

Analysis of Business Intelligence Strategies in SMEs using Neural Networks

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Abstract

A documentary review was carried out on the production and publication of research papers related to the study of the variables Business Intelligence and Neural Networks. The purpose of the bibliometric analysis proposed in this document was to know the main characteristics of the volume of publications registered in the Scopus database during the period 2017-2022 by Latin American institutions, achieving the identification of 29 publications. The information provided by this platform was organized through graphs and figures, categorizing the information by Year of Publication, Country of Origin, Area of Knowledge and Type of Publication. Once these characteristics have been described, the position of different authors on the proposed topic is referenced through a qualitative analysis. Among the main findings made through this research, it is found that Brazil, with 11 publications, was the country with the highest scientific production registered in the name of authors affiliated with institutions of that nation. The Area of Knowledge that made the greatest contribution to the construction of bibliographic material related to the study of Business Intelligence in SMEs using neural networks was Computer Science with 23 published documents, and the most used Publication Type during the period indicated above were Conference Articles with 48% of the total scientific production.

Keywords: *Business Intelligence, Neural Networks, SMEs.*

1. Introduction

The commercial operations which are responsible for reflecting the market conditions between independent buyers and sellers, small and medium-sized enterprises also known by their acronym SMEs, this economic sector plays an important role in economic growth at a global level, contributing exponentially to the growth of the gross domestic product GDP supported by innovation, employment and substantial productivity gains. In order for these SMEs to actively compete in international and national markets, small and medium-sized enterprises must make important decisions based on data analysis, which is provided by the integration of business intelligence, as it has become a powerful tool that helps in the extraction and coding of millions of information data. which help in a valuable way in the collection and execution of good business decisions. Using the strategies offered by artificial intelligence allows SMEs to optimize their processes, with

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the purpose of improving commercial experiences between customers and companies and exponentially increasing sustainable growth.

In recent decades, the implementation of artificial intelligence, with an emphasis on neural networks, has led to a transformation in the implementation of business strategies that have changed the way business intelligence implemented by small and medium-sized companies can effectively obtain knowledge from a series of data sets automatically, allowing neural networks in subsets of learning to mitigate the use of the human brain allowing artificial intelligence to process and analyze much more complex data.

Small and medium-sized enterprises are the backbone of the economy of all countries since this economic sector substantially represents the employment of many citizens, contributes directly to the increase of the gross domestic product and the innovation and commercialization of production. In many cases, in order to emerge in a highly competitive business environment, small and medium-sized companies must focus on being able to keep up with the changing pace of markets, starting with innovation and the evolution of their business operations. Undoubtedly, decision-making based on quantitative statistics from a series of data has been promoted as the key to success and business intelligence is at the forefront of a new transformation system.

Artificial intelligence, together with neural networks, have substantially gained the field offered by business intelligence since it has the ability to process and analyze large amounts of data efficiently, allowing natural language which imitates and structures those functions of the human brain, which these neural networks with the interface of artificial intelligence can immediately identify patterns. To make commercial and market predictions capable of learning continuously, these advantages allow SMEs to have the flexibility and adaptability to be able to handle all types of data and thus be able to adapt to any changing environment.

The integration of neural networks into business intelligence strategies for SMEs requires careful execution and planning. This innovation process requires data preprocessing, model development, and continuous learning and improvement. However, as this technology continues to advance, SMEs can take advantage of the full potential offered by the implementation of neural networks in business strategies, as this sector faces much more constant challenges and complexities of an economy that is constantly evolving and transforming. For this reason, this article seeks to describe the main characteristics of the compendium of publications indexed in the Scopus database related to the variables Business Intelligence and Neural Networks, as well. Such as the description of the position of certain authors affiliated with institutions, during the period between 2017 and 2022.

2. General Objective

To analyze, from a bibliometric and bibliographic perspective, the preparation and publication of research papers in high-impact journals indexed in the Scopus database on the variables Business Intelligence and Neural Networks, during the period 2017-2022 by Latin American institutions.

3. Methodology

This article is carried out through a research with a mixed orientation that combines the quantitative and qualitative method.

On the one hand, a quantitative analysis of the information selected in Scopus is carried out under a bibliometric approach of the scientific production corresponding to the study of Business Intelligence and Neural Networks.

A qualitative perspective, examples of some research works published in the area of study mentioned above, based on a bibliographic approach that allows describing the position of different authors on the proposed topic. It is important to note that the entire search was carried out through Scopus, managing to establish the parameters referenced in Figure 1.

