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MOBILE MARKETING AS A COMMUNICATIVE STRATEGY IN INDUSTRY 4.0

EL MOBILE MARKETING COMO ESTRATEGIA COMUNICATIVA EN LA INDUSTRIA 4.0

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ABSTRACT

This research called Mobile Marketing as a dissemination strategy in Industry 4.0 aims to analyze the study of research variables through scientific mapping; through this process, it is possible to understand and identify phenomena and research communities which are not directly appreciable; the use of software tools for visualization allows a large number of volumes of data to be processed and accessed in the same way; through a type of descriptive-analytical research; thus, it also consents to the construction of scientific visualizations of co-occurrences and co-citations concerning keywords. The bibliometric analysis of this study has been consolidated since the years 2019-2022 through the Lens.org tool as a platform with great scientific impact and resources in scientometric studies in areas such as social innovation, technology, education, and industry. As a result of the investigation, the patterns and trends were analyzed concerning the scientific literature retrieved from databases about scientific subscriptions through scientograms, which constitute a spatial representation of the patterns found through records and the relationship that exists.

Keywords: Mobile Marketing, Industry 4.0, scientometrics, bibliometric indicators, co-occurrence analysis.

RESUMEN

Esta investigación denominada el Mobile Marketing como estrategia de comunicación en la industria 4.0 tienen como objetivo analizar mediante mapeo científico el estudio de las variables de investigación; por medio de este proceso se puede comprender e

identificar fenómenos y las comunidades de investigación las cuales no son apreciables de forma directa; el uso de herramientas *software* para la visualización permite que se pueda procesar y de la misma forma acceder a una gran cantidad de volúmenes de datos; por medio de un tipo de investigación descriptiva – analítica; así también consiente en la construcción de visualizaciones científicas de coocurrencias y cocitaciones en lo que respecta a palabras claves. El análisis bibliométrico de este estudio se consolida desde los años 2019-2022 por medio de la herramienta Lens.org como una plataforma de gran impacto científico y recursos en estudios cientométricos en las áreas como la innovación social, tecnología, educación e industria. Como resultados de la investigación se analizaron los patrones y tendencias en lo que respecta a la literatura científica recuperada de bases de datos en lo referente a suscripciones científicas por medio de cientogramas, los cuales constituyen una representación espacial de los patrones hallados por medio de registros y la relación que existe.

Palabras clave: Mobile Marketing, Industria 4.0, cientimetría, indicadores bibliométricos, análisis de coocurrencias.

O MOBILE MARKETING COMO ESTRATÉGIA DE COMUNICAÇÃO NA INDÚSTRIA 4.0

RESUMO

Esta investigação denominada Mobile Marketing como estratégia de comunicação na Indústria 4.0 tem como objetivo analisar o estudo das variáveis de pesquisa por meio de mapeamento científico; por meio desse processo é possível compreender e identificar fenômenos e comunidades de pesquisa que não são diretamente visíveis; o uso de ferramentas de *software* para visualização permite o processamento e acesso a uma grande quantidade de volumes de dados. A análise bibliométrica deste estudo é consolidada a partir dos anos 2019-2022 por meio da ferramenta Lens.org como plataforma de grande impacto científico e recursos em estudos cientométricos em áreas como inovação social, tecnologia, educação e indústria. Como resultados da pesquisa, foram analisados padrões e tendências da literatura científica recuperada de bases de dados em termos de assinaturas científicas por meio de cientogramas, que constituem uma representação espacial dos padrões encontrados por meio de registros e da relação existente.

Palavras chave: Marketing Móvel, Indústria 4.0, cientimetria, indicadores bibliométricos, análise de co-ocorrência.

1. INTRODUCTION

Currently, companies have discovered that smartphones, also known as smartphones, are the perfect means of communication for advertising, sending and receiving information, and above all, for staying connected in real-time. In the last two years, these devices have been used more frequently and have embraced the application of Mobile Marketing or M-Marketing, which is considered a trend that proved to be very effective during the COVID-19 pandemic (Ianenko et al., 2021).

Before the pandemic, the most important thing for companies was to develop marketing strategies traditionally, using traditional media such as brochures, flyers, posters, or billboards. However, starting in 2020, this field undergoes an overwhelming transformation and shifted towards the digitalization of advertising and innovative strategies, giving way to Mobile Marketing. This approach focuses on a highly personalized treatment that guarantees a brand has greater customer loyalty (Barykin et al., 2022).

