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Bibliometric Study: scientific articles from the Technology Acceptance Model

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Abstract

Bibliometric study of articles on technology acceptance from Elsevier's specialized Scopus database. The productivity of documents is measured by year, author, affiliation, country, area of knowledge and sponsor a network map analysis with the VOSviewer software, the productivity of documents per year shows an increase of 2006, the highest productivity is found by the authors: Amornkitpinyo, T., Venkatesh, V., Chiu, W., Sun, Y. y Wang, N.; highest document productivity by affiliation Universiti Teknologi MARA, Universiti Sains Malaysia and University of Arkansas, the productivity of more documents by country United States, China, Taiwan and Malaysia, the highest document productivity by funding sponsor is National Natural Science Foundation of China, National Institutes of Health, Ministry of Science and Innovation and Ministry of Higher Education, Malaysia, according to the visualization of the network map, the terms innovation and competitiveness have a high co-occurrence with an approximation of terms such as ""technology, acceptance", "consumer" and the term "risk"" are strongly linked to investigate these relationships.

Keywords: competitiveness, Innovation, bibliometrics, Technology Acceptance Model

Introduction

The objective of this research project is to carry out a bibliometric study on the Technology Acceptance Model (TAM) and its relevance in the field of innovation and competitiveness. The TAM is a widely used conceptual framework to understand and predict user acceptance and adoption of technology. Technological innovation and adoption strategies have been under development and study since the late 20th century. (Sorce and Issa, 2021). The model of technology acceptance or TAM is one of the most dominating models of research. TAM consists of several variables that explain behavioral intentions and the use of technology both directly and indirectly. (Sholikah & Sutirman, 2020).

The acceptance and adoption of technology have become central issues in today's digital age. In a constantly evolving world, understanding how individuals and organizations adopt new technologies is essential for success and innovation. In this context, the Technology Acceptance Model (TAM) has emerged as a fundamental theoretical framework in research on technology adoption. It is from the perspective of innovation and the results of this process that facilitating agents can improve results and by this way it is inferred that the company also

learns during these phases of value acquisition. (Ahumada Tello y Perusquia Velasco, 2015), for this, it must be clear that to innovate and create value it is necessary to differentiate, improving competitiveness by favoring specialization. TAM assumes that two convictions dictate an individual's behavioral aim to utilize a system. One is perceived usefulness, characterized as the degree to which a person trusts that utilizing this system will improve his or her employment execution. (Elshafey et al., 2020)

The TAM, initially developed by Fred Davis in the 1980s, has proven to be an invaluable tool for analyzing and predicting technology acceptance in various contexts. The Technology Acceptance Model (TAM) has been a widely recognized and used theory to understand how individuals adopt and use technology. Initially developed by Davis (1989). Although many models have been proposed to explain and predict the use of a system, the Technology Acceptance Model has been the only one which has captured the most attention of the Information Systems community. (Chuttur, 2009). Therefore, different authors have adapted TAM model to specific contexts by incorporating specific variables; nevertheless, little theoretical insight has been provided to explain the mechanism of "the why" behind the interaction effects of TAM. Bagozzi (2007)

This model is based on the premise that the intention to use a technology is influenced by the perception of usefulness and perceived ease of use. Over time, the TAM has evolved and adapted to address technological changes and emerging research needs. Technology Acceptance Model (TAM) has been widely used to analyze technology adoption, and its previous versions, TAM and TAM2, have proven effective in predicting user behavior. (Martínez Amado et al., 2022). As the field of study of technology adoption continues to develop, it is essential to conduct a comprehensive analysis of the existing literature regarding TAM.

TAM was developed to predict individual adoption and use of new ITs. It posits that individuals' behavioral intention to use an IT is determined by two beliefs. (Venkatesh, V. & Bala, H., 2008). Although other authors indicate that there may be other variables in the TAM apart from the perception of ease of use and perceived usefulness, taking into account future use. Variables within the technology acceptance model include perceived ease of use, perceived usefulness, attitude, behavioral intentions (i.e., future use), and actual use. (Bailey et al., 2022). It is highlighted that in society all sectors allow the incorporation of new technologies, especially in the generation of new computers with high technology and together with Internet advances, all have potential users of technology that can help understand knowledge transfer and acquisition. After experiencing trends and extension by introducing predictors for the basic TAM constructs, new TAM modifications emerged as a result of "enhancement" and incorporation of supplementary elements as a result of relevant research. It also included the PEOU determinants. (Benakatii & Muukherjee, 2022).