3.1. Methodological design

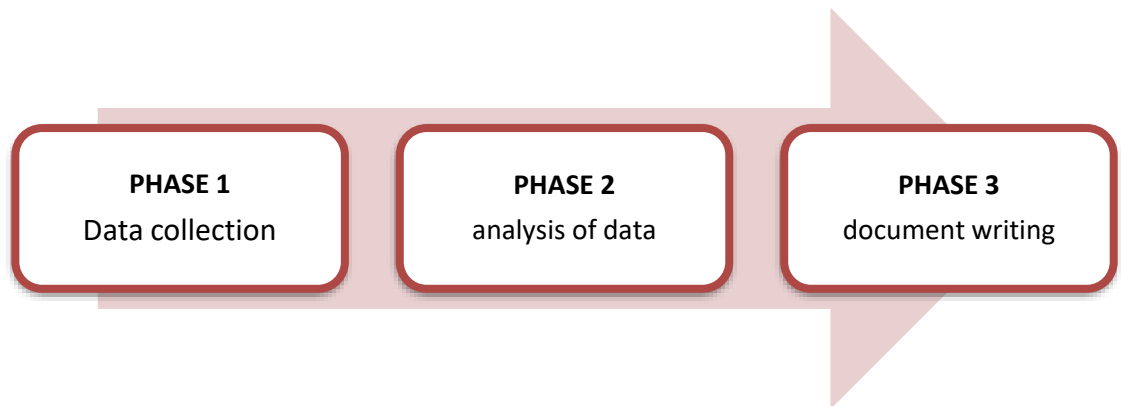


Figure 1. Methodological design

Source: Authors' own creation

3.1.1 Phase 1: Data collection

Data collection was carried out from the Search tool on the Scopus website, where 29 publications were obtained from the following filters:

TITLE-ABS-KEY (business AND intelligence, AND neural AND networks) AND PUBYEAR > 2016 AND PUBYEAR < 2023 AND (LIMIT-TO (AFFILCOUNTRY , "Brazil") OR LIMIT-TO (AFFILCOUNTRY , "Mexico") OR LIMIT-TO (AFFILCOUNTRY , "Ecuador") OR LIMIT-TO (AFFILCOUNTRY , "Colombia") OR LIMIT-TO (AFFILCOUNTRY , "Uruguay") OR LIMIT-TO (AFFILCOUNTRY , "Peru") OR LIMIT-TO (AFFILCOUNTRY , "Cuba")

- Published documents whose study variables are related to the study of Business Intelligence and Neural Networks.
- Limited to the years 2017-2022.
- Limited to Latin American countries.
- Without distinction of area of knowledge.
- No distinction of type of publication.

3.1.2 Phase 2: Construction of analytical material

The information collected in Scopus during the previous phase is organized and then classified by graphs, figures and tables as follows:

- Co-occurrence of words.
- Year of publication.
- Country of origin of the publication.
- Area of knowledge.
- Type of publication.

3.1.3 Phase 3: Drafting of conclusions and outcome document

In this phase, the results of the previous results are analysed, resulting in the determination of conclusions and, consequently, the obtaining of the final document.

4. Results

4.1 Co-occurrence of words

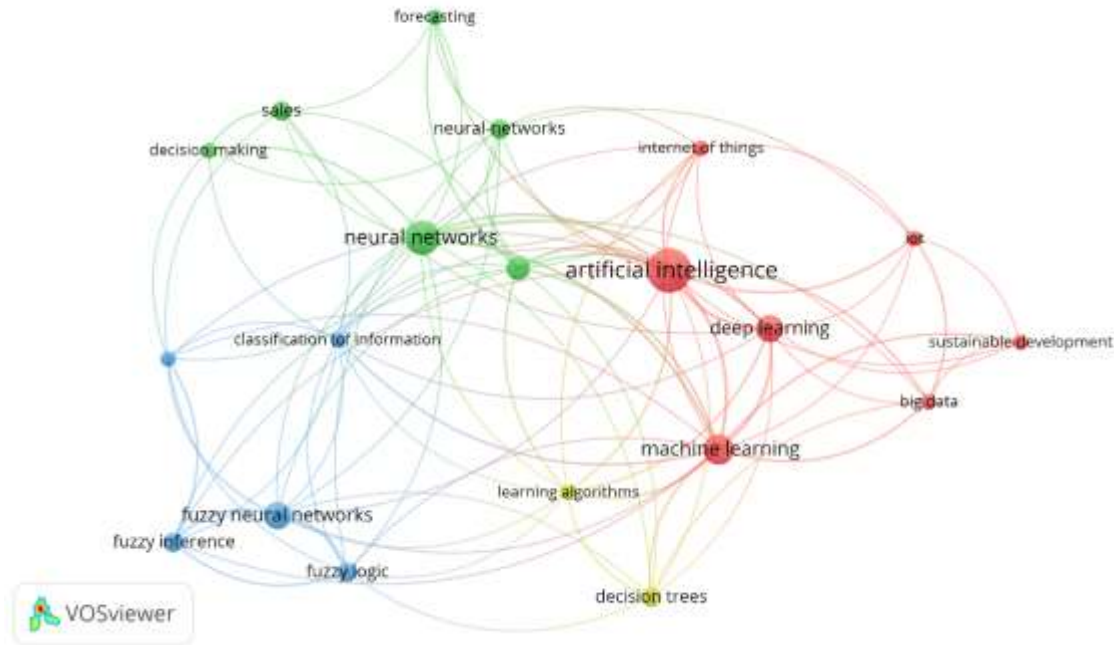


Figure 2. Co-occurrence of words

Source: Authors' own elaboration (2023); based on data exported from Scopus.

