Vol. XV & Issue No. 07 July - 2022
INDUSTRIAL ENGINEERING JOURNAL

OPEN INNOVATION CULTURE SUPPORTING COMPETITIVE INTELLIGENCE

S. L. Capinzaiki Ottonicar
M. L. Pomim Valentim
L. Maia Woida
E. Silva

Abstract

This paper aims to discuss how open innovation culture contributes to the competitive intelligence process. Furthermore, it aims to verify whether open innovation culture encourages quality information and knowledge sharing. Finally, this paper aims to identify whether that quality information contributes to the competitive intelligence process. This paper is an exploratory research based on a quantitative and qualitative approach, and the method is the systematic literature review about open innovation and competitive intelligence. The literature review shows that the topic of this paper is innovative, so it is a potential topic of discussion for future researchers. The paper concludes that competitive intelligence may use information and knowledge created by open innovation. This intelligence creates the best solution for the organization through prospecting partners' information. Therefore, open innovation culture must encourage information and knowledge sharing. There is a gap in the literature about open innovation and competitive intelligence. Therefore, this paper is crucial because it connects both topics which are studied by Information Science and Business Management. This paper encourages new research to use its concepts in practice in order to make organizations more competitive.

Keywords: Open Innovation, Competitive Intelligence, Open Innovation Culture.

1. INTRODUCTION

Organizations use competitive intelligence to understand their strengths and weaknesses. Professionals can improve the weaknesses, so the organization can become more competitive [1] [2] [3] [4]. This process gathers data and trustworthy information which are analysed to create knowledge [5]. The reports resulting from competitive intelligence support decision-making and the innovation process [6].

Effective decision-making depends on knowledge created inside and outside of organizations [1] [5]. Therefore, competitive intelligence allows professionals to monitor the market in order to learn and follow trends. Furthermore, the competitive intelligence process helps them to understand competitors and clients by prospecting media ethically. Competitive intelligence can provide relevant information to guide the innovation process in organizations [7]. The analysis, graphs, tables and figures can explain clients' needs and competitors' survival strategies. Currently some organizations have developed partnerships with universities, suppliers, clients, research institutes and the government to share ideas and encourage creativity together. According to Narkhede (2019, p. XIX): "In today's era of globalization and competition, business excellence is important, which needs coordination between business and manufacturing strategy." Competitive intelligence helps professionals to understand the strategy and improve it based on the market. Open innovation encourages learning in a group as a win-win relationship, and it is based on trust between organizations. That type of innovation is important in a context of disruptive technology demands. That partnership requires respect for strategies, appropriate partners, good communication channels and process alignment among organizations [8] [9].

Open innovation must be encouraged by an organizational culture that values information and knowledge sharing. Open innovation culture "is facilitated by the integration of trust and reduced by information asymmetry within the cluster region" [10 p. 653]. This culture needs some changes to the mission, vision and values of organizations.The concepts proposed in the introduction stimulate the following research questions: How can open innovation culture contribute to the competitive intelligence process in organizations? Does open innovation culture encourage quality information and knowledge sharing? Can open innovation become a source of information for the competitive intelligence process? This paper aims to investigate how open innovation culture can contribute to the competitive intelligence process. Furthermore, this paper aims to verify if open innovation culture allows the dissemination of quality information. This paper also aims to identify the contribution of open innovation to the competitive intelligence process. Silva and Woida (2019, p. 64) explain that organizational culture is: "[...] a culture created inside organizations to have a standard work procedure which employees must follow to keep order [...]". It influences individuals' behaviour and thinking in the organization. This culture can encourage information and knowledge sharing to feed the competitive intelligence process [10]. This research motivates organizations to modify their culture to develop open innovation, using information and knowledge sharing as an element of the competitive intelligence process. Open innovation takes advantage of various data sources, and it contributes to decision-making and competitiveness by providing high value-added information back to the competitive intelligence process. Professionals and managers can learn more about open innovation as a source of knowledge creation for the business. Businesses can improve the processes based on partnerships with other companies.

These partnerships allow professionals to share information and learn together. According to Narkhede (2017) information helps to construct knowledge, solve problems, make decisions and innovate. Because of that, this paper helps businesses to become more competitive.