Mobile Marketing encompasses a series of strategies that allow companies to communicate directly with customers at a local and global level through smartphones, employing personalized approaches when customers acquire offers or promotions (Subriadi and Baturmah, 2022). The strategies within Mobile Marketing are always developed through planning, starting with studying the target audience, their habits, behaviors, and customs, ensuring that the market launch strategy is not erroneous (Meshko and Savinova, 2020).

Within the field of Marketing, a mobile phone or cellphone is in itself its universe, as it is identified by the characteristics it possesses when developing or designing an M-marketing strategy (Müller et al., 2018) so that the user experience is optimal when launching an app (Yadav et al., 2015). Therefore, the following sections shown in Figure 1 should be considered:

Figure 1

Elements to consider when developing or designing an M-marketing strategy.



Source: Yadav et al., 2015.

Furthermore, websites or web platforms must adapt to smartphones. The reason is

that users now frequently connect through a tablet or mobile phone instead of a computer. Therefore, when designing or developing a website, it should be optimized for mobile technology (Boydak-Öztaş, 2018). Through Mobile Marketing, regardless of the product or service offered, a brand can engage with a specific digital community and establish direct and seamless communication with each member. As a result, they obtain information more easily and quickly, receiving instant messages from the company that promotes closer communication with each user utilizing this marketing strategy (Faruk et al., 2021).

1.1. Types of M-Marketing Strategies

In the field of marketing focused on Industry 4.0, several strategies are considered to be the most suitable for disseminating information. Among them are QR codes: they are a bidirectional system for storing data that is encoded or encrypted. The information presented can be diverse and is displayed on a mobile device. The user's action is to scan the code.

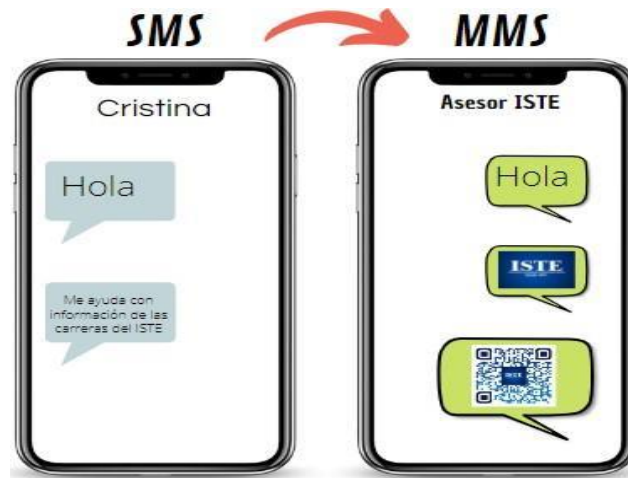
Figure 2
QR code.



Source: Instituto Superior Tecnológico España.

Multimedia messaging: It is an innovative way to send text messages where a series of elements such as photos, text, and audio can be sent, allowing simultaneous communication with a digital community. One of the advantages is that there is no need for an internet connection to communicate with customers who are interested in the service or product.

Figure 3
Multimedia texts.



Source: Author's own work.

Apps: They are considered strategies that arouse curiosity in the digital community and should be attractive and user-friendly. They serve as the image of the company's brand and aim to establish a closer connection with each customer (Grabara, 2021).

Augmented reality: It is a strategy that allows customers to visualize products or static objects in a 3D immersive experience. Currently, it is a widely adopted marketing strategy and is also being implemented in Tourism 4.0.

Figure 4
Augmented reality.



Source: IONOS (2022).

1.2. Industry 4.0

Industry 4.0 is currently based on the development of mass automation and digitalization processes, IoT, and the Internet of Services and People. These technologies work in conjunction with other resources such as 3D printing, additive manufacturing, reverse engineering, web analytics, Big Data, augmented reality, virtual reality, and native apps, among others (Namjoshi and Rawat, 2022). Together, these technologies bring about significant changes not only in the field of marketing but also in the new buyer persona archetype and in the way services or products are consumed within the standards of this new industrial revolution (Li-Har et al., 2022).

From the perspective of Industry 4.0, machines can communicate with each other to

transmit or receive information and subsequently execute actions or processes. Similarly, products are intelligent as most of them are connected through the IoT, interconnecting sensors through devices, which allows the handling of large amounts of data of various types. This data is ultimately managed and stored in cloud computing, which provides Big Data processing capabilities (Bayram and Ince, 2018).

Therefore, this research focuses on identifying Mobile Marketing as a dissemination strategy within Industry 4.0. It examines how users communicate and interact with each other, as well as with their suppliers, companies, or organizations, who have greater participation in the decision-making process, personalization, and quality of services and/or products. The research also takes into account the challenges of cybersecurity, ensuring a robust way for information exchange and collaborative work.