The model argues that the disposition of a person to use information technology is based on two fundamental beliefs: The first is the perception of its usefulness, which refers to the level at which a person considers that the use of said technology will benefit their work performance; The second is the perceived ease of use, it refers to the degree to which a person believes that using the technology will be hassle-free. Taking into account that technological advances help the company's activity, sharing common processes and sometimes data models that help in decision making, for this the theoretical foundation must be understood. In this sense (de Leon-Sigg et al., 2014) indicate that IT adoption has been widely studied to find theoretical foundations, factors, roles and organizational structures.

This model seeks to determine whether users accept or reject a certain information technology based on the assumptions of the Theory of Reasoned Action and the Theory of Planned Behavior, providing a basis for evaluating the influence of factors such as perceived usefulness and perceived ease of use on technology adoption (Ramírez et al., 2016). The initial TAM had two exogenous variables of perceived usefulness and perceived ease of use that have a direct effect on attitudes toward using technology, and ultimately, influence the intention to use technology. (Jang et al., 2021)

The TAM has become a fundamental tool for understanding how individuals perceive and adopt technology in various contexts. Its application covers areas such as computing, engineering, economics and business. TAM relies on two constructs; perceived usefulness (e.g., can the technology enhance my performance) and perceived ease of use (e.g., will using the technology be low efort). (Vilaro et al., 2021). The TAM was designed to analyze

why and how workers in different sectors choose to use or not use emerging information technologies, with the idea that this knowledge will allow organizations to optimize the implementation and use of IT in the work environment. TAM was designed to explore the factors that shaped the intention of workers from different sectors to use emerging information technologies (IT), which should help organizations improve their workers' IT use. (Kabir et al., 2022)

The TAM model states attitude toward use of new technology as a construct explained by two perceived variables: usefulness and ease of use. (Muñoz-Leiva et al., 2017). The TAM seeks to understand how these two variables (usefulness and ease of use) influence people's attitude toward adopting new technologies, which in turn affects their intention to use those technologies. This theoretical approach can be useful for companies that want to improve the acceptance and use of technologies because it allows them to identify areas where they can improve the perceived usefulness and ease of use of the technologies they offer. On the other hand, we have the bibliometric study, which entails this research on the technology acceptance model, allowing an analysis of the scientific literature published in Scopus. The wealth of scientific information generated in recent years combined with new forms of communication, has led the research community to propose the measure, which has given rise to a new discipline of bibliometrics. (Góngora Orjuela, 2010).

Bibliometric analyses, which involve the quantification and evaluation of scientific production, it can play a crucial role in making decisions about how to allocate these resources in ways that have a positive and measurable impact on society, where it is a great help, especially in countries with social, economic or political problems, which see resources for research reduced. Indeed, governmental funding of research in countries with enormous social, economic or political challenges and restricted amount of available resources should be highly effective, which cannot be achieved without correct bibliometric analyses. (Matcharashvili et al., 2014)

Through this bibliometric study, we hope to contribute to existing knowledge in this field, identifying key advances and pending challenges in research on TAM.

Methodology

The methodology used in this study consisted of two stages. In the first stage, a comprehensive literature search was conducted in the Scopus Elsevier database, using a combination of terms related to the TAM. A total of 244 documents were collected, which were analyzed in terms of productivity per year, journals indexed, authors, and affiliations.

In the second stage of the study, the VOSviewer software was used to visualize the bibliometric data obtained. This software made it possible to generate a network map of terms related to technology, acceptance, information technology and knowledge. This visualization provided a graphical representation of the co-occurrences of keywords and terms, revealing the relationships and connections between them.

