (Hisiu-Fen, 2007) in a management's and supervisors' support (Lynch *et al.*, 2005; Cabrera *et al.*, 2006), as well as top management's support (Lee *et al.*, 2006, 2016), increases intrinsic motivation. Connelly and Kelloway (2003) have found a positive correlation between management support and a knowledge sharing culture. King and Marks (2008) confirm that organizational support is positively associated with an individual's effort to collect knowledge. Gilad (2004, p. 121) states that recognition from peers and/or superiors leads to success in knowledge networks "if taken seriously by management".

H8. The perception of the top management support regarding the CI processes is positively correlated with a tracker's intrinsic motivation (Qs08).

2.5.9 Relationship needs. SDT attests that there is a relation between relationship needs and intrinsic motivation (Deci and Ryan, 2000). The perception of an individual's proximity with people is related to his or her intrinsic motivation. If an activity enables supplying an individual's needs of relationship, it will lead to intrinsically motivated behavior. Wasko and Faraj (2000) found intrinsic motivation as a factor of knowledge sharing in communities of practice in on-line newsgroups. They engaged in the exchange of ideas and solutions, because they wanted to participate in a community. Relation between oral communication/interaction among employees and knowledge sharing was observed by Al-Alawi *et al.* (2007).

Relationship between individuals positively affects knowledge sharing behavior (Zhang and Jiang, 2015).

H9a. The perception of proximity of the employee with the other employees involved in CI process is positively correlated with a tracker's intrinsic motivation (Qs09a).

H9b. The perception of interaction with the CI responsible is positively correlated with a tracker's intrinsic motivation (Qs09b).

3. Methodology

3.1 Data collection and survey implementation

A survey based on the literature review and on the hypothesis presented earlier was carried out in a telecommunications-related company. This company has implemented a CI process based on the weak signals sharing and interpretation approach. Trackers' cooperation in collecting and sharing weak signals, as well as their perception and knowledge about the competitive environment, was part of the process. The approaches suggested by Schoemaker and Day (2009) and Lesca and Lesca (2011) were the conceptual base for the process implementation.

An information system and its knowledge base are a central aspect in the company's knowledge sharing process. The system follows the framework suggested by Lesca and Lesca (2011), where trackers introduce weak signals and their perceptions about their meanings and importance (Box 1).

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Box 1. Weak signals collection framework

Tracker: Kelly **Date**: 01/30/2013

Information: Competitor X is searching for an area of 22,000 ft^2 in our region.

Comments: It is a large area they are searching for. They are also searching for a building in our region. It is almost sure that they will start developing their activities here.

As the tracker identifies competitor X's intention of acquiring an important area in the company's activity zone, she also comments that the competitor is searching for a building in their activity zone and infers this competitor's potential threat.

The survey was implemented in a company that provides data and voice communication services in the Latin American market to firms and to individual customers. Company's management was especially worried about the lack of information sharing about the market through the company. Important moves from competition were overlooked and sometimes ignored. In one occasion, a sales employee had warned of a competitor trying to buy another company of their interest. However, considering it might only be a rumor, the information had not appropriately reached top management, and they missed an important opportunity to avoid that competitor's move. Management saw then that it was time to work on bettering knowledge sharing about competition. The CI process started in 2012, intending to monitor competitors' market actions. The company is a unit of a South American group founded in 1950s. The group has offices in Mercosur (Argentina, Brazil, Colombia and Chile), with approximately 15,000 employees. The company is built around a very strong regional culture, being proud of its regional origins.

The company has 126 trackers, formally allocated to the process in the two different business units where it was implemented. An e-mail explaining the research goals and a link to an internet-based questionnaire was sent to trackers. Answers were obtained from October to November 2013. In addition, 78 questionnaires were considered, and the remaining were incomplete. The sample is formed of 62 males and 16 females. They work in six different areas (technical [6], commercial and sales [49], marketing [10], CI [3], institutional relations [5] and planning and innovation [5]). A significant part of trackers in this study was related to the commercial and marketing areas of the company (59 of 78 respondents), areas especially involved in the CI processes in this company.

3.2 Data analysis

The analysis of collected data was organized in four parts, the first one being a preliminary exploratory analysis. The remaining three parts are:

1. respondents' intrinsic motivation to participate in the CI process;
2. non-parametric correlation between motivation variables and intrinsic motivation; and
3. canonical correlation (Johnson and Wichern, 2002) to validate correlation hypothesis among motivation variables and intrinsic motivation.