2. MAIN CONCEPTS

2.1. Competitive Intelligence

Information became an important asset in the context of World War II because people used computers and networks between allied bases. The intelligence was seen as espionage between countries, but currently, organizations use intelligence to achieve their goals in the long term. After that war, Information Science emerged as a scientific field promoting information in a multidisciplinary way. Some people may confuse competitive intelligence and industrial espionage, because the word intelligence refers to secret agents of the government. These agents collect data and information for the country. This context was common during wars, especially during the Cold War between the United States of America and the Soviet Union. During the Cold War, the competition left physical space and migrated to a digital dimension. The intelligence services access, gather, analyse, organize and store information. The purpose of the government is to construct knowledge about the specific context of political and economic interests. According to Calof, Richards and Smith (2015, p. 71): "[...] with the increasingly competitive environment, government and business have been turning to a greater extent to competitive intelligence to better understand their environment and develop better programmes and strategies". Competitive intelligence is a process that emerged in the industrial espionage era. Sometimes, industrial espionage used illegal ways to gather information about competitors. Currently, professionals and researchers understand competitive intelligence as a process that analyses data and information [12] ethically through the connection between opportunities and risks of the organization [13] [14] [15]. There are many legal ways to gather information, so professionals do not need to use non-ethical methods. The strategic, tactical and operational levels may use competitive intelligence in the organization [16] [13] [17]. The competitive intelligence process is based on planning methods to access, gather and evaluate information, so professionals can understand the competitive environment [18] [13] [3] [19]. Before prospecting and monitoring information externally, professionals must understand the information flow inside the organization. Because of that, competitive intelligence is a holistic process, and it involves the mission, vision and values of the organization. Furthermore, competitive intelligence must include organizational strategies to achieve competitiveness [20]. Competitive intelligence has many concepts, and its use is a challenge for organizations [21].Some managers may feel comfortable after working so many years for the same organization. They may think that they know everything. However, professionals need to know new competitors emerging in the market [22]. Competitive intelligence allows individuals to know the external context through i nformation sources [23]. Therefore, this process adds value to products and services since it contributes to competitive advantage [2]. Competitive intelligence contributes to innovation because it creates data, information and knowledge that influence creativity. Therefore, decision-making about innovation must be based on strategy and the external context of organizations [15] [20]. The elements of organizational culture influence competitive intelligence [24] such as values, myths and stories of organizations [1] [25]. Informal socialization and the collaboration between professionals are fundamental to the competitive intelligence process because they allow information and knowledge [1] [5] [4]. Both information and knowledge are inputs of competitive intelligence and encourage innovation and competitiveness [26].

2.2. Open Innovation and Its Culture

According to The Organisation for Economic Co-operation and Development [27] the innovation activities of an organization depend on information, knowledge, technology, practices, human resources and financial resources. These elements are related to actors of innovation systems such as government, education, research centres, competitors, regulatory organizations, clients and suppliers. Open innovation emerges in the context of knowledge use inside and outside of the organization. Therefore, there is an open knowledge creation in the innovation process [28]. The open innovation process is based on the partnership between knowledge creators and innovation users. Furthermore, supply chain management is also an element that influences open innovation [29]. Open innovation is a model focused on input and output flow of knowledge between organizations [30]. The strategy of the organization must include open innovation practises [31]. Furthermore, open innovation is the combination of different types of knowledge and resources. This type of innovation needs a multidimensional process that involves the stakeholders. Innovation may not be focused only in technology innovation [29]. The cooperation allows the organization to create new projects with other organizations. We emphasize that hiring a third-party organization is not necessarily considered a collaboration. During open innovation process the organization share knowledge with stakeholders through networks and national systems of innovation [32]. Open innovation is a key element of strategic planning, and this innovation must be based on the general strategy of the organization. Open innovation has many concepts and every organization may choose the appropriate concept. Every professional must value open innovation, not only the research and development department (R&D) but also sales, marketing, finance, human resources and information technology. The open innovation culture depends on the creation of a few essential elements in the organization [33]:

- Flexible people: ability to manage emotions to deal with clients and stakeholders;
- Help others: ability to help other professionals to understand an idea and implement a task;
- Visualize failure as learning: reward the efforts and learning, use mistakes to be overcome as elements of the innovation process;

- Use internal and external ideas: the organization may learn and profit from people's ideas and buy intellectual property when needed;
- Balance R&D internally and externally: externally to add value and internally to have the right of value created;
- Take risks: avoid risk denial and use this risk to grow;
- Accept that open innovation brings the debate to professionals about intellectual property: the organization needs a constructive approach for its progress;
- Develop open communication: share ideas and information, and respect confidentiality, intellectual property to construct an environment of trust;
- Avoid the need to be the first one: The effective development of the organization is better than being the pioneer in the market.

Open innovation depends on the connection between internal and external resources, so the organization may innovate in many aspects. This innovation requires a change of paradigm, because professionals need to change their ideas. Professionals must see the innovation in a holistic manner. Open innovation culture depends on the development of a network culture. Network culture is focused externally to keep good relationships with partners. This culture does not emerge by itself: leaders must make an effort to adopt open innovation culture [33]. Business models generate value because they create ideas when acquiring external knowledge. In these models, organizations acquire knowledge from the external context and share this knowledge with partners. Open organizations keep a good relationship with universities because academics have knowledge about specific aspects of the organization [34].