Artificial Intelligence was the most frequently used keyword within the studies identified through the execution of Phase 1 of the Methodological Design proposed for the development of this article. Deep Learning is among the most frequently used variables, associated with variables such as Machine Learning, Neural Networks, Information Classification, Decision Making, Big Data, Sustainable Development, Learning Algorithm. The use of neural networks in BI strategies for SMBs has numerous advantages, such as greater data accuracy, faster decision-making, better customer insights, and the ability to identify emerging trends. However, it also comes with its own set of challenges, including the need for trained data scientists and engineers, concerns about data privacy and security, and the potential for bias in AI models. Understanding these benefits and challenges is vital for SMBs considering adopting neural networks in their BI efforts. Business intelligence encompasses a variety of processes and technologies that are used to transform raw data into meaningful insights that inform strategic and operational decisions. BI tools collect, analyze, and visualize data, allowing organizations to monitor their performance, gain a deeper understanding of their customers, and identify trends and opportunities. For SMBs, BI is a powerful tool for resource optimization, cost reduction, and strategic growth.

4.2 Distribution of scientific production by year of publication

Figure 3 shows how scientific production is distributed according to the year of publication.

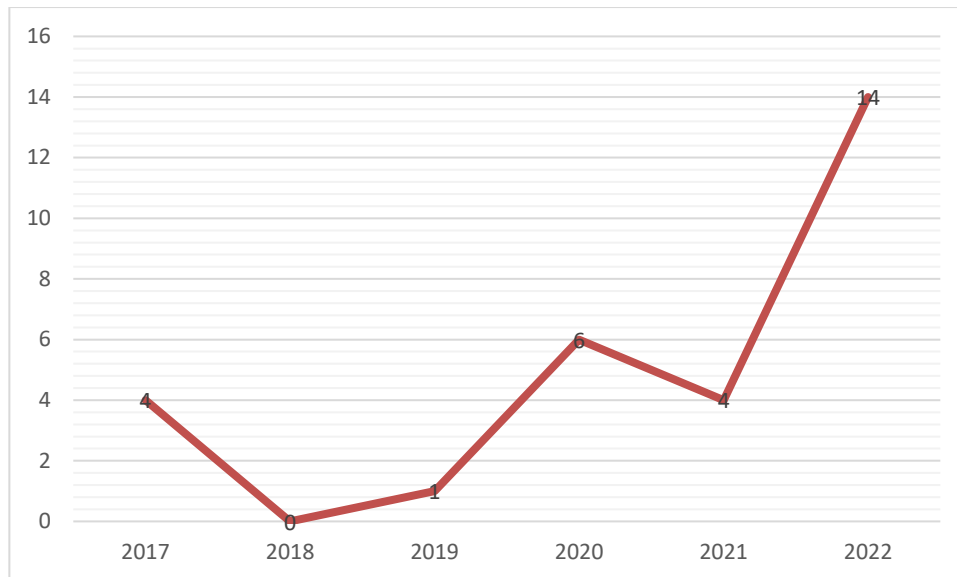


Figure 3. Distribution of scientific production by year of publication.

Source: Authors' own elaboration (2023); based on data exported from Scopus

Among the main characteristics evidenced through the distribution of scientific production by year of publication, the number of publications registered in Scopus was in 2022, reaching a total of 14 documents published in journals indexed on this platform. This can be explained thanks to articles such as the one entitled "Analysis of the Entrepreneurial Intentions of Mexican University Students Using an Artificial Neural Network to Promote Sustainable Business: An Interdisciplinary Perspective" This article shows an analysis of the patterns of entrepreneurship intentions in the short, medium and long term of Mexican university students. The analysis of entrepreneurship patterns was carried out using a personalized artificial neural network, considering as inputs the self-assessment of multiple intelligences from an interdisciplinary perspective. Therefore, many important findings reveal that not all multiple intelligences have a direct and proportional impact on business intent. In fact, linguistic-verbal intelligence, intrapersonal intelligence, and interpersonal intelligence are the types of intelligence that have the greatest influence on entrepreneurial intentions. In addition, the ANN's performance metrics for classifying business intents are higher than those reported in the literature (i.e., accuracy $\approx 99.29\%$, accuracy $\approx 98.89\%$, sensitivity $\approx 99.53\%$, and specificity $\approx 99.01\%$). The article contributes to the literature on the deep understanding of entrepreneurs' behavior in relation to the strengths and weaknesses of their multiple intelligences. In addition, this interdisciplinary empirical work contributes to improving the design of methods and techniques to strengthen entrepreneurship from the early stages of students' lives and promote sustainable business. (López-Leyva, 2022)

4.3 Distribution of scientific output by country of origin

Figure 4 shows how scientific production is distributed according to the country of origin of the institutions to which the authors are affiliated.