According to the bibliometric study of competitiveness and Innovation, it was planned in two stages, the first stage the literature of the study for the bibliometric analysis of competitiveness and Innovation in Scopus Elsevier, whose consultation: TITLE-ABS-KEY (technology AND acceptance AND model 3) AND PUBYEAR > 1975 AND PUBYEAR < 2023 AND (LIMIT-TO (SUBJAREA , "COMP") OR LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "ENGI") OR LIMIT-TO (SUBJAREA , "ECON")) AND (LIMIT-TO (EXACTKEYWORD , "Technology Acceptance Model") OR LIMIT-TO (EXACTKEYWORD , "Technology Acceptance") OR LIMIT-TO (EXACTKEYWORD , "Perceived Ease Of Use") OR LIMIT-TO (EXACTKEYWORD , "Perceived Usefulness") OR LIMIT-TO (EXACTKEYWORD , "TAM") OR LIMIT-TO (EXACTKEYWORD , "Technology Acceptance Model (TAM)") OR LIMIT-TO (EXACTKEYWORD , "Technology Adoption") OR LIMIT-TO (EXACTKEYWORD , "Technology") OR LIMIT-TO (EXACTKEYWORD , "Information Use") OR LIMIT-TO (EXACTKEYWORD , "Information Technology")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English"))), innovation and competitiveness documents of the Spanish and English languages are abstracted with the type of article documents, then an analysis is prepared.

In the first stage of the bibliometric study, a detailed search of the published literature was carried out through the Scopus Elsevier database, compiled from the terms technology, acceptance and information technology, limited to the English language and with the document type articles.

Results

To begin the interpretation of the results, it is important to carefully analyze the findings and draw significant conclusions, for this reason, two hundred and forty-four (244) documents were collected, of which the following were analyzed:

1) Document productivity per year in terms of Technology Acceptance Model (TAM) in Scopus Elsevier;

2) Productivity of documents in TAM by journals indexed in Scopus Elsevier;

3) Productivity of documents by Authors of the TAM topic;

4) Productivity of documents on the TAM topic by Author Affiliation;

5) Productivity of documents on the TAM topic by country;

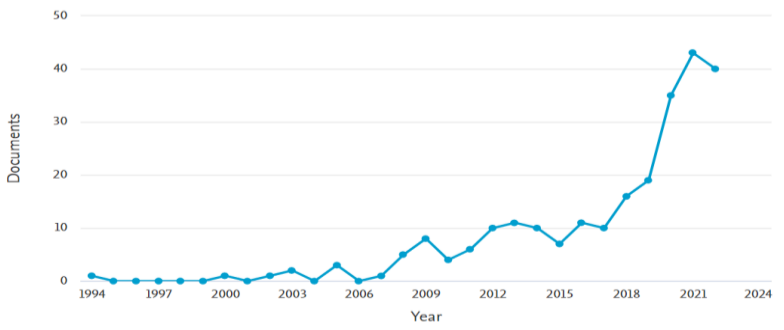
6) Productivity of TAM topic documents by funding sponsor.

Second stage consisted of the analysis of the network map and the density map with the VOSviewer software version 1.6.19, a scientific map viewer by authors Nees Jan van Eck and Ludo Waltman and sponsored and developed by the Center for Science and Technology Studies at Leiden University and Erasmus University Rotterdam. According to the Technology Acceptance Model (TAM) analysis of document productivity in Scopus Elsevier; next, 244 documents were collected from the proposed equation where, starting in 1994, the highest productivity was in 2021 with 43 documents, the journal Computers In Human Behavior with 11 documents has the highest Document Productivity by journals indexed in Scopus Elsevier, the author with the highest productivity is Amornkitpinyo, T. with 4 documents, Universidad Teknologi MARA with 5 documents has the highest productivity of documents by Affiliation, United States with 48 papers is the country with the highest Technology Acceptance Model (TAM) paper productivity, the sponsor National Natural Science Foundation of China with 8 papers has the highest Paper Productivity per funding sponsor. According to the productivity of documents per year in innovation and competitiveness in Scopus Elsevier.

Publications per year

The following table shows the distribution of documents published by year, which according to the information obtained in the search it was found that during the years between 1994 and 2007 only 9 documents were published, in the time between 2008 and 2011, a very slight increase begins to be seen, which adds up to 23 published documents; starting in 2012, the number of published documents begins to increase relatively, reaching a total of 244 publications in 2022.