2. OBJECTIVES

General Objective

To analyze, through scientific mapping, Mobile Marketing as a dissemination strategy in Industry 4.0.

Specific Objective

To identify trends within research communities that are not directly observable.

3. METHODOLOGY

For this research, a bibliometric analysis of scientific publications was conducted, which is an essential component of the research process. It is a useful tool for analyzing the generation and evolution of scientific contributions and new knowledge, evaluating scientific activity and its impact on the world.

This bibliometric analysis examined the scientific resource based on a quantitative-objective perspective, which is useful for organizing information within a specific thematic field, specifically Mobile Marketing and Industry 4.0 for this study. To conduct the systematic analysis of scientific articles on the aforementioned topics through bibliometrics, several factors were taken into consideration. These factors included the trend of articles over a certain period, the keywords used with the highest frequency, author networks or clusters, and the countries that produced a greater number of scientific articles on these topics.

The scope of this bibliometric study included languages, documents, authors, countries, and keywords found, to obtain a global perspective on the evolution of Mobile Marketing and Industry 4.0 from 2020 to 2022, as this was the period when this technology and strategy were most widely used. A total of 45,000 documents were obtained.

The indicators used in the research were productivity, measured by the number of citations received by the articles, and the number of published articles, analyzed with the keywords used.

4. RESULTS

Within the obtained results, a bibliometric review of the investigated variables was carried out to analyze the study background through scientific mapping. As a result, it was identified that Mobile Marketing has a trend in the years 2020-2022, while Industry 4.0 emerged in 2017 with a higher trend in 2019-2021, with fewer studies in the years 2022-2023.

Figure 5 displays the number of documents analyzed through scientific mapping according to the indicators mentioned in the methodology. For the variable Mobile Marketing, the following were taken into account: 45,000 articles, 690 patents, 2,744 citations to patents, 2,793 patent citations, 27,141 cited works by scientists, and finally, 775,282 academic citations.

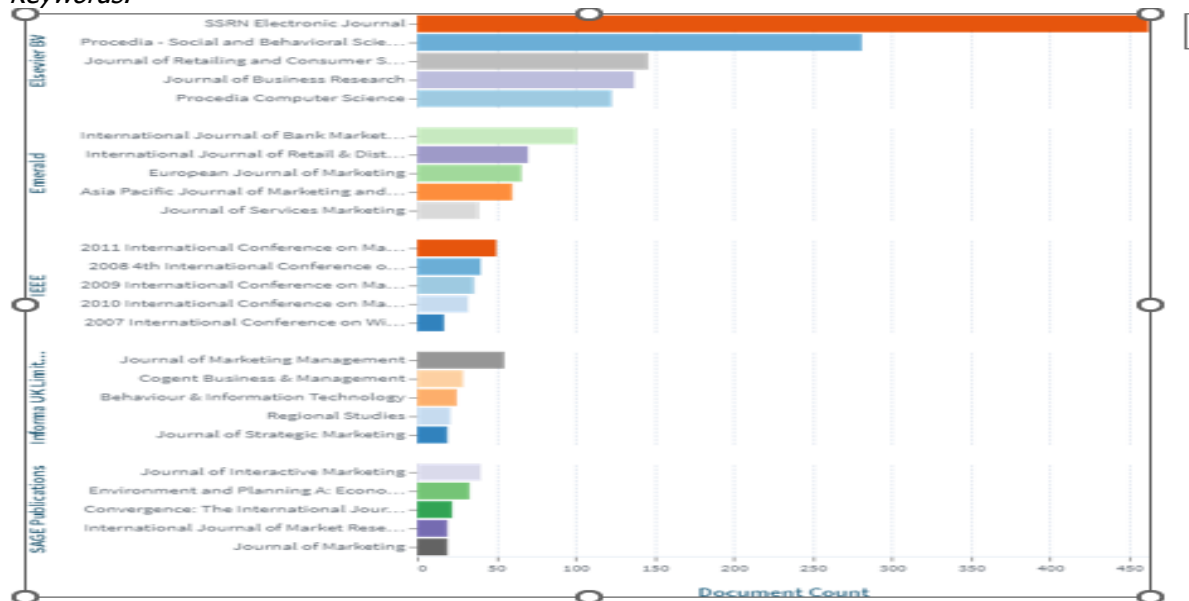
Figure 5
 Document analysis.



Source: Author's own work.

Figure 6 shows the frequency of keyword usage in scientific articles related to the variable Mobile Marketing. The most frequently used keyword is "Business" with a total of 12,931 occurrences, followed by "Marketing" with 8,947 occurrences, and "Computer Science" with 7,419 occurrences. Regarding M-Marketing and M-technology, both keywords have a frequency of 923 uses each.