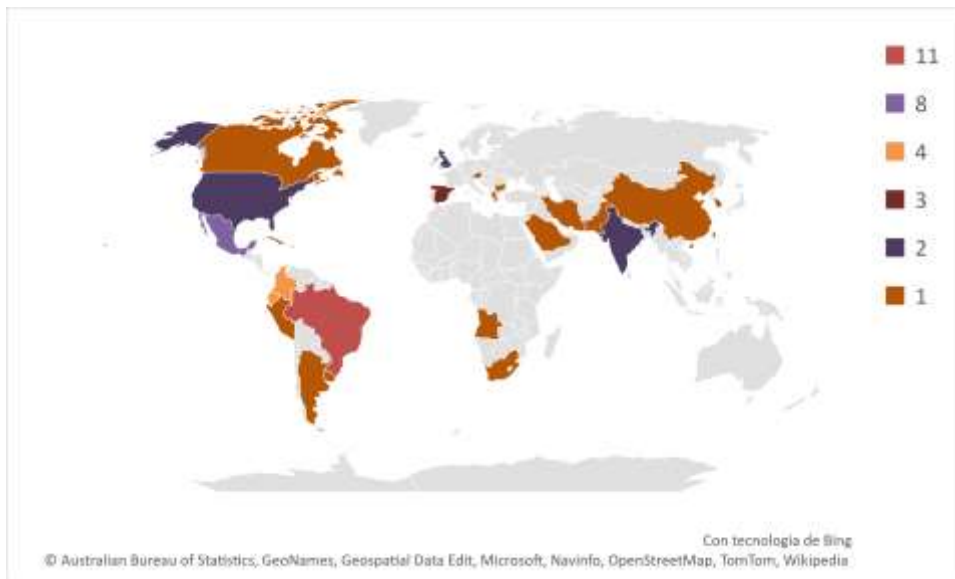


Figure 4. Distribution of scientific production by country of origin.

Source: Authors' own elaboration (2023); based on data provided by Scopus.

Within the distribution of scientific production by country of origin, the registrations from institutions were taken into account, establishing Brazil as the country of this community, with the highest number of publications indexed in Scopus during the period 2017-2022, with a total of 11 publications in total. In second place, Mexico with 8 scientific papers, and Colombia occupying the third place presenting to the scientific community, with a total of 4 documents among which is the article entitled "A framework for the analytical process and mapping of big data: baprom: description of an application in an industrial environment" this article aims to present an application of a framework for the mapping and analytical process of Big Data (BAProM) It consists of four modules: Process Mapping, Data Management, Data Analysis, and Predictive Modeling. The framework was conceived as a decision-support tool for industrial companies, encompassing the entire big data analytical process. The first module incorporates a mapping of processes and variables into big data analytics, something not common in this type of process. This is a proposal that proved appropriate in the practical application that was developed. Next, an analytical workbench was implemented for data management and exploratory analysis (Modules 2 and 3) and, finally, in Module 4, the implementation of artificial intelligence algorithms that support predictive processes. The modules are adaptable to different types of industry and problems and can be applied independently. The paper presents a real-world application that seeks as its ultimate goal the implementation of a predictive maintenance decision support tool in a hydroelectric power plant. Process mapping at the plant identified four subsystems and 100 variables. With the support of the analytical workbench, all variables have been properly analyzed. All of them went through a cleaning process and many had to be transformed, before being subjected to exploratory analyses. A predictive model, based on a decision tree (DT), was implemented for predictive maintenance of equipment, identifying critical variables that define the imminence of an equipment failure. This DT model was combined with a time-series forecasting model, based on artificial neural networks, to project those critical variables for a future time. The real-world application showed the practical feasibility of the framework, in particular the effectiveness of the analytical workbench, for pre-processing and exploratory analysis, as well as the combined predictive model, demonstrating its effectiveness in providing insights into future events leading to equipment failures. (De Carvalho Chrysostomo, 2020)

4.4 Distribution of scientific production by area of knowledge

Figure 5 shows the distribution of the elaboration of scientific publications based on the area of knowledge through which the different research methodologies are implemented.

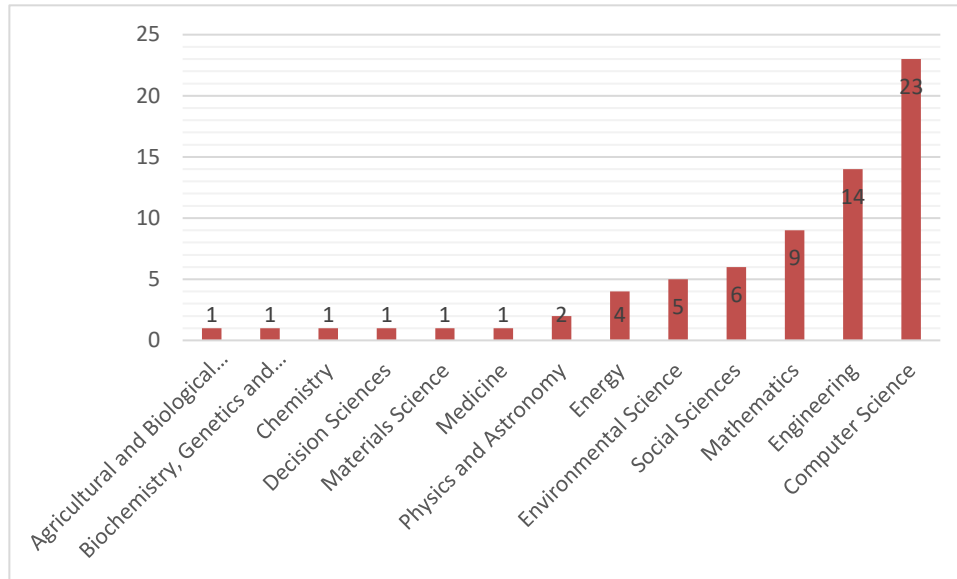


Figure 5. Distribution of scientific production by area of knowledge.