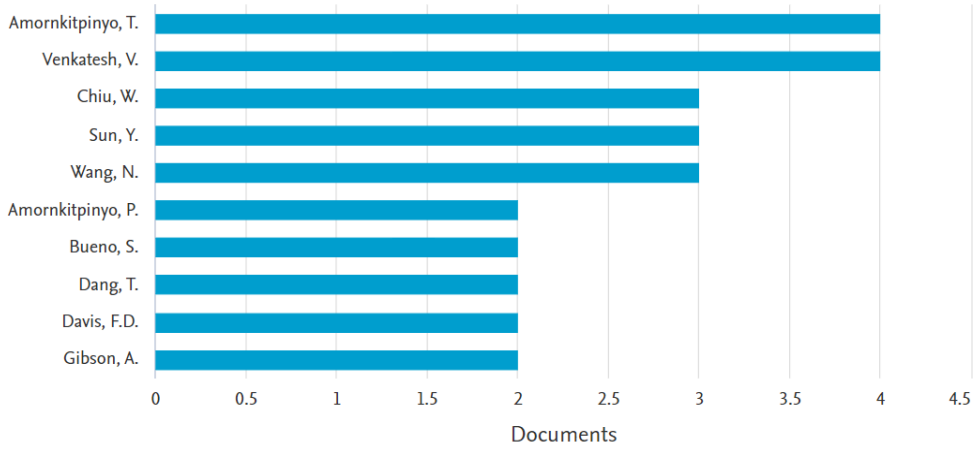
Figure 1. Documents by year in Technology Acceptance Model (TAM).



Source: taken from Scopus Elsevier (2022)

Starting in 1994, the first document was published, but it stopped being published until 2000 and 2002, when a document was published again each year, a considerable increase is seen starting in 2012, in which ten documents were published, which represents a percentage of (4.10%), in the number of documents, in 2013 eleven documents were published with a percentage of (4.51%); In 2014, ten documents were published with a percentage of (4.10%); In 2015, seven documents were published with a percentage of (2.87%); In 2016, eleven documents were published with a percentage of (4.51%); In 2017, ten documents were published with a percentage of (4.10%); In 2018, sixteen documents were published with a percentage of (6.56%); In 2019, nineteen documents were published with a percentage of (7.79%); In 2020, thirty-five documents were published with a percentage of (14.34%); In 2021, forty-three documents were published with a percentage of (17.62%); In 2022, forty documents were published with a percentage of (16.39%); until the consultation time. Document productivity per year for the Technology Acceptance Model (TAM) topic.

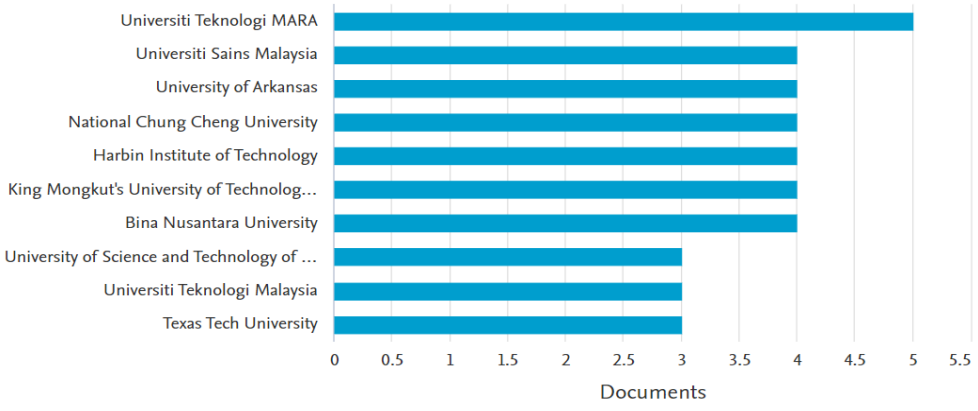
Figure 2. Documents by authors on the topic Technology Acceptance Model (TAM).



Source: taken from Scopus Elsevier (2022)

The Top-10 document productivity by authors in the Technology Acceptance Model (TAM) topic. The author Amornkitpinyo, T. published four papers; author Venkatesh, V., published four papers; the author Chiu, W., published three papers; the author Sun, Y., published three papers; the author Wang, N., published three papers; the author Amornkitpinyo, P., published two papers; the author Bueno, S. published two documents; author Dang, T., published two papers; author Davis, F.D., published two papers; the author Gibson, A., published two papers; of the Technology Acceptance Model (TAM) topic according to the Scopus Elsevier Database. Next, the productivity of innovation and competitiveness documents by Author Affiliation.