A questionnaire containing 11 questions corresponding to the previously presented hypothesis was sent to trackers to access their perceptions about the CI process by using a seven-point Likert ordinal scales; the answers ranged from totally disagree to totally agree.

4. Results

4.1 Exploratory analysis

Missing data analyses, outliers' analyses and normal distribution analyses were performed. A small number of missing data was replaced by variable means, retaining 78 observations. One of the observations showed extreme values (outlier). After withdrawing this observation from the sample, no significant changes were observed in the results. In

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consequence, this observation was maintained in the sample. The Kolmogorov–Smirnov test shows that the normality of distributions cannot be observed. Bartlett's test of sphericity shows χ^2 of 361 (significance = 0.000), allowing for identification of the correlation among variables. The Kaiser Meyer Olkin test (KMO) test of 0.9, above 0.6, indicates the adequacy of the sampling to access correlation among variables (Crane *et al.*, 1991).

4.2 Respondents' intrinsic motivation to participate in competitive intelligence process

To evaluate a tracker's motivations, two groups of trackers were identified through a cluster analysis, using the five variables measuring intrinsic motivation (Table II). Two groups of individuals were identified: Group 1 = 22 individuals; Group 2 = 56 individuals. The second group was considered as intrinsically motivated through Deci's scale.

Each of the five variables significantly contributes to a group's separation. An analysis of variance and a *t*-student test shows the following results: Qse01 (F = 65.28; t = −8.08; significance = 0.000), Qse02 (F = 42.59; t = −6.5; significance = 0.000), Qse03 (F = 14.74; t = −3.84; significance = 0.001), Qse04 (F = 20.64; t = −4.54; significance = 0.000); and Qse05 (F = 89.59; t = 9,46, significance = 0.000).

To observe the hypothesis formulated in this study, two methods were used:

1. a non-parametric correlation analysis (Spearman correlation – Table III); and
2. a canonical correlation, presented in the next session.

To proceed with the Spearman correlation, five intrinsic motivation variables were replaced by a factor in a factor analysis. The correspondent factor shows χ^2 of 166.15 (significance = 0.000) in a Bartlett's test of sphericity. The extracted factor represents 64.62 per cent of the total explained variance. Performing the Spearman correlation analysis between the factor extracted from the factor analysis and the 11 motivation variables, two of the variables did not show correlation with the intrinsic motivation factor (Qs05 and Qs07). All other variables show significant correlation, as shown in Table III.

Table III Correlation among elements of motivation and intrinsic motivation (Spearman)

H	*Hypothesis*	*Correlation coefficient*	*Significance*	*Result*
H1	The perceived importance of the CI process for the company to better understand its competitive environment is positively correlated with a tracker' s intrinsic motivation	0.653**	0.000	Confirmed
H2a	The importance given to the information technology support is positively correlated with a tracker's intrinsic motivation	0.617**	0.000	Confirmed
H2b	The perception of easy use of the information system supporting the CI process is positively correlated with a tracker's intrinsic motivation	0.677**	0.000	Confirmed
H3	The perception of learning with the CI process is positively correlated with a tracker's intrinsic motivation	0.701**	0.000	Confirmed
H4	Informational feedback is positively correlated with a tracker's intrinsic motivation	0.388**	0.000	Confirmed
H5	The perceived degree of uncertainty in the market is positively correlated with a tracker's intrinsic motivation	0.05	0.035	Not significant
H6	The perceived understanding of the objectives of the CI process is positively correlated with a tracker's intrinsic motivation	0.360**	0.000	Confirmed
H7	The importance given to rewards is negatively correlated with a tracker's intrinsic motivation	0.18	0.025	Not significant
H8	The perception of the of top management support to the CI processes is positively correlated with a tracker's intrinsic motivation	0.471**	0.000	Confirmed
H9a	The perception of proximity of the employee with the other employees involved in CI process is positively correlated with a tracker's intrinsic motivation	0.626**	0.,000	Confirmed
H9b	The perception of interaction with the CI responsible is positively correlated with a tracker's intrinsic motivation	0.376**	0.000	Confirmed

Note: **Correlations are significant in a level lower than 0.001

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4.3 Canonical correlation analysis

This technique allows for the correlation analysis of two different groups of variables and tests a dependence relation. The canonical correlation analysis was performed using the 11 motivation variables (independent variables) and the 5 intrinsic motivation variables (dependent variables).

4.3.1 Correlation among motivation variables and intrinsic motivation variables. The existence of correlation among motivation variables and intrinsic motivation variables can be observed (Pillais = 1.94, F = 3.83, significance = 0.000; Hotellings = 6.93; F = 7.6; significance = 0.000; Wilks = 0.041; F = 5.24; significance = 0.000; Roys = 0.83).