Source: Authors' own elaboration (2023); based on data provided by Scopus

Computer Science was the area of knowledge with the highest number of publications registered in Scopus with a total of 23 documents that have been based on its Business Intelligence and Neural Networks methodologies. In second place, Engineering with 14 articles and Mathematical Sciences in third place with 9. The above can be explained thanks to the contribution and study of different branches, the article with the greatest impact was registered by Computer Science entitled "A process for the evaluation of human resources performance using computational intelligence: an approach that uses a combination of rule-based classifiers and supervised learning algorithms" This article proposes a process for the evaluation of human resources performance using Computational intelligence. Human resources (or employee) performance appraisal is essentially a periodic evaluation and review of an employee's performance at work. This assessment can be done in different ways, depending on the employee's type of work and the company's policy or business area. The process proposed in this research combines fuzzy logic, textual sentiment analysis, and supervised learning classification techniques, such as a multi-layered perceptron artificial neural network, decision tree algorithms, and naïve bayes into set classifiers, in an attempt to provide a fair evaluation process, minimizing or even eliminating common problems caused by simple objective or subjective approaches. The data provided for this research emerged from several evaluations applied in two Brazilian institutions. The results of the simulation show consistency in the data generated by this proposed process, which indicates a good outlook for applications in companies in most business areas. (De Oliveira Goes, 2020)

4.5 Type of publication

In the following graph, you will see the distribution of the bibliographic finding according to the type of publication made by each of the authors found in Scopus.

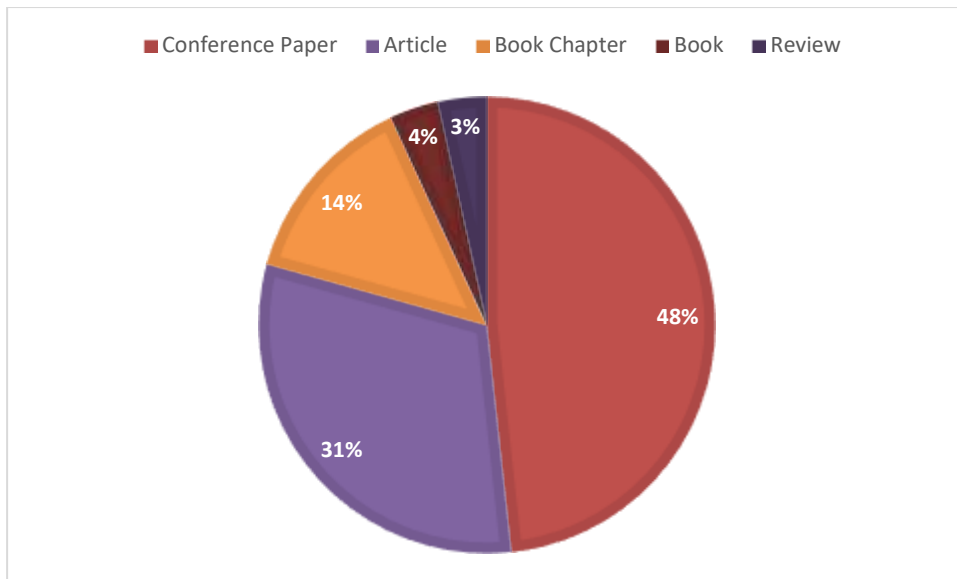


Figure 6. Type of publication.

Source: Authors' own elaboration (2023); based on data provided by Scopus.

The type of publication most frequently used by the researchers referenced in the body of this document was the one entitled Session Paper with 48% of the total production identified for analysis, followed by Journal Articles with 31%. Chapter of the Book are part of this classification, representing 14% of the research papers published during the period 2017-2022, in journals indexed in Scopus. In the latter category, the one entitled "Simplifying credit scoring rules using LVQ + PSO" stands out. This article presents an alternative method that is capable of generating rules that work not only with numeric attributes but also with nominal attributes. The key feature of this method, called vector quantification learning and particle swarm optimization (LVQ + PSO), is the finding of a reduced set of classification rules. This is possible thanks to the combination of a competitive neural network with an optimization technique. Findings: These rules constitute a predictive model for credit risk approval. The small number of rules makes this method useful for credit counselors who want to make decisions about granting credit. It could also act as a guide for the borrower's self-assessment of their creditworthiness. Limitations/implications of the research: Despite the fact that the tests performed showed no evidence of dependence between the results and the initial size of the LVQ network, it is considered desirable to repeat the measurements using a minimum size LVQ network and a variable population version. PSO to properly explore the solution space in the future. Practical implications: In recent decades, there has been an increase in consumer credit. Retail banking is a growing industry. Not only has there been a boom in credit card memberships, especially in emerging economies, but also an increase in small consumer credit. (Lanzarini, 2017)

5. Conclusions

Through the bibliometric analysis carried out in this research work, it was possible to establish that Brazil was the country with the highest number of published records for the variables Business Intelligence and Neural Networks. With a total of 11 publications in the Scopus database. In the same way, it was established that the application of theories framed in the area of Computer Science, were used more frequently in the comprehensive exploration of business intelligence and neural networks in SMEs lays the foundations to understand their transformative impact and the opportunities and challenges they bring to these vital economic actors. Neural networks provide SMEs with the ability to process and analyze countless amounts of data, providing valuable information that companies

can execute by favoring their competencies in the international market that are constantly changing and a volatility in their financial and commercial behavior. Therefore, by being able to efficiently take advantage of the advantages of artificial intelligence and machine learning, this economic sector with a great impact on the economy around the world can make much more accurate decisions, allowing it to identify opportunities for growth more efficiently and seek to optimize its internal operations. This not only helps reduce business costs, improve productivity, but also gain a competitive advantage in a vast, ever-evolving business environment. It is worth mentioning that the implementation of business intelligence strategies based on neural networks can facilitate predictive analysis, allowing SMEs to anticipate future market dynamics and adapt their strategies accordingly. These strategies enable greater profitability and business resilience in the face of trade uncertainty caused by trade and economic instability and adapt quickly to changing consumer preferences.