3. METHOD

This is a descriptive and exploratory research with a quantitative and qualitative approach. The method is the systematic literature review about competitive intelligence and open innovation culture. This method is useful for innovative studies, for research with new and few explored topics in order to establish initial relationships between the topics [35] [36]. The keywords "competitive intelligence" and "open innovation" (in quotation marks) were combined in three international databases. We also researched the word "open innovation culture" alone because there are only a few papers that study this topic connected to competitive intelligence. The databases are Scopus, Web of Science (WoS) and Library and Information Science abstracts (LISA). The keywords were in the English language between quotation marks in the advanced search section of each database. We did not limit the period because there are only a few papers that discuss the topic. We selected peer-reviewed and journal papers. The relationship of Open Innovation and Competitive Intelligence is innovative for Business Management and Engineering fields. There is a gap of research about these topics connected to improve business performance. The systematic literature review helps to understand how these topics may be connected and how business can value partnerships to learn. Furthermore, open innovation through partnership provides important information that can be used to competitive intelligence process.

4. RESULTS

4.1 Quantitative Results

We developed two searches for the Scopus database. The first search had the Boolean combination "competitive intelligence" AND "open innovation" and the second had "open innovation culture" alone. We collected 18 scientific papers and evaluated them based on the inclusion and exclusion criteria. Table 1 below shows the results of Scopus.

Table 1 – Results of Scopus

Paper	Keywords	Includes or Excludes
1) Nestle, V. et. al. (2019). Establishing open innovation culture in cluster initiatives: The role of trust and information asymmetry. Technological Forecasting and Social Change, v.146, pp. 563-572.	Open innovation culture	Included because the paper studies open innovation in a cultural aspect.
2) Papula, J., Kohnova, L., Papulova, Z. (2018). Impact of national culture on innovation activities of companies: A Case of Germany, Austria, Switzerland and the Czech Republic. Economic Annals-XXI, 169(1-2), pp. 26-30	Open innovation culture	Excluded because the paper was published by a conference proceeding.
3) Lee, W. I. (2018). The effect of external technology cooperation and internal relation on innovative behaviour in technology-intensive organizations. International Journal of Engineering and Technology (UAE), 7(4), pp. 26-29	Open innovation Culture	Included because it emphasizes cooperation
) Hasan, N., Rahman, A.A. (2017). Ranking the factors that impact4 customers online participation in value co-creation in service sector using analytic hierarchy process. International Journal of Information Systems in the Service Sector, 9(1), pp. 37-53	Open innovation Culture	Included because it studies the cooperation between organization and clients.

5) Oparaocha, G.O. (2017). Towards building internal social network architecture that drives innovation: a social exchange theory .perspective. Journal of Knowledge Management, 20(3), pp. 534-55	Open innovation Culture	Included because the paper research socialization as a means to share information and knowledge to innovation development.
6) Nakagaki, P., Aber, J., Fetterhoff, T. (2012). The challenges in implementing open innovation in a global innovation-driven corporation. Research Technology Management, 55(4), pp. 32-38.	Open innovation Culture	Included because of open innovation
7) Herzog, P., Leker, J. (2010). Open and closed innovation - Different innovation cultures for different strategies. International Journal of Technology Management, 52(3-4), pp. 322-343	Open innovation culture	Included Because of Open Innovation
8) Van Der Meer, H. (2007). Open innovation - the Dutch treat: Challenges in thinking in business models. Creativity and Innovation Management 16(2), pp. 192-202.	Open innovation culture	Included because of open innovation
10) Calof, J., Richards, G., Santilli, P. (2017). Integration of business intelligence with corporate strategic management, Journal of Intelligence Studies in Business, 7(3), pp. 62-73.	"competitive intelligence" AND "open innovation"	Included because it connects business intelligence and open innovation
11) Hughes, S.F. (2017). A new model for identifying emerging technologies. Journal of Intelligence Studies in Business, 7(1), pp. 79-86.	"competitive intelligence" AND "open innovation"	Excluded because the paper does not approach the topic.
12) Agostinho, C., Lampathaki, F., Jardim-Goncalves, R., Lazaro, O. Accelerating web entrepreneurship in local incubation environments. Lecture Notes in Business, Information Processing, 215, pp. 183-194.	"competitive intelligence" AND "open innovation"	Excluded because the paper does not approach the topic.
13) Rodrigues, L.C. (2012). Technical competitive intelligence systems: An innovation and technology management tool (Book Chapter). Service Science Research, Strategy and Innovation: Dynamic Knowledge Management Methods, pp. 202-226.	"competitive intelligence" AND "open innovation"	Excluded because the paper is a book chapter
14) Miller, L., Miller, R. (2012). Competitive intelligence supporting team management of second-generation Ari. International Journal of Innovation and Technology Management, 9(1),1250006X.	"competitive intelligence" AND "open innovation"	Excluded because the paper does not approach the topic.
15) Miller, L., Miller, R.H. (2009). Competitive intelligence supporting team management of 2nd generation ARI. PICMET: Portland International Center for Management of Engineering and Technology, Proceedings, 5262061, pp. 692-705.	"competitive intelligence" AND "open innovation"	Excluded because the paper was published and conference proceedings.
16) Koivuniemi, J., Edelmann, J. (2007). Networked innovation management: A framework and case application. Proceedings of the Annual Hawaii International Conference on System Science 4076843.	"competitive intelligence" AND "open innovation"	Excluded because the paper was published and conference proceedings.
17) Corkill, D. (2007). Why can't we do it alone? [Innovation management]. IET Engineering Management 17(2), pp. 36-39.	"competitive intelligence" AND "open innovation"	Excluded because the paper does not approach the topic.
18) Chesbrough, H., Schwartz, K. (2007). Innovating business models with co-development partnerships. Research Technology Management, 50(1), pp. 55-59.	"competitive intelligence" AND "open innovation"	Included because of open innovation
Total for complete text reading		**8 papers**