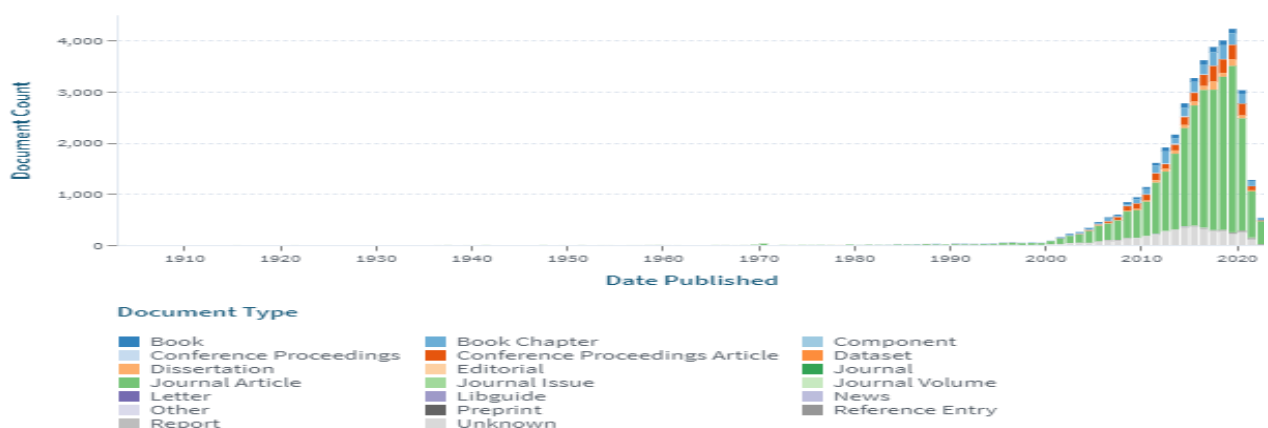
Figure 6
 Keywords.



Source: Author's own work.

In Figure 7, the journals with the highest number of articles indexed in the field of Mobile Marketing and Industry 4.0 are shown. The three clusters with the highest number of journals are Elsevier BV, Emerald, and IEEE. In the first cluster, journals such as SSRN Electronic Journal have over 450 articles, Procedia - Social and Behavioral Science has 270 works, and Journal of Retailing and Consumer and Journal of Business Research have 200 works each. In the second cluster, Emerald, journals such as International Journal of Bank Marketing have 150 articles for publication, while International Journal of Retail, European Journal of Marketing, and Asia Pacific Journal of Marketing have an estimated publication of 100 scientific articles.

Figure 7
 Article publication database.

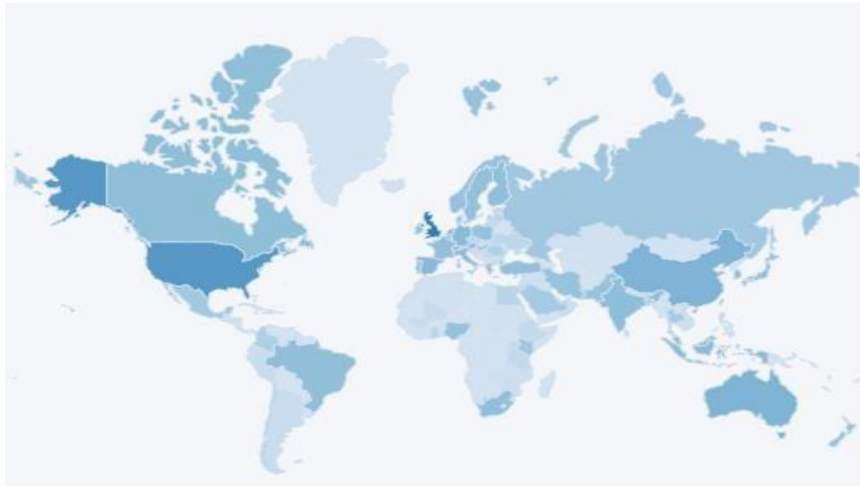


Source: Author's own work.

