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Growth of Digital Entrepreneurship in Academic Literature: A Bibliometric Analysis

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ABSTRACT

Entrepreneurial activity is considered the driving force for modern economies and societal development through economic growth, employment generation and the promotion of innovation. This paper seeks to study the growth of the available literature in the academic world and to highlight the trends regarded as 'key' in the realm of digital entrepreneurship by means of the conduct of bibliometric analysis concerning the conceptual background, the assumptions that lie under, the designs of the research along with an analysis of what was contributed to the field and the direction road map pointing out topic areas for further research. An in-depth bibliometric and systematic literature analysis is conducted in accordance with the objectives of the study. As we know the bibliometric analysis of literature can identify research clusters based on the quantity and the quality of the research conducted. Through the use of Vosviewer 1.6.10 software, the authors analyzed 122 articles from the Scopus database. The progress of research on digital entrepreneurship has been studied from 1970 to 2022. It is found that digital entrepreneurship research has gained encouragement after the year 2018. By means of cluster analysis, the authors identified three clusters which revealed a number of closely associated key words. The findings further revealed that the synthesis of topics of recent date which were of interest to scholars have led about the evolution of a large number of topical clusters along with the identification of a change in interest over the days gone past. From a study whose aim was the various economic issues, in the direction of an analysis that has deepened the factors which have led to a number of factors that have contributing for the development of digital entrepreneurial platforms.

1. INTRODUCTION

Entrepreneurial activity is considered the driving force for modern economies and societal development through economic growth, employment generation and the promotion of innovation [1]. The importance of entrepreneurial activity to economic growth and societal development is particularly evident in emerging economy contexts [2, 3].

Entrepreneurship scholars have long been interested in understanding how institutional arrangements shape not only the rate but also the nature of entrepreneurial activity across economies [4], stimulate knowledge development [5], technological change [6], competitiveness and innovation [7, 8]. It is to be noted that institutions are found across various countries and societies, but it cannot be stated that they may be homogenous as there is a considerable amount of heterogeneity, when we compare one institution to another. One such difference concerning institutional arrangements may be observed between developed and developing or emerging economies [9, 10]. Consequently, scholars have been growing calls for enabling studies that could account for and understand the ways and means through which entrepreneurship and entrepreneurial activity in general, is taking shape in terms of the contexts of the emerging economy. Many, numerous opportunities for entrepreneurship and entrepreneurial activity have been created by means of digitalization [11]. It can be stated that any activity of entrepreneurial nature that causes for the transfer of an asset, service or a significant part of a business into a digital form, could be characterized as digital entrepreneurship.

1.1 Concept of digital entrepreneurship

Following example, digital entrepreneurship is defined as "the pursuit of possibilities based on the use of digital media and other information and communication technology" [12]. Another definition of digital entrepreneurship is "adopting new initiatives and transforming existing businesses by developing and deploying new digital technologies" [13]. Any entrepreneurial action that converts an asset, a service, or a significant portion of a business to digital is considered digital entrepreneurship [14]. E-entrepreneurship, electronic entrepreneurship, web entrepreneurship, internet entrepreneurship, computer entrepreneurship, information entrepreneurship, and online entrepreneurship are all used in the literature to describe digital entrepreneurship [15]. These concepts have been grouped in this study as "digital entrepreneurship."

The distinction between traditional and digital entrepreneurship is based on ease of market access, production and storage, digital market distribution, digital workplace, digital products, digital service, and digital commitment [11].

1.2 Digital entrepreneurship evolution

In the last decade or two, the rise of a wide range of unique and robust digital technologies, platforms, and infrastructures has profoundly changed innovation and entrepreneurship, with extensive organizational and policy ramifications [16]. Indeed, the term "digital transformation" has become widely used in today's business media to describe the transformative or disruptive effects of digital technologies on businesses, as well as how current entrepreneurs must change themselves to succeed in the ever-increasing digital world [17, 18].

Even though digitalization affects all aspects of life, it is mainly responsible for transforming entrepreneurial and commercial models in various industries. The intention is a mental process that precedes the effective involvement of the individual in any activity [19]. In particular, the entrepreneurial intention is closely linked to the business world [20] and has become a rapidly evolving research sector on the international scene [21]. The main reason motivating this evolution is the non-permanent, ever-evolving needs of the society, measurable in terms of products and services which are playing the role of a catalyst for initiating and encouraging new, innovative prototype transformations, which can lead to the development of new products and services in the future.