After reading the title, keywords and abstract, we chose eight papers to read and to write about in the quantitative analysis section of this paper. The most quoted authors in Scopus were Miller, L. (2 papers), Calof, J. (1), Chesbrough, H. (1) and Herzog, p. (3). After that, we used the same strategy in WoS and the results are shown in Table 2.

Table 2 – Results of WoS

Paper	Keywords	Includes or Excludes
1) Nestle, V. et. al. (2019). Establishing open innovation culture in cluster initiatives: The role of trust and information asymmetry. Technological Forecasting and Social Change, v.146, pp. 563-572.	"Open innovation Culture"	Duplicated
2) Papula, J., Kohnova, L., Papulova, Z. (2018). Impact of national culture on innovation activities of companies: A Case of Germany, Austria, Switzerland and the Czech Republic. Economic Annals-XXI 1-2), pp. 26-30)169	"Open innovation Culture"	Duplicated
3) Hasan, N., Rahman, A.A. (2017). Ranking the factors that impact customers online participation in value co-creation in service sector using analytic hierarchy process. International Journal of Information Systems in the Service Sector 9(1), pp. 37-53	"Open innovation Culture"	Duplicated
4) Oparaocha, G.O. (2017). Towards building internal social network architecture that drives innovation: a social exchange theory perspective. Journal of Knowledge Management 20(3), pp. 534-556	"Open innovation Culture"	Duplicated
5) Van Goolen, R., Evers, H., & Lammens, C. (2014). International Innovation Labs: An innovation meeting ground between SMEs and business schools. Procedia Economy and Finance, v. 12, 184-190	"Open innovation Culture"	Excluded because the paper was published and conference proceedings.
6) Xia, E. J., Zhang, M., & Zhu, H. J. (2013). The Operation Mechanism of Open Innovation Community Network: A System Dynamics Model 19th International Conference on Industrial Engineering and Engineering Management: Management System Innovation Páginas: 475-485	"Open innovation Culture"	Excluded because the paper was published and conference proceedings.
7) Nakagaki, P., Aber, J., Fetterhoff, T. (2012). The challenges in implementing open innovation in a global innovation-driven corporation. Research Technology Management 55(4), pp. 32-38	"Open innovation Culture"	Duplicated
8) Calof, J., Richards, G., Santilli, P. (2017). Integration of business intelligence with corporate strategic management, Journal of Intelligence Studies in Business, 7(3), pp. 62-73	"competitive intelligence" AND "open innovation"	Duplicated
9) Hughes, S.F. (2017). A new model for identifying emerging technologies. Journal of Intelligence Studies in Business, 7(1), pp. 79-86	"competitive intelligence" AND "open innovation"	Duplicated
10) Agostinho, C., Lampathaki, F., Jardim-Goncalves, R., Lazaro, O. Accelerating web entrepreneurship in local incubation environments. Lecture Notes in Business Information Processing, 215, pp. 183-194	"competitive intelligence" AND "open innovation"	Duplicated
11) Miller, L., Miller, R.H. (2009). Competitive intelligence supporting team management of 2nd generation ARI. PICMET: Portland International Center for Management of Engineering and Technology, Proceedings 5262061, pp. 692-705	"competitive intelligence" AND "open innovation"	Duplicated
12) Porter, A., Newman, N. C. (2009). Tech Mining: A Key Tool to Bolster Innovation. Proceedings of International Forum on Technological Innovation and Competitive Technical Intelligence, p. 254-270.	"competitive intelligence" AND "open innovation"	Excluded because the paper was published and conference proceedings.
Total for complete text reading		**0 papers**

We identified that the majority of papers of WoS were already retrieved in Scopus (9 duplicated papers). We deleted the rest of the papers because they had a different topic from competitive intelligence and open innovation. Because of that, we selected zero papers in WoS. Last, we used the same search strategy in LISA (Proquest) and the results are in Table 3.