The first three canonical correlations are significant in a level lower than 0.003, and the canonical correlation captures 91.67 per cent of the correlation between the two groups of variables. The first canonical correlation captures 75.46 per cent of the correlations (Table IV).

Table V shows the measures of redundancy from the results obtained. It can be observed that for the first canonical correlation, 47.69 per cent of the variance in intrinsic motivation is generated by the independent variables measured in this study (Qs01-Qs09b). Thus, it can be concluded that intrinsic motivation is related to the independent variables and can be predicted by independent variables when they are joined together. The total cumulated value of the redundancy measure of the five canonical variables is 59.67 per cent, which is a very acceptable indication correlation for the equivalent of multiple regression.

Sharma (1996) attests that using standardized coefficients of canonical correlation may present bad results in the presence of a small number of observations and that there is multicollinearity in data. In consequence, many researches opt to also use the simple correlation between variables and canonical variables (loadings or structural correlations) to have more stable interpretations. So, in Table VI, the influence of each variable in forming the first canonical equation can be observed. It can be concluded that intrinsic motivation is strongly correlated with the different independent variables measuring the perceptions of trackers about the CI process.

Table IV Eigenvalues and canonical correlations

Root	*Eigenvalue*	*Pct.*	*Cum. Pct*	*Canon Cor.*	*Sq. Cor.*
1	5.2638	75.45946	75.45946	0.91671	0.84035
2	0.84163	12.06521	87.52467	0.67602	0.457
3	0.41571	5.95939	93.48406	0.54188	0.29364
4	0.34072	4.88447	98.36852	0.50412	0.25413
5	0.11381	1.63148	100	0.31965	0.10218

Note: Pct = Percentage; Cum. Pct. = cumulated percentage; Canon Cor. = canonical correlation; Sq. Cor. = square correlation

Table V Variance in dependent variables explained by canonical variables

CAN. VAR.	*Pct. Var DEP*	*Cum PCT DEP*	*Pct Var COV*	*Cum Pct COV*
1	56.74531	56.74531	47.68605	47.68605
2	13.64366	70.38896	6.23518	53.92123
3	7.76765	78.15661	2.28088	56.20212
4	8.10202	86.25863	2.059	58.26112
5	13.74137	100	1.40406	59.66518

Note: CAN. VAR. = canonical variance; Pct. Var DEP = percentage variance of dependent variable; Cum PCT DEP = cumulated percentage of dependent variable; Pct Var COV = percentage variance of covariance; Cum Pct COV.= cumulated percentage of covariance

Table VI Correlations between dependent and canonical variables

Variable	*1*	*2*	*3*	*4*	*5*
Qse04 – I think this activity is quite enjoyable	−0.88537	−0.10207	0.2731	−0.35729	0.05878
Qse02 – I would describe this activity as very interesting	−0.8865	0.07631	−0.32515	0.25464	0.19425
Qse01 – I've enjoyed doing this activity	−0.8138	−0.26367	0.3237	0.40161	−0.04613
Qse05 – I think this activity is very boring (inverted scale)	−0.52559	−0.07466	−0.23894	0.21067	−0.78531
Qse03 – the knowledge sharing meetings are very interesting	−0.57357	−0.76866	−0.21494	0.08326	0.16445

When each independent variable is observed separately, it can be observed that some of the variables are more strongly correlated with the intrinsic motivation of trackers. From the independent variables in Table VII, those more correlated are Qs03, Qs01, Qs04, Qs02a and Qs09a.

This means that:

- The stronger the perception of learning with the CI process (Qs03), the stronger the tracker's intrinsic motivation (coefficient of canonical correlation of −0.769, confirming *H3*).
- The stronger the perception of the importance of the CI process to the firm (Qs01), the stronger the tracker's intrinsic motivation (coefficient of canonical correlation of −0.7415, confirming *H1*).
- The stronger is the positive feed-back received by the tracker, (Qs04), the stronger the tracker's intrinsic motivation (coefficient of canonical correlation of −0.7108, confirming *H4*).
- The stronger the importance given to the information technology support (Qs02a), the stronger the tracker's intrinsic motivation (coefficient of canonical correlation of −0.6870, confirming *H2a*).
- The stronger the perception of proximity of the employee with the other employees involved in the CI process (Qs09a), the stronger the tracker's intrinsic motivation (coefficient of canonical correlation of −0.6145, confirming *H9a*).