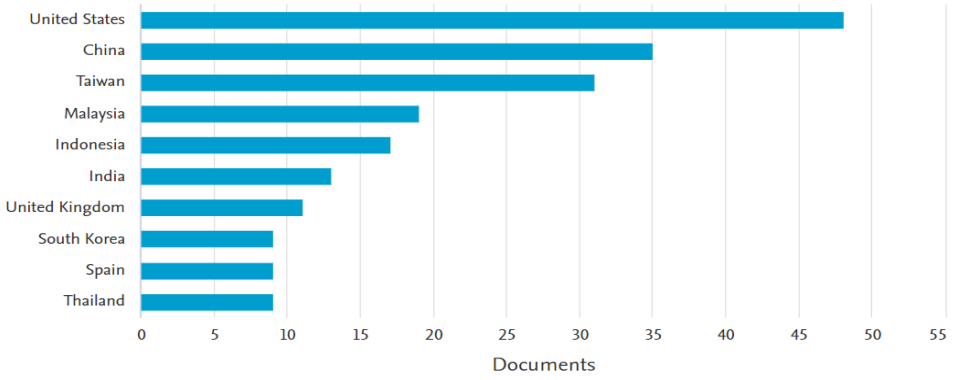
Figure 3. The Top-10 documents by affiliation in Scopus



Source: taken from Scopus Elsevier (2022)

Below, you can see the Top-10 by affiliation of Technology Acceptance Model (TAM) documents in Scopus, with a total of 260 entities in which the Universiti Teknologi MARA is in first place with five documents, which represents a percentage of (1.92%) of publications in Scopus; follows the affiliation of Universiti Sains Malaysia with four documents with a percentage of (1.54%); the affiliation of the University of Arkansas with four documents and a percentage of (1.54%); the affiliation of National Chung Cheng University with four documents with a percentage of (1.54%) over the total documents published; the affiliation of Harbin Institute of Technology with four documents with a percentage of (1.54%); the affiliation of King Mongkut's University of Technology North Bangkok with four documents in scopus with a percentage of (1.54%); the affiliation of Bina Nusantara University with four papers published with a percentage of (1.54%); the affiliation of University of Science and Technology of China with three published papers with a percentage of (1.15%); the affiliation of Universiti Teknologi Malaysia with three papers published with a percentage of (1.15%); and in tenth place the affiliation of Texas Tech University with three documents with a percentage of (1.15%). Next, the productivity of innovation and competitiveness documents by country.

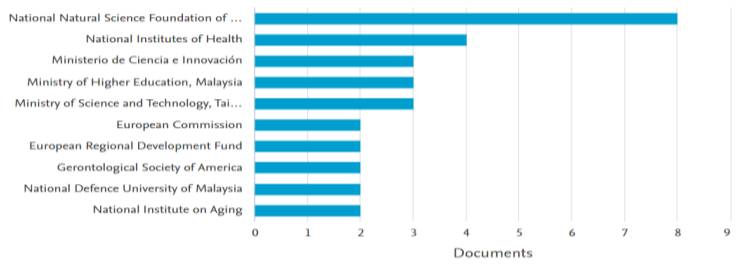
Figure 4. Innovation and competitiveness documents by country or territory.



Source: taken from Scopus Elsevier (2022)

Below is the productivity of Technology Acceptance Model (TAM) documents by country, in the top-10, in first place is the United States with the highest number of publications and in tenth place is Thailand, in that order of ideas, the United States country with the highest productivity has forty-eight documents; the country China with a productivity of thirty-five documents; the country Taiwan with a productivity of thirty-one documents published in Scopus; the country Malaysia with a productivity of nineteen published documents; the country Indonesia with a productivity of seventeen documents; the country India with a productivity of thirteen documents; the country United Kingdom with a productivity of eleven documents; the country South Korea with a productivity of nine documents; the country Spain with a productivity of nine documents; In tenth place is the country Thailand with a productivity of nine Technology Acceptance Model (TAM) documents published in Scopus articles. Next, the productivity of innovation and competitiveness documents by funding sponsor.