This is the result of digital entrepreneurship paving the way for individuals to perform or do their work, with the freedom of location, compared to the earlier fixed location of the office. In contrast, now they can do their work at their convenience of time, location and place, at rest or while travelling, subject to the limits of the battery, internet speed and data they are using along with the smart devices they use for work.

On the other hand, Berger et al. [22] have said that digital entrepreneurship has the power to promote gender equality and economic and social inclusion. Furthermore, Satalkina and Steiner [23] have noted that it encourages local development and ensures long-term sustainability, mainly when contemporary technologies are linked with public and open data. An example of this is how data on climate/weather, road, soil or crop and traffic conditions can be used to create apps and services that solve local problems, such as agricultural production optimization, urgent care and humanitarian aid rebuttal, accident prevention and accident denial, or traffic congestion and parking issues [24].

Digital entrepreneurship demonstrates the potential for new digital divides to increase [25-27]. Observations in many developed economies have revealed that the digital gap is shifting, which is leading to the creation of new opportunities in the brave new world. However, it has also been seen that many businesses need to catch up as they have yet to use this technology to its fullest extent.

This lacuna has been traced to a lack of capabilities, vision, and legal obstacles. A lack of competition can slow technology diffusion, and entrance hurdles may prohibit digital entrepreneurs from taking on incumbents and traditional enterprises. Additional divisions are emerging, such as in scale: certain services can only be provided in sectors or geographical locations with the appropriate scale (and density) and several customers [28].

By challenging and restructuring business patterns in all industrial sectors, digitalization becomes, on the one hand, an outcome and, on the other hand, a source of innovation, while entrepreneurs and intrapreneurs maybe not only the drivers but also the affected agents of digital transformations [15].

1.3 Growing need for research on digital entrepreneurship

Innovations and innovation systems could be two parts of the same meta-system, wherein entrepreneurship activities are the primary force that drives the system. Despite the growth of digital entrepreneurship on the high incline, not much research has taken place on this topic, resulting in a scarcity of available papers and research articles on digital entrepreneurship. In addition, a large portion of the articles selected by the authors for the purpose of this literature review has placed their focus on the relatively narrow sub-topic of digital entrepreneurship. This gap has resulted in the obstruction of the structured sub-assumptions of the contributions, research papers and articles in the recent date to the broader domain of digital entrepreneurship.

Bibliometric analysis, which entails in-depth research into the characteristics of published literature, can reveal an institution's academic strength and the potential of citation/co-citation models, allowing for the exploration and clarification of the main work contents and progress of a discipline [29]. Modern bibliometric methods not only count and calculate statistics but also reflect the influence of prominent scientists and various periodicals [30, 31]. They also underline the importance of knowledge institutions and development changes in an area for future research and growth [32]. Initial studies in this topic area have provided some helpful, informative and insightful literature reviews. However, their focus is more on entrepreneurship alone and not on the other areas related to it.

The existing academic literature review leads to the research gap as no appropriately extensive and integrative systematic review of digital entrepreneurship and digital transformation exists. In this context, based on bibliometric analysis, this study aims to explore the topic and comprehend the current research trends in digital entrepreneurship. This research attempts to synthesize key knowledge gaps through the bibliometric perspective of the relevant literature, covering key themes, e.g., innovation, digital transformation, business growth, digital start-up ecosystem, and digital entrepreneurship. In particular, this study is based on three objectives as follows:

1. To exhibit the growth of digital entrepreneurship in academic literature with three perspectives, e.g., chronological publications, authors, journals, and countries.
2. To establish and highlight the key trends in digital entrepreneurship concerning the conceptual background that lies beneath the held assumptions, the research design, the number of contributions to the field, and the direction ahead for further research in this topic.

The paper has been organized as follows: Section 2 describes the bibliometric analysis and the methodology of the systemic analysis they have conducted to make logical sense of the research data they selected. Then, in Section 3, the authors performed a thorough data analysis using the VOS Viewer tool and presented, in the form of images and tables, the most influential authors, sources and citations found in articles selected for the research. Finally, in Section 4, the authors have drawn their conclusion based on the data and information they analyzed, which has formed the basis for further research in this topic area and the limitations they had to navigate through while performing this study.