In Table VII, it can be observed that some of the variables are also correlated with the intrinsic motivation of trackers, though at a lesser degree:

- The stronger the perception of easiness in using the information system supporting the CI process (Qs02b), the stronger the tracker's intrinsic motivation (coefficient of canonical correlation of −0.3895, confirming *H2b*).
- The stronger the perception of understanding of the objectives of the CI process (Qs06), the stronger the tracker's intrinsic motivation (coefficient of canonical correlation of −0.3809, confirming *H6*).

Table VII Correlations between covariates and canonical variables

COVARIATE	*1*	*2*	*3*	*4*	*5*
Qs03	−0.76879	−0.01862	−0.06206	0.02011	−0.30621
Qs01	−0.74154	−0.21668	0.24482	−0.29019	0.00331
Qs04	−0.71084	−0.40183	0.00774	0.12898	0.32817
Qs02a	−0.68701	−0.16069	−0.07486	−0.17462	0.34603
Qs09a	−0.61446	−0.06695	−0.56757	0.00701	0.00106
Qs02b	−0.3895	−0.73055	−0.18681	−0.14121	−0.17844
Qs06	−0.38091	−0.06773	−0.16561	−0.37248	0.17907
Qs08	−0.3477	−0.47845	0.05716	−0.05423	0.01148
Qs09b	−0.33996	−0.53867	−0.22256	−0.35779	0.00496
Qs07	−0.13679	−0.39157	0.05026	−0.08828	0.51848
Qs05	−0.11932	−0.04686	0.00598	−0.80889	0.21393

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- The stronger the perception of support of top management to the CI processes (Qs08), the stronger the tracker's intrinsic motivation (coefficient of canonical correlation of −0.3477, confirming *H8*).
- The stronger the perception of interaction with the CI responsible (Qs9b), the stronger the tracker's intrinsic motivation (coefficient of canonical correlation of −0.3400, confirming *H9b*).

The other two variables, Qs07 and Qs05, do not show a strong influence on a tracker's intrinsic motivation. It was not possible to observe a correlation with the perception of uncertainty (Qs05) or with the use of rewards to motivate trackers (Qs07).

5. Discussions

The study of an employee's knowledge sharing motivation in organizations has attracted many researchers and practitioners. However, most of available studies explore motivational aspects without making a distinction between intrinsic and extrinsic motivation, concentrating mainly on controlled motivation, as observed by Gagné (2009). Studies also frequently disregard specific applications or kinds of knowledge being treated.

The present study focused on knowledge sharing about competitive environment in a CI process, a specific kind of knowledge management process. It allows for the comparison with results of studies exploring more general knowledge sharing activities. Some factors studied in previous researches can also be observed in this specific domain of CI and weak signal sharing.

Different authors present and confirm the importance of information technology in an effective knowledge management process (Hendrics, 1999; Cabrera *et al.*, 2006; Chennamaneni *et al.*, 2012). These findings were confirmed in the present study.

The importance of an information system supporting knowledge sharing and its ease of use suggests that an information system's structure and information technology play an important role in motivating trackers to participate in the process. Information technology cannot substitute the richness of a dialog, but it is an important facilitator (Fahey and Prusak, 1998). Information technology available in an organization will impact knowledge sharing activity, as tested by Connelly and Kelloway (2003), which is coherent with the hypotheses confirmed in this paper.

Cabrera *et al.* (2006) and Lin *et al.* (2009) confirmed that self-efficacy (feelings of competence) is positively correlated with the willingness to share knowledge. The present study showed a positive correlation between the perception of learning with the CI process and intrinsic motivation.

Information feed-back (Hall, 2001), top management support (Lee *et al.*, 2006) and relationship needs (Zhang and Jiang, 2015) verified as positively related with knowledge sharing were also confirmed in this study. Correlation of intrinsic motivation with needs for relationships and competence were considerably high in this study (0.701 and 0.626, respectively, $p < 0.001$), suggesting the importance in considering psychological needs when considering knowledge sharing.

Some studies approach intrinsic motivation as a moderating element when studying elements of motivation; others do not make a distinction between intrinsic and extrinsic motivation. This may also explain incongruences in findings in relation with knowledge sharing and elements such as rewards (Wang and Noe, 2010). Rewarding knowledge sharing may change intrinsic motivation into extrinsic motivation and then to no motivation over time.

