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Research Article

Confirmatory Factor Analysis on the Formation of Intellectual Capital and Entrepreneurship based on Artificial Intelligence

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Abstract

Artificial Intelligence has emerged as a system for the formation of intellectual capital and entrepreneurship. In this sense, a review of the impact of AI on scientific and technological information systems will allow establishing the axes and topics of discussion of the research agenda. A documentary, transversal, exploratory and retrospective study was carried out with a sample of 130 students selected for their affiliation to a university committed to the implementation of AI. The results show the prevalence of dimensions related to training and entrepreneurship based on AI.

Keywords: intellectual capital: vocational training: knowledge management: artificial intelligence

Introduction

The history of artificial intelligence (AI) and its influence on libraries dates back several decades. The first theoretical works on AI emerged in this period, with figures such as Alan Turing and John von Neumann (Johnson, 2019). Largely theoretical at the time, they laid the groundwork for the future development of AI. During this time, the first natural language processing (NLP) systems were developed. Although they were rudimentary compared to today's capabilities, they laid the groundwork for future information search and retrieval applications in libraries (Ponsford, 2018).

Significant advances were made in areas such as fuzzy logic, neural networks, and expert systems (Pradhan & Mishra, 2020). These advances laid the groundwork for the development of recommendation systems and automated classification systems that would later be useful to libraries. The rise of the Internet and the World Wide Web radically changed the way libraries managed information and resources (Sadiq, 2021). Increasingly sophisticated search engines emerged, and libraries began digitizing their collections and creating online catalogs. AI began to play a larger role in information searching and retrieval in digital libraries.

AI has become more ubiquitous in libraries, with the adoption of advanced recommendation systems, chatbots for virtual reference services, and data analytics tools to better understand user needs and improve collection management (Yoon & Park, 2020). AI is also used in the preservation and conservation of library materials, with optical character recognition (OCR) tools and digital restoration techniques.

However, the impact of AI on libraries has also been considered as an effect of dependence on technology, devices and socio-digital networks on Internet users who will eventually be users of some information reservoir.

Libraries can be conceptualized based on their functions and their perspective regarding the impact of Artificial Intelligence on them. In this way, the taxonomy can range from newspaper libraries to art galleries.

The taxonomy of information source reservoirs and databases is due to the impact of the publishing industry and the information industry (Rupp-Serrano & Olendorf, 2020). In this sense, from content to collaborative networks, they distinguish the type of relationship between industries and spaces for preservation and public consultation.

The taxonomy and the industries that define it foster a structure of actors in the information reservoir process (see Table 1). In this sense, the reservoirs had been structured according to their relationship with the industry, but the emergence of Artificial Intelligence (AI) modified the sequences of the information preservation and dissemination processes (Conner, 2019).

More specifically, knowledge management systems such as infodiversity and plurality reflected the impact of industries in their globalized management of knowledge production and dissemination.

In this context of interaction between the industrial publishing economy and information regarding the administration of local reservoirs, AI emerges as a determinant of new systems of management, preservation and dissemination of information (Wang, 2020). It will be in the field of intellectual and academic dissemination where AI will have its applicability.

AI has a growing penetration in the repositories and disseminators of academic, scientific and technological information (Nasir, 2019). In this process, its importance ranges from the speed in searching for information to the interpretation of data trends regarding their impact on the repositories (Bracke, 2020). In this sense, the literature review suggests that the future of libraries lies in AI as a backup of information that AI has already selected

and processed to disseminate it to users who make decisions regarding need or expectation. Therefore, AI depends on the adoption that users show if they find it useful. Or, the ease of access to AI will determine the capacity of the repositories as consultants.

Therefore, the objective of this paper will be to review the impact of AI on reservoirs in order to open discussion on the validity of its importance in a scenario of increasing diffusion and storage of information in the face of limitations in search, selection, analysis, synthesis and criticism capabilities of the information available in the reservoirs.

Are there significant differences between reservoirs according to the degree of influence of AI on their processes, functions and prospects?

The premise guiding this work indicates that AI has an asymmetric impact on reservoirs based on their investment capacities to update their search, storage, cataloging, dissemination and preservation structure.

Method

Design. A cross-sectional, exploratory and retrospective study was conducted with a sample of 130 students selected for their affiliation to a Higher Education Institution committed to training based on Artificial Intelligence.

Instrument. The Intellectual Capital Formation and Traditional and AI-based Entrepreneurship Scale was used (see Annex A). It includes: 1) Intellectual Capital; Skills Formation, Knowledge Transfer, Innovation and Creativity. 2) Traditional Entrepreneurship; Identification of Business Opportunities, Management of Tangible Resources and Traditional Market Strategies. 3) AI-Based Entrepreneurship; Use of AI Technology, Adaptability to Technological Changes, Generation of Value through Disruptive Innovation. 4) Strategic Decisions; Risk and Benefit Analysis, Socio-Economic Impact Assessment and Prioritization of Objectives. The reliability of the general scales was 0.768 and 0.798 respectively. The subscales ranged between 0.762 and 0.784 with a significant sample adequacy and sphericity, and the validity reached values between 0.324 and 0.657.