Figure 8 shows the years in which there is a publication trend regarding the variables analyzed in the bibliometric study. In this case, it is evident that in the year 2020,

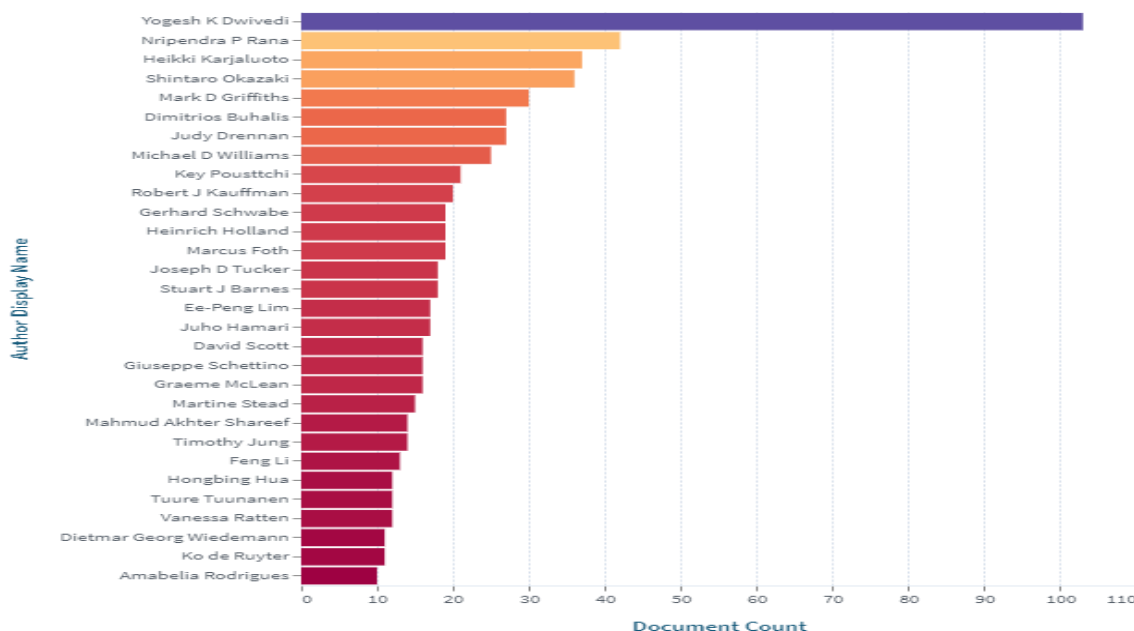
there was a significant number of publications, with over 4,000 documents. These publications are divided into journal articles, with approximately 3,800 articles, followed by dissertations, conference proceedings, and finally, book chapters and books. The years 2018 and 2019 show a similar trend in scientific production, with approximately 3,800 and 4,000 documents respectively, divided into the same categories as in 2020.

Figure 8
Number of documents per year.



Source: Author's own work.

Figure 9
Countries with the highest scientific production.



Source: Author's own work.

5. DISCUSSION

In the last two years, a large amount of scientific production focused on Mobile Marketing and Industry 4.0 has been reported. These studies aim to validate and/or develop clusters of information, revealing research areas that still need to be explored or in which fewer publications have been made (Valencia et al., 2019).

This information is highly relevant to understanding the limitations in scientific production and also enables researchers to search for previous works on which they can rely. These investigations serve as a foundation for future research and publications (Araya-Castillo et al., 2021). Following this type of analysis, bibliometrics was applied, which is an important methodological technique for evaluating phenomena related to the dissemination of science and scientific production.

The analysis conducted through scientific mapping regarding Mobile Marketing and Industry 4.0 considers the map as a graphical summary of the information obtained from publication databases, patents, citations, or any type of bibliometric element.

In this analysis, 45,000 documents were selected and classified according to the most used keywords, authors with the highest number of publications, countries with the highest index of scientific production, databases, and journals where the most scientific documents related to the research variables were published.

6. CONCLUSIONS

This work presents an overview of research regarding scientific production in the field of digital marketing and Industry 4.0 through bibliometric analysis. The Lens tool was used to generate maps and networks. Among the most relevant documents analyzed, the development of clusters for information classification stands out, facilitating better management and more accurate information. These representations allow for quantitative identification of worldwide scientific production. Finally, the most relevant research trends are visualized through graphs.

Scientific production in terms of the number of publications has shown accelerated growth in the last two years, with this growth becoming more evident during the COVID-19 pandemic. This field of knowledge, known as bibliometrics, is relatively young and allows for qualitative and quantitative analysis of relevant information related to the research variables. There is clear evidence within the scientific community regarding the contrast of authors with the highest number of publications, including Yogesh K. Dwivedi (105), Nripendra P. Rana (43), Heikki Karjaluoto, and Shintaro Okazaki (38 publications each).

In terms of countries leading scientific production, the United Kingdom takes the lead with 6,151 publications, demonstrating its hegemony in research related to Mobile Marketing and Industry 4.0. Other notable countries include the United States with 4,144 publications, China with 1,571 publications, and Australia with 1,518 publications. In Latin America, Brazil stands out with 406 publications, followed by Colombia with 95 publications and Chile with 57 publications.

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