Table 3 – Results of Lisa (Proquest)

Paper	Keywords	Includes or Excludes
1) Desouza, K. C. (2006). The frontiers of knowledge management: Very informal newsletter on library automation very informal newsletter on library automation. Vine, 36(3), 284-288.	"competitive intelligence" AND "open innovation"	Excluded because the paper does not approach the topic.
2) Desouza, K. C. (2006). The frontiers of knowledge management: Very informal newsletter on library automation very informal newsletter on library automation. Vine, 36(3), 284-288.	"competitive intelligence" AND "open innovation"	Duplicated
3) Rodriguez, I. M. A., & Gómez, C. G. (2015). La información como recurso estratégico en las empresas de base tecnológica. Revista General De Información y Documentación, 25(2), 265-285.	"competitive intelligence" AND "open innovation"	Excluded because the paper does not approach the topic.
4) Rothberg, H. N., & Erickson, G. S. (2017). Big data systems: Knowledge transfer or intelligence insights? Journal of Knowledge .Management, 21(1), 92-112	"competitive intelligence" AND "open innovation"	Excluded because this paper studies intelligence in the context of Big Data.
5) Spiandorello, F. d. M., Schiavi, M. T., & Hoffmann, W. A. M. (2018). Inteligência competitiva em contratos internacionais de tecnologia: contratações de uma empresa petrolífera. Perspectivas Em Gestao & Conhecimento, 8, 21.	"competitive intelligence" AND "open innovation"	Excluded because the paper does not approach the topic.
6) Vuori, M. (2012). Exploring uses of social media in a global corporation. Journal of Systems and Information Technology, 14(2), 155-170.	"competitive intelligence" AND "open innovation"	Excluded because the paper does not approach the topic.
7) Bican, P. M., Guderian, C. C., & Ringbeck, A. (2017). Managing knowledge in open innovation processes: An intellectual property .perspective. Journal of Knowledge Management, 21(6), 1384-1405	"open innovation culture"	Included because the paper studies knowledge sharing for open innovation.
8) Gospel, O. O. (2016). Towards building internal social network architecture that drives innovation: A social exchange theory .perspective. Journal of Knowledge Management, 20(3), 534-556	"open innovation culture"	Included because the paper studies network in open innovation.
Total for complete text reading		**3 papers**

In LISA database we found only one duplicated paper and we deleted four papers because they are not part of the systematic literature review criteria. Therefore, we chose only three papers for complete reading and discussion. In conclusion, we evaluated 12 papers in total. This result reinforces the statement we wrote in the introduction section, that the topic of this paper is innovative and only a few international authors have published about competitive intelligence and open innovation. The next section discusses the content of these papers.

4.2 Qualitative Results

Nestle et. al paper (2019) "Establishing open innovation culture in cluster initiatives: The role of trust and information asymmetry" explain that clusters encourage trust and information sharing. Both trust and information sharing is part of the organizational culture. A high level of trust encourages open innovation culture [10]. The authors Hassan and Rahman (2017) in the paper "Ranking the factors that impact customers online participation in value co-creation in service sector using analytic hierarchy process shows" that clients provide useful information. Clients' information can guide the open innovation process because organizations may learn from them and improve products and services. Beyond client information sharing, there is knowledge dissemination between employees [37]. According to Oparaocha (2017) in "Towards building internal social network architecture that drives innovation: a social exchange theory perspective" employees' interaction through social media contribute to innovation, especially in geographically dispersed organizations [38]. Traditional and closed organizations face challenges to implement open innovation because the culture is very rigid. Based on these ideas, Nakagaki, Aber and Fetterhoff (2012) wrote, "The challenges in implementing open innovation in a global innovation-driven corporation." The authors (2012) explained that organizations need to modify their culture so that executives value knowledge [39]. Beyond traditional organizational culture, organizations need to face the not-invented-here (NIH) syndrome, as studied by Herzog and Leker (2010) in "Open and closed innovation - Different innovation cultures for different strategies" [40].

Van Der Meer (2007) in "Open innovation - the Dutch Treat: Challenges in thinking in business models" explains that open innovation is the third stage of innovation management.

Organizations must encourage open innovation culture to manage information successfully [41]. Open innovation is responsible for the success of the Dutch Industry. Beyond innovation management, business strategy must focus on flexibility, so that organizations can adapt to the market [42].

Business intelligence which is developed from a flexible strategy helps decision-making and organization competitiveness [42]. A flexible strategic management encourages partnership and values open innovation. Chesbrough and Schwartz (2007) in "Innovating business models with co-development partnerships" showed that open innovation depends on technological partnership and business models of organizations. Business models guide strategic management and the purpose of the organization. Hence, the authors reinforce the importance of strategy to implement open innovation [43].