Procedure. Students were contacted through their institutional email. A letter of informed consent was attached and the objectives and functions of the project managers were explained to them, as well as the non-remuneration for their participation. Students were surveyed at their university facilities.

Analysis. The data were captured in Excel and processed in Google Colab (see Appendix B). The coefficients of reliability, adequacy, sphericity, validity, adjustment and residual were estimated in order to contrast the hypothesis regarding significant differences between decisions based on academic and entrepreneurial training with respect to decisions based on Artificial Intelligence.

Results

The analysis of covariances suggests the impact of factors and indicators not included in the model. The results suggest a significant relationship between traditional entrepreneurship and intellectual capital, as well as areas of opportunity in the other relationships that involve the inclusion of other factors and indicators that would increase the percentage of total variance explained.

Confirmatory factor analysis suggests the convergence of indicators on common factors. The results demonstrate the prevalence of two factors, one of first order related to AI-based entrepreneurship and another of second order related to AI-based entrepreneurial training.

The fit and residual values [x2 = 63.088 (14 gl) $p < 0.001$; CFI = 0.902; IFI = 0.903; RNI = 0.902; GFI = 0.998; MFI = 0.936; RMSEA = 0.097; SRMR = =.053] suggest the non-rejection of the hypothesis regarding significant differences between the theoretical structure of traditional training and entrepreneurship with respect to AI-based training and entrepreneurship.

Discussion

The contribution of this work to the state of the art lies in the confirmation of a factorial structure related to AI-based entrepreneurial training. The results suggest that the factorial structure explained AI-based entrepreneurship.

In recent years, there has been a significant influx of capital into AI-focused startups, highlighting the growing importance of intellectual property in this sector. Entrepreneurs in the AI and ML space are increasingly focusing on knowledge related to security, data privacy, and intellectual property laws to protect their innovations.

The World Bank highlights the role of artificial intelligence in improving the human capital stock and lessons learned from the Entrepreneur Marathon. Protecting intellectual property is crucial for technology developers creating AI tools, with strategies such as incorporating watermarks highlighted as essential. Improving commercial protection of intellectual property rights is seen as a positive development for entrepreneurial opportunities, especially in the context of artificial intelligence. Additionally, access to capital, education and digital resources are key components to empowering women entrepreneurs.

Entrepreneurial pedagogy plays an important role in developing founding teams, with a particular focus on social and human capital among nascent entrepreneurs. Governments can foster entrepreneurship by addressing challenges related to access to capital, streamlining business registration processes, and protecting intellectual property rights. Artificial intelligence is seen as a technology that complements human ingenuity rather than replacing it, allowing entrepreneurs to preserve their innovative capabilities.

Unlike the state of the art where the IP dimension prevails, this work suggests an AI-based learning that increases the percentage of explained variance with the inclusion of other factors and indicators that the literature identifies as entrepreneurial innovation with IP hallmarks. Therefore, the limits of the study can be overcome with the inclusion of factors related to IP and innovation.

Conclusion

Artificial intelligence (AI) is having a significant impact on libraries in a few ways.

Search and information retrieval: AI systems can improve the effectiveness of search engines within digital libraries and online catalogues. They use advanced natural language processing (NLP) and machine learning algorithms to better understand user queries and deliver more relevant results.

Classification and organization of materials: AI can assist in the automated classification and organization of materials within libraries. AI algorithms can analyze metadata, content, and other attributes to more accurately assign labels, categorize, and recommend materials to users.

Virtual Reference Services: AI-powered chatbots are being used by many libraries to provide virtual reference services. These chatbots can answer frequently asked questions, help users find resources, and provide basic assistance in real-time, allowing libraries to expand their reach and improve the availability of after-hours services.

Service Personalization: AI enables libraries to personalize services and recommendations for users. By analyzing users' search and borrowing history, as well as their preferences, AI systems can offer more relevant recommendations for materials and services tailored to each user's individual needs.

Preservation and conservation: AI is also being used in the preservation and conservation of library materials. For example, computer vision algorithms can help in the identification and restoration of old or damaged documents, while AI techniques can be used for the digitization and preservation of historical archives.

Data analytics and collection management: AI can help libraries analyze large data sets to gain insights into materials usage, research trends, and user needs. This can inform decision-making about acquisitions, collection management, and service development.

AI is transforming libraries by improving the efficiency of services, personalizing the user experience, and expanding data preservation and analysis capabilities. However, it also poses challenges in terms of data privacy, equity in access, and the need for training for library staff in the use of these emerging technologies.

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