It may be considered surprising that no correlation was observed between the perception of the degree of uncertainty in the market and a tracker's intrinsic motivation to share

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knowledge. This is incoherent with different studies that attest that uncertainty is a good predictor of environmental scanning activity (Kefalas and Schoderbek, 1973; Daft *et al.*, 1988; Choo, 2002). One reason might be that the perception of uncertainty may be related to other moderating factors such as personal traits, the firm's industry or cultural aspects, influencing scanning behavior (Choo, 2002).

6. Conclusions

6.1 Summary of conclusions

The present study aimed to bring a better understanding of motivated behavior of employees in a company working in a CI process. It is expected from them to share knowledge about the competitive environment.

The study confirms 9 of the 11 hypotheses proposed, showing important elements of knowledge sharing motivation in the CI process, as proposed in the beginning of this study. Some relations were observed before in other domains by other studies, but not in CI. Knowledge sharing and perceptions of competitive environments by employees are the basis for understanding and anticipating threats and opportunities in the market and an important support for decision-making.

6.2 Implications for practitioners and researchers

One first aspect of the present study is highlighting the importance of an information system to support knowledge sharing in general and, specially, in CI processes.

Practitioners should pay attention to the implementation of information systems and knowledge bases, assuring an adequate support of information collection and sharing. An inappropriate information system may turn into a barrier for effective knowledge sharing, instead of facilitating it (Lee *et al.*, 2006). IT, if properly used, is a way to facilitate interaction among individuals and knowledge sharing. However, managers should start evaluating the knowledge management process by focusing aspects other than IT, such as informing knowledge management objectives and their importance and introducing occasions of interaction among employees involved.

Managers should keep in mind that supporting competence and relationship needs are ways of motivating intrinsic motivation, and a suggestion would be to promote formal knowledge sharing meetings, promoting relationship and learning.

Managers should be very careful in using rewards as the consequences are not well understood in knowledge sharing activity. Some knowledge sharing studies (Osterloh and Frey, 2000, Bock *et al.*, 2005) show significant evidences of the bad effect of economic rewards for motivation in the long term.

Managers responsible for knowledge management processes should involve top management from the beginning and keep them involved, motivating them to interact with participating employees. Receipts of the information shared should return to trackers, confirming the utility/importance of the information to keep them motivated. Even if these conclusions come from a study focused in a CI process, it is reasonable to consider them for other knowledge sharing processes.

6.3 Limitations of research

The study was developed in a single organization, and external validity could not be tested. More general conclusions cannot be taken. There may be cultural particularities in the company, as well as in Brazil, that were not considered in the study. Applying the research model in different companies or countries may address this limitation.

Second, the sample size was relatively small, as the total number of trackers in the company was 126 and the number of the respondents of the survey was of 78. It was not

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possible to evaluate the impact that the sample size had on the results. These limitations should be addressed in future works with larger samples.

It was not possible to use techniques such as structural equations to have an understanding of other moderating factors of intrinsic motivation. However, canonical correlation (Hair *et al.*, 2005) is adequate to evaluate simultaneously the relationship among multiple independent metric variables (variables of motivation in this study) and multiple dependent metrical variables (intrinsic motivation).

This study explored a special case of knowledge sharing. Conclusions specifically from this study may not be observed in other CI processes and should be explored in other studies, perhaps bringing new perspectives.

6.4 Areas of future research

Future researches could explore other aspects that could influence intrinsic motivation not distinguished here, such as a tracker's cognitive style, other affective elements or situational dimensions, that may affect what Choo (2016) called information behavior in seeking information and sharing knowledge.

Commercial and marketing professionals were more expressively involved in the CI process in the company studied (59 of the 78 respondents). Other studies involving other areas such as purchasing or R&D may produce different results.

In the present study, it was not possible to observe the importance of rewards on a tracker's intrinsic motivation, as the correlation was very low. It is possible to suggest some explanations not explored here:

- different kinds of rewards and incentives considered in the studies (Cabrera and Cabrera, 2002; Choi *et al.*, 2008; Wei *et al.*, 2009);
- other intervening factors influencing reward perception (Durmusoglu *et al.*, 2014);
- different impacts in tacit and explicit knowledge sharing (Osterloh and Frey, 2000; Hau *et al.*, 2013);
- influence of extrinsic motivation and changing perception of rewards by individuals over time; and
- impact of expected versus non expected rewards on motivation (Lepper *et al.*, 1973).

Another interesting point to explore is to develop research without asking the respondents to identify themselves. An anonymous response may allow stronger conclusions.

The survey was realized one year after the beginning of the process implementation. It would be interesting for future researches to explore eventual changes in trackers' intrinsic motivation over longer periods, especially in cases where extrinsic rewards were used.

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