2. METHODOLOGY

The paper follows a bibliometric and systematic literature analysis in congruence with the objectives. Through bibliometric analysis, it is possible to identify research clusters in quantity and objectivity. However, it is not possible to describe the most recent developments or the gap in terms of the research clusters. The authors state that in their desire to find a solution to this problem, they have combined the technique of bibliometric analysis along with the systematic review technique, thereby making it possible for the authors to analyze the papers that have a connection with the clusters.

By means of combination of the dual methods, the authors state that they were able to identify research clusters of significant interest in congruence with the objectives of the research and in a bias free manner, which in addition to fulfilling its original purpose are also able to study the research trajectory curves of recent nature in this area wherein discovery of future research prospects was made in the clusters. Prior literature evaluations have disclosed that this tactic of combination of the strategies has created results of higher accuracy [33]. In order to follow the guidelines of the systematic review, the authors have established the eligibility criteria in terms of inclusion criteria and exclusion criteria for this present study.

In this sense, the data was extracted from the Scopus database, widely recognized in the scientific community, with more than 27 million abstracts, and is currently considered the most extensive scientific literature database [34]. The researchers have sought to identify articles that would be most relevant to the objectives of this research, for which the search area was defined based on a certain set of words or phrases relevant to the topic, which was compared with the future research articles identified on basis of their title, abstract description and the keywords mentioned in the articles. The systematic review procedure, in line with the definition given by Kraus et al. [14], was followed to define the structure for the conduct of the existing research on digital entrepreneurship.

The selected search terms included the words "entrepreneurship" and "digital", including "all fields" as a search field, with a time margin of 1970 to 2022. As a result, 1863 documents were retrieved from the initial search. The final selection amidst the prospective research articles so identified was made following further refinement using these search criteria namely – Document type articles written and published in journals that have been peer reviewed and were in English language. This could be regarded as a limitation as this might cause us to exclude a few research articles, we the authors consider that it is an effective way to ensure that the quality of the work is in line with the credibility in the academic world and have been subjected to rigorous review processes, usually used while conducting quality research.

This process narrowed down the articles to 927 documents. After retrieving 927 papers, the authors narrowed the search even further by focusing on the exact keyword – "digital entrepreneurship," which resulted in the exclusion of 801 documents and reduced the article number to 126. In the last stage of screening, the documents were filtered by reading the abstract and full papers; 4 documents were excluded due to their lack of relevance, which produced the final result of 121 articles.

To reduce the subjective component and potential attribution errors, we used the PRISMA method [35]. We used a series of bibliometric indicators to analyse the temporal evolution of research publications, the most influential authors on the subject, the most productive scientific journals in terms of the number of articles published, and countries with the highest number of scientific contributions [16]. Figure 1 shows the bibliographic research flow chart according to the PRISMA method's recommendations. The data was then exported to carry out descriptive statistical analysis in the VoSviewer Software version 1.6.16 [36, 37] including the title, author, abstract, keyword information, and citation information.

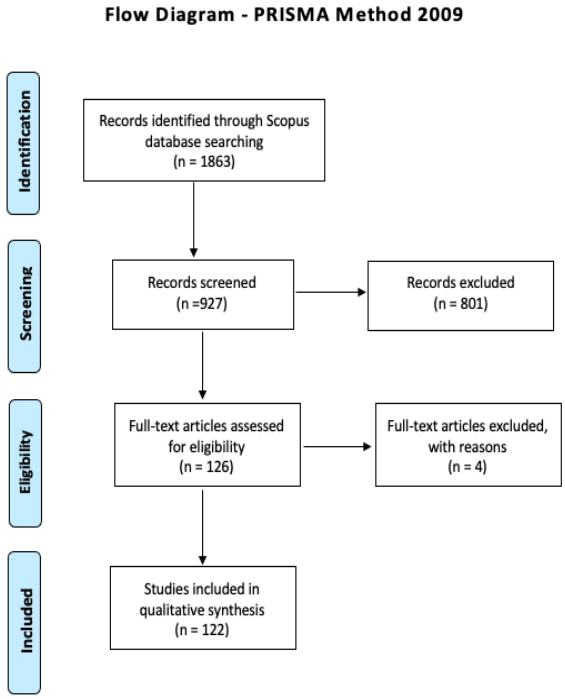

Figure 1. Prisma method – flow diagram

VoSviewer is a software tool that can be employed for the generation, visualization and analysis of bibliometric networks inclusive of research authors, journals, institutions and individual publications. In addition, the tool also facilitates the creation of network maps of co-occurring keywords sourced from the abstract and the main text body of research papers and articles by means of handling of vast volumes of data and has played a yeoman role in support of all the tasks examined in this study [35].