However, it is essential to recognize that embracing these new trends offered by neural networks in SMEs comes with challenges such as initial setup costs, data quality, and the need for specialized expertise. Therefore, SMBs should carefully consider their specific needs and available resources before embarking on the journey of integrating neural networks into their business intelligence strategies. When successfully addressing these challenges, the advantages of being able to implement these business intelligences allow for economic growth and sustainable success with greater commercial profitability.

References

- Ballesteros-López, L., Peñaherrera-Zambrano, S., Armas-Arias, S., & López-Pérez, S. (2021). Web 2.0 Digital Marketing Tools in the Ecuadorian Tourism Sector Against of the COVID-19 Pandemic. *Lecture Notes in Networks and Systems* Volume 411 LNNS, Pages 615 - 626 2022 14th International Conference on Interactive Mobile Communication, Technologies and Learning, IMCL 2021 Virtual, Online 4 November 2021 through 5 November 2021 Code 276629.
- De Carvalho Chrysostomo, G. G. (2020). A framework for the analytical process and mapping of big data: baprom: description of an application in an industrial environment. Brazil.
- De Oliveira Goes, A. S. (2020). A process for evaluating human resource performance using computational intelligence: an approach that uses a combination of rule-based classifiers and supervised learning algorithms. BRAZIL.
- Han, H., Xiong, J., & Zhao, K. (2022). Digital inclusion in social media marketing adoption: the role of product suitability in the agriculture sector. *Information Systems and e-Business Management*, 657 - 683.
- Lanzarini, L. C. (2017). Simplifying credit scoring rules using LVQ + PSO. Argentina, Ecuador .
- López-Leyva, J. A.-C.-G.-G.-I. (2022). Analysis of the Entrepreneurship Intentions of Mexican University Students Using an Artificial Neural Network to Promote Sustainable Business: An Interdisciplinary Perspective. MEXICO.
- Sombultawee, K., & Wattanatorn, W. (2022). Management of social selling and B2B customer-brand engagement: Is direct selling on social media good for your brand and relationships? *Electronic Commerce Research and Applications*.
- Ballesteros-López, L., Peñaherrera-Zambrano, S., Armas-Arias, S., & López-Pérez, S. (2021). Web 2.0 Digital Marketing Tools in the Ecuadorian Tourism Sector Against of the COVID-19 Pandemic. *Lecture Notes in Networks and Systems* Volume 411 LNNS, Pages 615 - 626 2022 14th International Conference on Interactive Mobile Communication, Technologies and Learning, IMCL 2021 Virtual, Online 4 November 2021 through 5 November 2021 Code 276629.
- Han, H., Xiong, J., & Zhao, K. (2022). Digital inclusion in social media marketing adoption: the role of product suitability in the agriculture sector. *Information Systems and e-Business Management*, 657 - 683.