Bican, Guderian and Ringbeck (2017) in the paper "Managing knowledge in open innovation processes: An intellectual property perspective" studied knowledge management of open innovation partnership. Organizations must use knowledge of intellectual property and they must collect individual knowledge at project and firm levels [44]. The partnership between organizations may occur through social media, as Gospel (2016) wrote in "Towards building internal social network architecture that drives innovation: A social exchange theory perspective." The knowledge of the relationships contributes to the sustainable development of open innovation culture in geographically spread organizations [45]. Based on that literature review, we state that open innovation creates information and knowledge between partners and organization [10[[37] [38]. The information encourages creativity that generates new knowledge and innovation. The competitive intelligence process must use the information that originated from relationships between customers, suppliers, universities, the government and research institutes. Competitive intelligence outlines better scenarios for the organization, and it may also prospect and monitor information between partners. The systematic literature review demonstrates that this paper is a potential topic for future researchers. Competitive intelligence selects appropriate information through the communication and transforms it into strategic knowledge. For open innovation to occur, the culture of valuing partnerships must guide the organization.

5. CONCLUSION

Few papers connect competitive intelligence and open innovation culture. There is a gap in the literature of research that studies both topics together. Therefore, researchers may study this topic and research it in practical contexts. Practical studies help to understand the topic in open organizations. Open innovation culture supporting competitive intelligence influences innovation and prospecting the market, in order to achieve competitiveness. The papers we chose for the systematic literature review discussed that open innovation culture occurs through information collection from employees, clients and partners of the organization. The organizations must face the challenges of implementing open innovation culture such as rigid culture, lack of managers' support and the not-invented-here syndrome. Open innovation must be part of strategic planning, so organizations must construct a relationship of trust with partners. We highlight the authors Calof, Richards and Santilli (2017) who studied the role of strategic management to business intelligence, encouraging organizations to become more flexible. Flexibility is fundamental to the development and practical implementation of open innovation culture. Narkhede (2017) explains that information is useful to construct knowledge. As a consequence, business innovate effectively. Open innovation allows partnerships between stakeholders. These stakeholders share information and support each other daily, so professionals can use that information to learn. Therefore, we encourage business to adopt an open innovation culture to encourage partnerships with other organizations. The information disseminated in open innovation environment may feed the competitive intelligence process. Competitive intelligence process helps managers, engineers and professionals to improve business performance and to make decisions strategically. This research is relevant because it identifies knowledge gaps about open innovation culture and competitive intelligence. We encourage studies about both of these topics for start-ups and small businesses, especially for organizations in the field of artificial intelligence technology. Artificial intelligence organizations need to share information and knowledge through open innovation in start-up accelerators.

ACKNOWLEDGEMENTS

The authors would like to thank the Coordenação de Aperfeiçoamento de Nível Superior (CAPES) and Conselho Nacional Científico e Tecnológico (CNPq).

REFERENCES

[1] Calof, J., Wright, S., Dishman, P. (2008), "Competitive intelligence: a multiphasic precedent to marketing strategy," European Journal of Marketing, Vol. 42 No. 7/8, pp. 766-785. https://doi.org/10.1108/03090560810877141 S. Zhang, C. Zhu, J. K. O. Sin, and P. K. T. Mok, "A novel ultrathin elevated channel low-temperature poly-Si TFT," IEEE Electron Device Lett., vol. 20, pp. 569–571, 2007.

[2] Bouthillier, F. Shearer, K. (2003). Assessing Competitive Intelligence Software: a guide to evaluate CI technology. New Jersey: Information Today, Inc.

[3] Kahaner, L. (1997). Competitive Intelligence: how to gather, analyze, and use information to move your business to the top. First Touchstone Edition: New York.

[4] Teixeira, T. M. C. (2014). Inteligência competitiva organizacional: um modelo apoiado nos comportamentos de busca, compartilhamento e uso de informação e de TIC. 2014. Tese (Doutorado em Ciência da Informação) - Programa de Pós-Graduação em Ciência da Informação, Faculdade de Filosofia e Ciências, Universidade Estadual Paulista, Marília..

[5] Valentim, M. L. P. et al. O processo de inteligência competitiva em organizações. DataGramaZero, Rio de Janeiro, vol. 4, No. 3,p pp. 1-23, 2004.

[6] Santos, V. C. B.; Santos, C. A.; Belluzzo, R. C. B. (2016). A competência em informação em articulação com a inteligência competitiva no apoio ao alinhamento estratégico das informações nas organizações. Perspectivas em Gestão & Conhecimento, João Pessoa, vol. 6, Special Number, pp. 45-60, jan. 2016.

[7] Calof, J., Richards, G., Smith, J. (2015). Foresight, Competitive Intelligence and Business Analytics — Tools for Making Industrial Programmes More Efficient. Foresight Russia, vol. 9, No. 1.

[8] Schwab, K. (2016). The fourth industrial revolution. Crown Business, New York.

[9] Motzer, P. L. H., Armellini, F., Solar-Pelletier, L. (2020). Change management in the context of the Fourth Industrial Revolution: An exploratory research using qualitative methods. The Journal of Modern Project Management, vol. 7, No. 4.

[10] Nestle, V. et. al. (2019). Establishing open innovation culture in cluster initiatives: The role of trust and information asymmetry. Technological Forecasting and Social Change, v.146, pp. 563-572.