3. RESULT AND DISCUSSION

A comprehensive and detailed bibliometric analysis of the selected literature on digital entrepreneurship was conducted by the researcher for this paper. Data and methods described in Section 02 were employed for consideration of three perspectives – 1) Entrepreneurship ecosystem, 2) Innovation and Business growth, 3) Digital transformation. We, the authors have structured the results section in this way – Initially, the characterization of the sample of articles chosen by us for this investigation has been presented by us. Next, we present the analysis of the bibliographic coupling results depicting the conceptual structure of the articles included by us in this study, enabling us to establish a set of dominant themes for our research.

3.1 Sample characterization

Table 1. Summary of dataset

Description	Results
Documents	126
Journals	80
Time Period	1970-2022
No. of Authors	340
Single Authored papers	304
Multi-Authored papers	36
Author Keywords	468
Indexed Keywords	313
No. of Keywords	693
No. of Countries	54

Source: Authors' compilation

Table 1 provides a summary of articles resulting from the bibliometric search conducted on digital entrepreneurship. The data set consisted of 340 authors, 693 keywords, and 126 articles reviewed across 80 journals and 54 countries. The progress of research on digital entrepreneurship was studied from 1970 to 2022; it is a research field that has been developing mainly in the last five years. As supported by the data in Figure 2, research on digital entrepreneurship has gained encouragement after 2018 by seventy per cent. Furthermore, 2020 proved to be the capstone for research on digital entrepreneurship. The COVID-19 crisis embraced the requirement for digital transformation and accelerated the rise of digital entrepreneurial activities. The generation of the digital entrepreneurship movement was catalysed by means of technological assets such as – internet tools, information technology tools and communication tools developed since the last two decades.

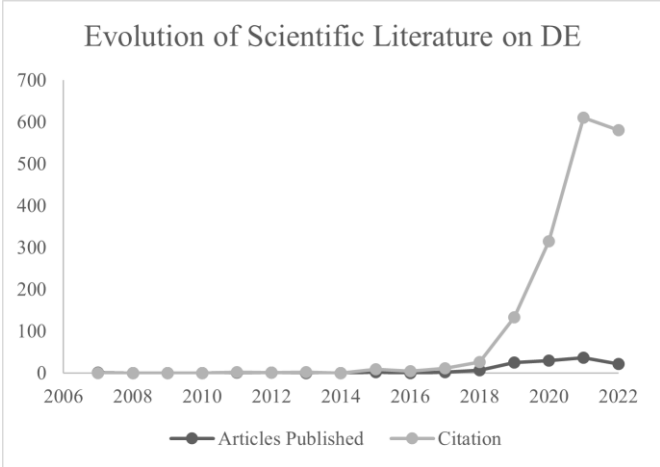

Figure 2. Evolution of literature on digital entrepreneurship

The upward trend in the evolution of literature on the topic of digital entrepreneurship has been depicted in Figure 2. The trend shows upward growth which reached its peak in the years 2020 – 21. The trend could be a sign of a change of interest in scientific research and the growing evolution of research on the field of digital entrepreneurship could be taken as a valid trend, in support of this.

Table 2 depicts the top 10 research articles related to E&C in terms of citations, author, year and date of publication. The data reveals that authors [38] have been cited most, terming their research article as the most influential and were followed by authors who are the second most influential with 104 citations to their name [11].