- Sombultawee, K., & Wattanatorn, W. (2022). Management of social selling and B2B customer-brand engagement: Is direct selling on social media good for your brand and relationships? *Electronic Commerce Research and Applications*.
- Akel, G. (2020). Management and marketing events in a digital era: Opportunities and challenges. *Impact of ICTs on event management and marketing* (pp. 105-122) doi:10.4018/978-1-7998-4954-4.ch007 Retrieved from www.scopus.com
- Akinboade, O. A., Taft, T., Weber, J. F., Manoko, O. B., & Molobi, V. S. (2022). Correlates of access to ICT and food security of the poor in south Africa's soshanguve. *GeoJournal*, 87(6), 5165-5178. doi:10.1007/S10708-021-10550-Y
- Alalwan, A. A., Baabdullah, A. M., Dwivedi, Y. K., Rana, N. P., Lal, B., & Raman, R. (2021). Et-moone and marketing relationship governance: The effect of digital transformation and ICT during the COVID-19 pandemic. *Industrial Marketing Management*, 98, 241-254. doi:10.1016/j.indmarman.2021.09.001
- Andion, J. L. Z. (2019). Engagement and new narratives in the design of the digital communication. [Engagement and New Narratives in Digital Communication Design] *Studies on the Journalistic Message*, 25(2), 1249-1261. doi:10.5209/esmp.64836
- Aramendia, G. Z., Ruíz, E. C., & Nieto, C. H. (2021). Digitalization of the wine tourism experience: A literature review and practical applications. [The Digitization of the Wine Tourism Experience: A Review of the Literature and Practical Applications] *Doxa Communication*, (33), 257-283. doi:10.31921/doxacom.n33a930
- Armas-Arias, S., González-Sánchez, A., Monge-Martínez, J., & Infante-Paredes, R. (2022). Web 2.0 education tools as support in digital marketing: Tungurahua case study doi:10.1007/978-3-030-96296-8_96 Retrieved from www.scopus.com
- Arteaga Cisneros, J. P., Coronel Pérez, V. C., & Acosta Véliz, M. M. (2018). Marketing's influence in the PYME's development in ecuador. [Influence of digital marketing on the development of MSMEs in Ecuador] *Spaces*, 39(47) Retrieved from www.scopus.com
- Bakar, M. S. A., Hassan, S., Ta'a, A., Yasin, A., Sheng, A. J., Suhaimi, S., & Yin, K. Y. (2020). Identify entrepreneurial opportunity by mining data from social media. *International Journal of Advanced Science and Technology*, 29(6 Special Issue), 1778-1782. Retrieved from www.scopus.com
- Ballesteros-López, L., Peñaherrera-Zambrano, S., Armas-Arias, S., & López-Pérez, S. (2022). Web 2.0 digital marketing tools in the ecuadorian tourism sector against of the COVID-19 pandemic doi:10.1007/978-3-030-96296-8_55 Retrieved from www.scopus.com
- Bismo, A., Putra, S., & Melysa. (2019). Application of digital marketing (social media and email marketing) and its impact on customer engagement in purchase intention: A case study at PT. Soltius Indonesia. Paper presented at the Proceedings of 2019 International Conference on Information Management and Technology, ICIMTech 2019, 109-114. doi:10.1109/ICIMTech.2019.8843763 Retrieved from www.scopus.com
- Bisoi, S., Roy, M., & Samal, A. (2020). Impact of artificial intelligence in the hospitality industry. *International Journal of Advanced Science and Technology*, 29(5), 4265-4276. Retrieved from www.scopus.com
- Bochert, R., Cismaru, L., & Foris, D. (2017). Connecting the members of generation Y to destination brands: A case study of the CUBIS project. *Sustainability (Switzerland)*, 9(7) doi:10.3390/su9071197
- Bossey, A. (2020). Accessibility all areas? UK live music industry perceptions of current practice and information and communication technology improvements to accessibility for music festival attendees who are deaf or disabled. *International Journal of Event and Festival Management*, 11(1), 6-25. doi:10.1108/IJEFM-03-2019-0022
- Calabretta, G., & Kleinsmann, M. (2017). Technology-driven evolution of design practices: Envisioning the role of design in the digital era. *Journal of Marketing Management*, 33(3-4), 292-304. doi:10.1080/0267257X.2017.1284436

- Caputo, F., Fiano, F., Riso, T., Romano, M., & Maalaoui, A. (2022). Digital platforms and international performance of Italian SMEs: An exploitation-based overview. *International Marketing Review*, 39(3), 568-585. doi:10.1108/IMR-02-2021-0102
- Carvalho, S., & Carvalho, J. V. (2020). The implications of digital marketing and e-commerce in the tourism sector growth doi:10.1007/978-981-15-2024-2_15 Retrieved from www.scopus.com
- Castro, J. P. (2018). Transmedia literacy and its repercussions on the academic use of the internet. Paper presented at the Iberian Conference on Information Systems and Technologies, CISTI, , 2018-June 1-5. doi:10.23919/CISTI.2018.8399363 Retrieved from www.scopus.com
- Chandra, P., Ahmed, S. I., & Pal, J. (2017). Market practices and the bazaar: Technology consumption in ICT markets in the global south. Paper presented at the Conference on Human Factors in Computing Systems - Proceedings, , 2017-May 4741-4752. doi:10.1145/3025453.3025970 Retrieved from www.scopus.com
- Chaudhary, S., & Suri, P. K. (2022). A multivariate analysis of agricultural electronic trading adoption. *Journal of Scientific and Industrial Research*, 81(9), 932-939. doi:10.56042/JSIR.V81I09.59538
- Chaudhuri, S. (2018). Application of web-based geographical information system (GIS) in e-business. *Digital marketing and consumer engagement: Concepts, methodologies, tools, and applications* (pp. 649-665) doi:10.4018/978-1-5225-5187-4.ch033 Retrieved from www.scopus.com
- Cheuk, S. C. -, Atang, A., Lo, M. -, & Ramayah, T. (2017). Community perceptions on the usage of digital marketing for homestays: The case of ba'kelalan, Malaysia. *International Journal of Business and Society*, 18(S4), 775-782. Retrieved from www.scopus.com
- Cowan, K., Ketron, S., & Kostyk, A. (2020). Using virtual reality to enhance brand experiences: An abstract doi:10.1007/978-3-030-42545-6_185 Retrieved from www.scopus.com
- Cunha, M., Correia, R., & Carvalho, A. (2021). The potential of digital marketing in the promotion of low-density territories: The case study of mirandela municipality doi:10.1007/978-3-030-90241-4_53 Retrieved from www.scopus.com
- da Silva-Pina, A. J., Hernández-Mogollón, J. M., & Campón-Cerro, A. M. (2018). Tourism destination management organization website usability: A qualitative evaluation model. [A Usabilidade de um website de uma Organização de Gestão de um Destino Turístico (DMO): Um modelo de avaliação qualitativa] *Revista Portuguesa de estudos regionais*, (49), 23-40. Retrieved from www.scopus.com
- Das, D. K. (2021). Revitalising south african city centres through ICT. *Urban Planning*, 6(4), 228-241. doi:10.17645/up.v6i4.4381
- Daud, A., Farida, N., Andriyansah, & Razak, M. (2018). Impact of customer trust toward loyalty: The mediating role of perceived usefulness and satisfaction. *Journal of Business and Retail Management Research*, 13(2), 235-242. doi:10.24052/JBRMR/V13IS02/ART-21
- de la Calle, A., Freije, I., Ugarte, J. V., & Larrinaga, M. Á. (2020). Measuring the impact of digital capabilities on product-service innovation in Spanish industries. *International Journal of Business Environment*, 11(3), 254-274. doi:10.1504/IJBE.2020.110904
- Del Vacchio, E., Gargiulo, R., & Bifulco, F. (2020). Digital communication and museum experience. A multichannel approach. *Micro and Macro Marketing*, 29(3), 513-533. doi:10.1431/98620
- Demydov, I., Baydoun, N. A., Beshley, M., Klymash, M., & Panchenko, O. (2020). Development of basic concept of ICT platforms deployment strategy for social media marketing considering tectonic theory. *EUREKA, Physics and Engineering*, 2020(1), 18-33. doi:10.21303/2461-4262.2020.001101
- Deora, M. S. (2019). A perception of ICT and social media for online purchasing trends. Paper presented at the Proceedings of the 2nd World Conference on Smart Trends in Systems, Security and Sustainability, WorldS4 2018, 16-21. doi:10.1109/WorldS4.2018.8611590 Retrieved from www.scopus.com