Figure 5.Technology Acceptance Model (TAM) documents by funding sponsor



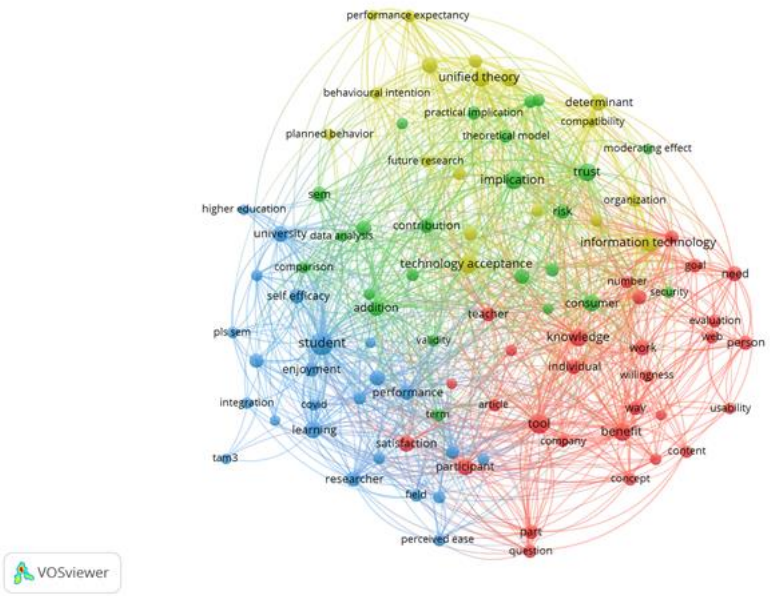
Source: taken from Scopus Elsevier (2022)

Below are the Top 10 funding sponsors on the Technology Acceptance Model (TAM) according to Scopus Elsevier, where the largest sponsor is the National Natural Science Foundation of China with eight papers published in Scopus Elsevier; In second place is the funding sponsor, National Institutes of Health with four published documents; funding sponsor Ministry of Science and Innovation of Spain with three published documents; funding sponsor Ministry of Higher Education, Malaysia with three published papers; funding sponsor Ministry of Science and Technology, Taiwan with three published papers; funding sponsor European Commission with two published documents; funding sponsor European Regional Development Fund with two published papers; funding sponsor Gerontological Society of America with two published papers; funding sponsor National Defense University of Malaysia with two papers published and in tenth place the funding sponsor National Institute on Aging with two papers published.

Next, the second stage where it is described by the network and density maps with the VOSviewer software version 1.6.19, whose authors are Nees Jan and Waltman, from the University of Leiden and the Erasmus University of Rotterdam, which visualizes the bibliometric data of the terms technology, acceptance and information technology based on query data in Scopus Elsevier.

Figure 6.

Network map visualization of the terms technology, acceptance, information technology and knowledge



Source: Own elaboration VOSViewer search data from Scopus Elsevier (2022)

In the visualization of the network map on the terms technology, acceptance, information technology and knowledge, a number of twenty (30) co-occurrences of keywords or terms were postulated reaching a threshold of (95), with a total co-occurrence link strength of (6390), the keywords with the highest total link strength were selected and the total number of keywords from which they were taken (95), with an organization of (4) clusters, (3100) connections, and a total connection strength of (6390), the closer the terms are located to each other, the stronger their co-occurrence analysis relationship.

Conclusions

In the bibliometric study of the literature of scientific articles in the Technology Acceptance Model, the importance and recognition that the individual perception of usefulness and ease of use is fundamental for the adoption of technology can be ratified (as stated by its predecessor Fred Davis, regarding the acceptance of technologies and information systems), which is evident in the productivity of documents on the subject, which determine a better understanding of it.

In relation to the productivity of documents in indexed journals, there is the journal Computers In Human Behavior, which is an academic journal dedicated to examining computer use from a psychological perspective with a high CiteScore (impact indicator); achieving the highest quartile during the respective period and the average number of citations received by the articles of said SNIP journal, followed by the journal Sustainability Switzerland, which is an open access international and interdisciplinary academic journal on the environmental, cultural, economic and social sustainability of human beings, which provides an advanced forum for studies related to sustainability and sustainable development with a good CiteScore (impact indicator), achieving the highest quartile during the respective year and the average number of citations received by the articles of SNIP journal.

In the respective visualization of the network map on the terms Technology Acceptance Model is postulated with a high co-occurrence of terms reaching a consistent threshold and a high total co-occurrence link strength given that the closer the terms are, the stronger their analysis relationship, with an approximation of terms with greater proximity which are “technology, acceptance”, “consumer” and “risk” where these terms are strongly linked, making it beneficial to investigate these relations.

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