Table 2. Top 10 most cited documents

Rank	Title	Authors	Year	Publication	Citation
1	Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process	Elia et al.	2020	Technological Forecasting and Social Change	135
2	Taking advantage of digital opportunities: A typology of digital entrepreneurship	Hull et al.	2007	International Journal of Networking and Virtual Organisations	104
3	Digital startups and the adoption and implementation of Lean Startup Approaches: Effectuation, Bricolage and Opportunity Creation in practice	Ghezzi	2019	Technological Forecasting and Social Change	60
4	Digital entrepreneurship; An interdisciplinary structured literature review and research agenda	Zaheer et al.	2019	Technological Forecasting and Social Change	59
5	Linking information systems and entrepreneurship: A review and agenda for IT-associated and digital entrepreneurship research	Steininger	2019	Information Systems Journal	59
6	Digital entrepreneurship in a resource-scarce context: A focus on entrepreneurial digital competencies	Ngoasong	2018	Journal of Small Business and Enterprise Development	52
7	Market orientation in digital entrepreneurship; Advantages and challenges in a web 2.0 networked world	Hair et al.	2012	International Journal of Innovation and Technology Management	50
8	Fostering digital entrepreneurship from startup to scaleup: The role of venture capital funds and angel groups	Cavallo et al.	2019	Technological Forecasting and Social Change	44
9	The CAGE around cyberspace? How digital innovations internationalize in a virtual world	Shaheer et al.	2020	Journal of Business Venturing	43
10	The Smart City as an opportunity for entrepreneurship	Richter et al.	2015	International Journal of Entrepreneurial Venturing	43

Source: Taken from Vosviewer

3.2 Bibliometric analysis

The task of topic identification in a particular field has been facilitated by the method of keyword analysis. Conducting co-occurrence analysis revealed the hive of research areas and research trends in the field. A density map is generated for keywords with a co-occurrence more significant than twice, including 270 keywords in the map (Figures 3 and 4). On analysis of the presented data, we can indicate that, the attention amidst researchers for DE is on an increasing trend. By employment of the method of cluster analysis, the authors were able to determine six clusters, which reveal keywords that are closely associated with each other. Each individual cluster was given a unique colour for the demonstration of the themes contained by the co-occurring words. Figure 2 depicts the network of keywords that was acquired, based on the data got from the co-occurrence matrix of keywords. This diagram depicting the network has highlighted the co-occurring clusters of the constituent keywords, which suggest six different thematic clusters.

Among the top 10 keywords, some are related to business growth, such as SME, digital start-ups, business models etc., while others were related to technological transformation, digital innovation and sustainability.