[11] Silva, T. A., Woida, L. M. (2019). A influência dos elementos da cultura organizacional no ambiente profissional. Revista de Graduação, vol. 12, no. 1, pp. 63 – 78.

[12] Derwi, M. V. K., Darma, D. S. (2019). The Role of Marketing & Competitive Intelligence in Industrial Revolution 4.0. Jurnal Manajemen dan Bisnis, Vol. 16, No. 1.

[13] Vaitsman, H. S. Inteligência Empresarial: atacando e defendendo. Rio de Janeiro: Interciência, 2001.

[14] Souza, J. S. F. (2016). Teoria dos jogos aplicada à inteligência competitiva organizacional no âmbito da Ciência da Informação. Dissertação (Mestrado em Ciência da Informação) - Programa de Pós-Graduação em Ciência da Informação, Faculdade de Filosofia e Ciências, Universidade Estadual Paulista, Marília.

[15] Tarapanoff, K., Valentim, M. L. P., Álvares, L. (2016). Trajetórias terminológicas relacionadas à inteligência competitiva. In: V Seminario Hispano Brasileño de Investigación em Información, Documentacion y Sociedad, 2016. Anais [...]. Facultad Ciencias de la Documentación Universidad Complutense, España.

[16] Silva, E. et al. (2016). O processo de inteligência competitiva e sua relação com indicadores de inovação e competência em informação. Perspectivas em Gestão & Conhecimento, vol. 6.

[17] Tarapanoff, K. (2001). Referencial teórico: introdução. In: Tarapanoff, K. (Org.). Inteligência organizacional e competitiva. Brasília: Editora da Universidade de Brasília, pp. 265278.

[18] Pintro, S., Vianna, W. B., Varvakis, G. (2016). Inteligência Competitiva e Ciência da Informação: conexões epistemológicas para tomada de decisão nas organizações. Em Questão, vol. 22, No. 3, pp. 10-35.

[19] Valentim et. al. (2003). O processo de inteligência competitive nas organizações: dado, informação e conhecimento. DataGramaZero, Rio de Janeiro, v. 4, n. 3, p. 1-23.

[20] Kumar, et. al. (2019). Generating Competitive Intelligence with Limited Information: A Case of the Multimedia Industry. Productions and Operations Management, vol. 29, No. 1, pp. 192-213.

[21] Pereira, A. M.; Ramos, I. (2009). A Competitive Intelligence nas organizações Portuguesas: um breve estudo. Departamento se Sistemas de Informação; Escola de Engenharia; Universidade de Minho, Portugal.

[22] Murphy (2005). Competitive Intelligence: Gathering, Analyzing and Putting it to Work. Aldershot: Gower Publishing.

[23] Valentim, M. L. P., Souza, J. S. F. de. Fluxos de Informação que Subsidiam o Processo de Inteligência Competitiva. Encontros Bibli: revista eletrônica de biblioteconomia e ciência da informação, v. 18, n. 38, p. 87-106, set./dez., 2013.

[24] Tu, J. C., Zhang, X. Y., Chiu, S. P. (2020). Assessing the Impact of Cultural Intelligence on Sustainable Career Competitive Advantage for Students in College of Design. Sustainability, vol. 12, No. 1, pp. 10.H. Zhang, "Delay-insensitive networks," M.S. thesis, Univ. of Waterloo, Waterloo, ON, Canada, 1997.

[25] Nasri, W. (2012). Conceptual Model of Strategic Benefits of Competitive Intelligence Process. International Journal of Business and Commerce vol. 1, no. 6, pp. 25-35.

[26] Calof, J., Wright, S., Tanev, S. and Bailetti, T. (2008), "Competitive intelligence information and innovation in small Canadian firms," European Journal of Marketing, Vol. 42 No. 7/8, pp. 786-803. https://doi.org/10.1108/03090560810877150

[27] Organisation for Economic Co-operation and Development - OECD (2005). Oslo Manual. Available at: https://stats.oecd.org/glossary/detail.asp?ID=6865

[28] Chesbrough, H., Vanhaverbeke, W. & West, W. (2017). Novas fronteiras em inovação aberta. São Paulo: Blucher.

[29] Bitzer V., Bijman, J. (2015). From innovation to co-innovation? An exploration of African agrifood chains," British Food Journal, vol.117, No. 8, pp. 2182-2199.

[30] Chesbrough, H., Borges, M. (2017). Explicando a inovação aberta: esclarecendo esse paradigma emergente para o entendimento de inovação. In: Chesbrough, H., Vanhaverbeke, W. (2017). Novas fronteiras em inovação aberta. São Paulo: Blucher.