- Dong, S., Yang, L., Shao, X., Zhong, Y., Li, Y., & Qiao, P. (2021). How can channel information strategy promote sales by combining ICT and blockchain? evidence from the agricultural sector. *Journal of Cleaner Production*, 299 doi:10.1016/j.jclepro.2021.126857
- Drozdowska, M., & Duda-Seifert, M. (2018). The most popular cultural tourist attractions in poland and the czech republic and their digital communication with customers (B2c). Paper presented at the Proceedings of the International Conference on Tourism Research, 31-40. Retrieved from www.scopus.com
- Dubovik, M. V., Novikova, E. S., & Sigarev, A. V. (2018). The role of information communications technology in the development of companies' business strategies: The russian experience. *International Journal of Civil Engineering and Technology*, 9(10), 1131-1139. Retrieved from www.scopus.com
- Duffett, R., Petroşanu, D. -, Negricea, I. -, & Edu, T. (2019). Effect of YouTube marketing communication on converting brand liking into preference among millennials regarding brands in general and sustainable offers in particular. Evidence from South Africa and Romania. *Sustainability (Switzerland)*, 11(3) doi:10.3390/su11030604
- Dzbor, M., Tapak, J., Rabatin, P., & Hrusovsky, T. (2017). From school-company collaboration on educating students to a structured career development system. Paper presented at the ICETA 2017 - 15th IEEE International Conference on Emerging eLearning Technologies and Applications, Proceedings, doi:10.1109/ICETA.2017.8102481 Retrieved from www.scopus.com
- Fauzi, T. H., Harits, B., Danial, R. D. M., & Komariah, K. (2020). Adaptive strategies of external environmental effects in digital entrepreneurship in the strategic management perspective. *Academic Journal of Interdisciplinary Studies*, 9(3), 38-45. doi:10.36941/ajis-2020-0040
- Fernandes, J., Martins, J., Teixeira, M. S., Branco, F., Gonçalves, R., Au-Yong-Oliveira, M., & Moreira, F. (2018). Incorporating innovative ICT in child-oriented marketing - A retail sector case study. Paper presented at the Proceedings of the European Conference on Innovation and Entrepreneurship, ECIE, , 2018-September 1006-1014. Retrieved from www.scopus.com
- Fernández-Ges, A. (2018). The rise of mixed-use urban developments and digital districts. *Urban visions: From planning culture to landscape urbanism* (pp. 217-226) doi:10.1007/978-3-319-59047-9_21 Retrieved from www.scopus.com
- Garcia, S. C., Garcia, D. A., & Blanco, T. P. (2017). Practices, skills and trends in digital advertising. the perspective of Spanish advertisers. [Practices, Competencies and Trends in Digital Advertising Communication: A View from the Perspective of Spanish Advertisers] *Latin Journal of Social Communication*, 72, 1648-1669. doi:10.4185/RLCS-2017-1239
- Gaur, S., Sahu, H., & Singh, K. (2020). ICT-enabled business promotion approach through search engine optimization doi:10.1007/978-981-32-9343-4_39 Retrieved from www.scopus.com
- Gaur, S., Sharma, L., & Pandya, D. D. (2019). A perception of ICT for social media marketing in india doi:10.1007/978-981-13-7150-9_52 Retrieved from www.scopus.com
- Giotopoulos, I., Kontolaimou, A., & Tsakanikas, A. (2022). Digital responses of SMEs to the COVID-19 crisis. *International Journal of Entrepreneurial Behaviour and Research*, 28(7), 1751-1772. doi:10.1108/IJEER-11-2021-0924
- Gössling, S. (2021). Tourism, technology and ICT: A critical review of affordances and concessions. *Journal of Sustainable Tourism*, 29(5), 733-750. doi:10.1080/09669582.2021.1873353