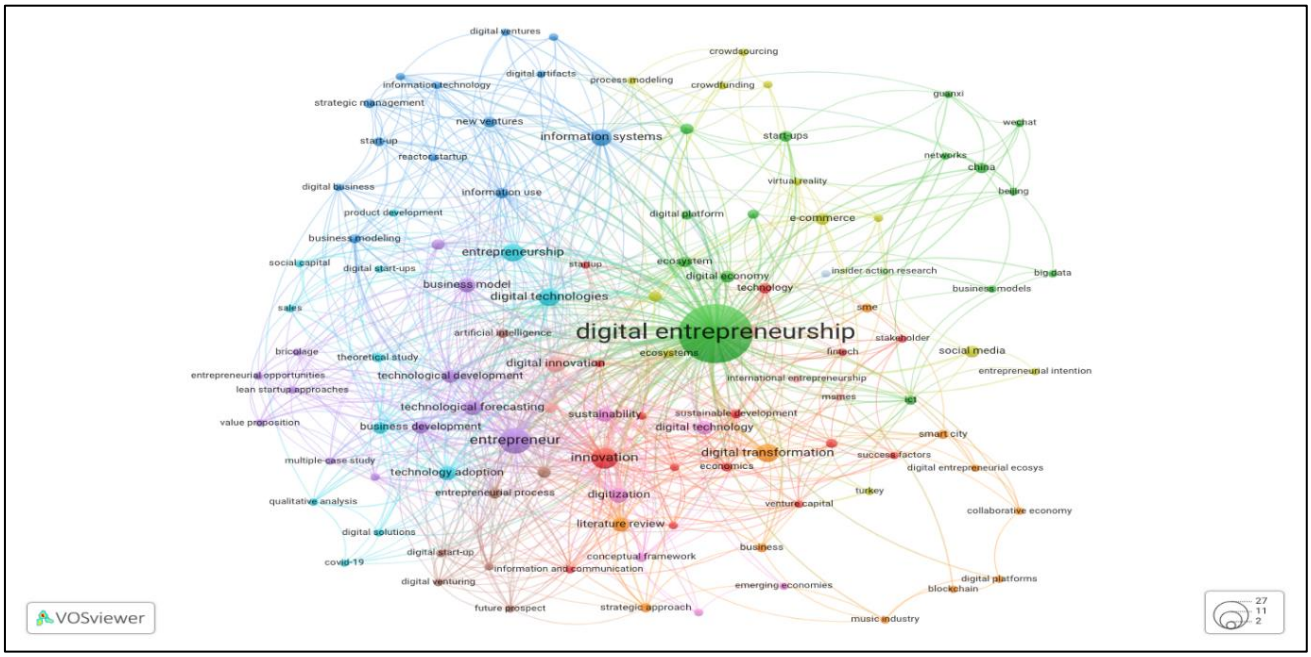

Figure 3. Keyword co-occurrence map for digital entrepreneurship

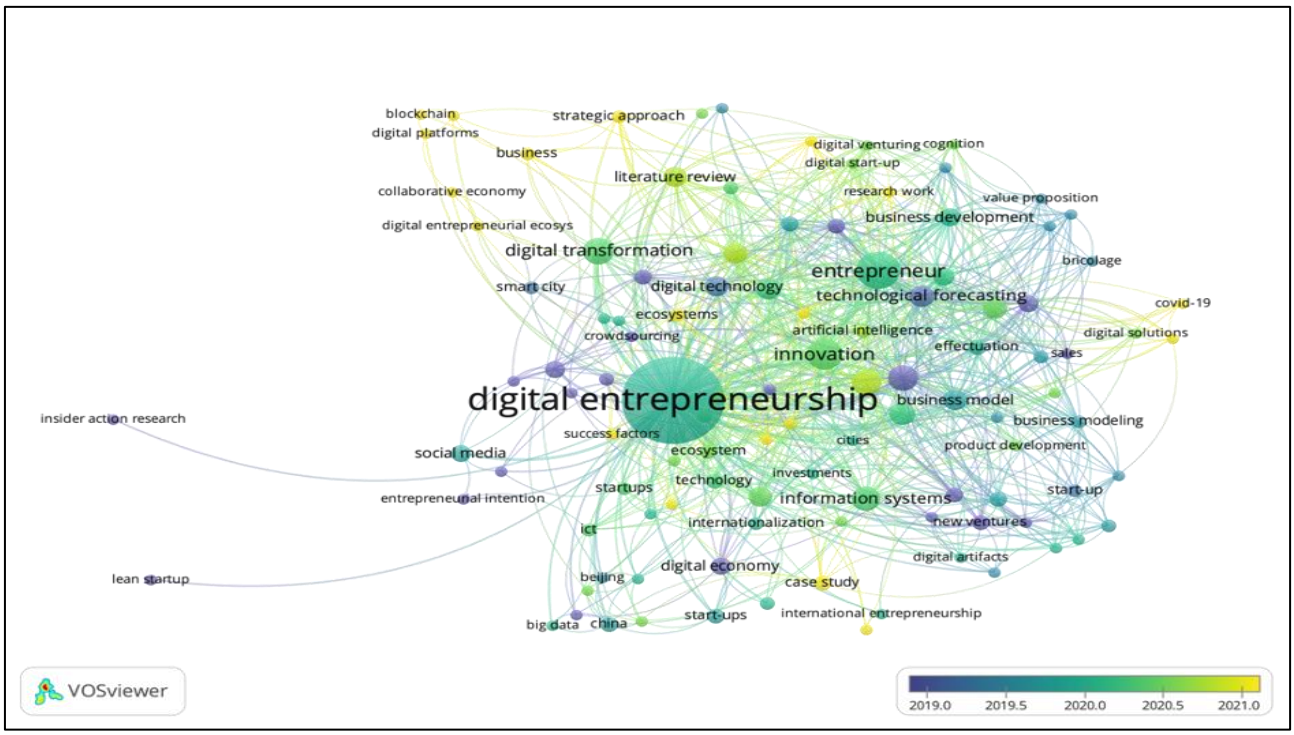

Figure 4. Overlay temporal of keyword co-occurrence map for digital entrepreneurship

Employment of the method of analysis of the co-occurrence of keyword (minimum, limited to 5 keywords) was done by the researchers in order to identify the research front on digital entrepreneurship through temporal overlap. The research front as discussed, Price [39] forms the growing point of literature and characterizes the non-permanent, transient, nature of the field that is research and can be called as 'dynamic analysis' because of the influence that has been had upon it by changes that have been made in the area of research along with the importance of a specific research line over the course of time. Identifying the research front assists scholars in highlighting the most recent trends in literature [40].