[31] *Vanhaverbeke, W., Cloodt, M. (2017). Teorias da empresa e inovação aberta. In: Chesbrough, H., Vanhaverbeke, W. (2017). Novas fronteiras em inovação aberta. São Paulo: Blucher.*

[32] *Índice Brasileiro de Geografia e Estatística (IBGE). (2016). Pesquisa em Inovação. http://biblioteca.ibge.gov.br/index.php/biblioteca-catalogo?view=detalhes&id=299007*

[33] *Lindegaard, S. A. (2011). A revolução da inovação aberta: princípios básicos, obstáculos e habilidades de liderança. São Paulo: Évora.*

[34] *Chesbrough, H. (2006). Modelo de Negócios Abertos. Porto Alegre: Artimed.*

[35] *Marconi, M. A., Lakatos, E. M. (2013). Técnicas de pesquisa. São Paulo: Atlas.*

[36] *Gil, A. C. (2002). Como elaborar projetos de pesquisa. 4.ed. São Paulo: Atlas.*

[37] *Hasan, N., Rahman, A.A. (2017). Ranking the factors that impact customers online participation in value co-creation in service sector using analytic hierarchy process. International Journal of Information Systems in the Service Sector, vol. 9, No. 1, pp. 37-53.*

[38] *Oparaocha, G.O. (2017). Towards building internal social network architecture that drives innovation: a social exchange theory perspective. Journal of Knowledge Management, vol. 20, No. 3, pp. 534-556.*

[39] *Nakagaki, P., Aber, J., Fetterhoff, T. (2012). The challenges in implementing open innovation in a global innovation-driven corporation. Research Technology Management, vol. 55, No. 4, pp. 32-38.*

[40] *Herzog, P., Leker, J. (2010). Open and closed innovation - Different innovation cultures for different strategies. International Journal of Technology Management, vol. 52, No. 3-4, pp. 322-343.*

[41] *Van Der Meer, H. (2007). Open innovation - the Dutch treat: Challenges in thinking in business models. Creativity and Innovation Management vol. 16, No. 2, pp. 192-202.*

[42] *Calof, J.; Richards, G.; e Santilli, P. (2017). Integration of business intelligence with corporate strategic management. Journal of Intelligence Studies in Businesses, v. 7, n. 3, pp. 62-73.*

[43] *Chesbrough, H.; Schwartz, K. (2007). Innovation business models with co-development partnerships. Research Technology Management, 50 (1) (2007), pp. 55-59*

[44] *Bican, P. M.; Guderian, C. C.; Ringbeck, A. (2017). Managing knowledge in open innovation processes: an intellectual property perspective. Journal of Knowledge Management, v. 21, n.6, pp 1384–1405.*

[45] *Oparaocha, G.O. (2016), "Towards building internal social network architecture that drives innovation: a social exchange theory perspective," Journal of Knowledge Management, v. 20 n. 3, pp. 534-556.*

[46] *Narkhede, B. E. (2017). "Advance manufacturing strategy and firm performance: An empirical study in a developing environment of small- and medium-sized firms," Benchmarking: An International Journal, v. 24 n. 1, pp. 62-101.*

[47] *Narkhede, B. E. (2017). Linkages in Advanced Manufacturing Strategy: A Literature Review. In: Management Association, I. (Eds.), Operations and Service Management: Concepts, Methodologies, Tools, and Applications (pp. 359-388). IGI Global. http://doi:10.4018/978-1-5225-3909-4.ch018*

[48] *Raut, R. D. (2019). Linking big data analytics and operational sustainability practices for sustainable business management. Journal of Cleaner Production, v. 224, pp. 10-24. https://doi.org/10.1016/j.jclepro.2019.03.181*

AUTHORS

Selma Leticia Capinzaiki Ottonicar, Ph.D. Candidate and Master's in Information Science at Sao Paulo State University (UNESP). Bachelor of Technology in Business Management at Faculdade de Tecnologia (FATEC)
Email: *selma.leticia@hotmail.com / selma.leticia@unesp.br.*

Marta Lígia Pomim Valentim, Professor, Information Science at Sao Paulo State University (UNESP),
Email: *valentim@valentim.pro.br.*

Luana Maia Woida, Professor, Information Science at Sao Paulo State University (UNESP), Responsible for the Business Management Technology Bachelor at Faculdade de Tecnologia (FATEC). Ph.D. and Master's in Information Science at Sao Paulo State University (UNESP). Bachelor in Business Administration at Universidade Estadual de Londrina (UEL), Brazil.
Email: *luana.woida@unesp.br / luanamwoida@yahoo.com.br*

Elaine da Silva, Professor, Information Science at Sao Paulo State University (UNESP), Ph.D. and Master's in Information Science at Sao Paulo State University (UNESP). Bachelor in Library and Information Science at Sao Paulo State University (UNESP).
Email: *elaine.silva1@unesp.br / elainesilva2108@hotmail.com*

Correspondence Author – Selma Leticia Capinzaiki Ottonicar, A. Hygino Muzzi Filho 737, Email: *Selma.leticia@hotmail.com / selma.leticia@unesp.br. + 55 14 3402-1300*