As depicted in Figure 3, a change has been observed in the level of interest in international research in the years that have gone by. From the initial observations in the field of financing and capitalization of businesses and enterprises (Keywords depicted in purple – business development, crowdsourcing, technological forecasting, business growth, sharing economy) a growing emphasis has been observed in the need for studying the topic of digital entrepreneurship as a separate field of research with an emphasis on the factors that differentiate them from the

Traditional entrepreneurship (the keywords in yellow: big data, strategic approach, entrepreneurship education, business ecosystem, digital platforms and collaborative economy). The relative emphasis on digital platforms, digital transformation, digital venturing etc. is playing the role for highlighting of the efforts put forth by the researchers in the task of analysis of the set of contextual and socio-economic factors for the facilitation of the change that is desired.

Figure 4 is a visual representation of the author's co-citation analysis. Out of a total sample population of 10,902 in the author co-citation network, 207 researchers were able to meet the threshold requirements of minimum 96 author co-citations. Three authors were identified as the most highly 'co-cited' authors in research articles on digital entrepreneurship and have been depicted in Table 3. The names of the authors are – 1) Nambisa, S (with 157 citations), 2) Davidsson, P (with 90 citations) and 3) Brem, A (with 72 citations). Researchers from the region of Europe and the countries of USA, Australia and Germany ranked highest on the lists. It is to be noted that the highly cited documents and research articles published by the authors have placed their primary focus on the two major lines of investigation of digital entrepreneurship namely - That which is in relation with the study of business factors associated with the process of growth and development in the realm of traditional entrepreneurship research with a later focus on the areas of technological adoption and the usage of digital platforms for further growth and expansion of businesses and ventures as observed from Table 4.

Table 3. Top 10 most-cited authors

Rank	Authors	Citations	TLS
1	Nambisan, S	157	7824
2	Davidsson, P	90	5371
3	Brem, A.	72	4271
4	Kumar, P.	71	4042
5	Wright, M.	71	3867
6	Iyytinen, K	68	3032
7	Henfridsson, O	62	2885
8	Yoo, Y.	61	2695
9	Kruas, S.	61	2631
10	Von briel, F.	45	2585

Source: Authors' Compilation

Table 4. Top 5 countries' highest articles and citations

Rank	Country	Documents	Citations	TLS
1	United States	15	339	4009
2	Italy	15	334	3932
3	Australia	15	265	5836
4	Germany	13	213	4607
5	United Kingdom	13	177	4981

Source: Authors' compilation

Figure 5 presents the top journals publishing digital entrepreneurship literature. Journal analysis and co-cited journal analysis can provide important information that can help researchers select appropriate journals for article submission. Through our research, we discovered that the top 15 most active journals publish less than a quarter of the total publications. The Journal of Technological Forecasting and Social Change followed by Journal of Strategic Information, Journal of Business Research, Technology in Society and Small Business Economics are the top 5 Publishers.

The majority of the papers (97%) were published in English because it is the only language used by many periodicals. Additionally, there are a few articles in Russian, French, Spanish, Slovak, Czech, and German. Authors belonging to 54 different countries, contributed their work in form of research papers and articles. However, the lion's share came from authors belonging to and from institutions located in the United States, the United Kingdom, Australia, Germany and Italia. Figure 6 depicts the countries with the highest number of publications. They work together more readily the closer they are.

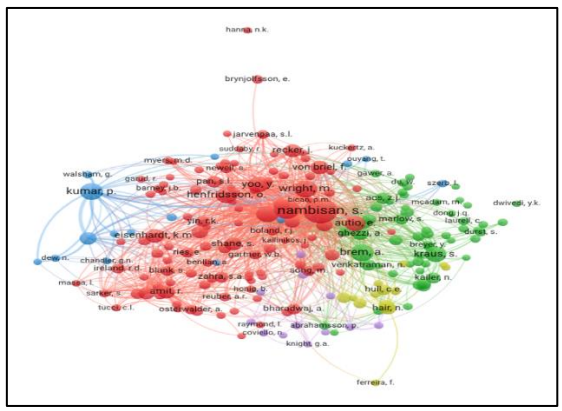

Figure 5. Authors co-citation analysis

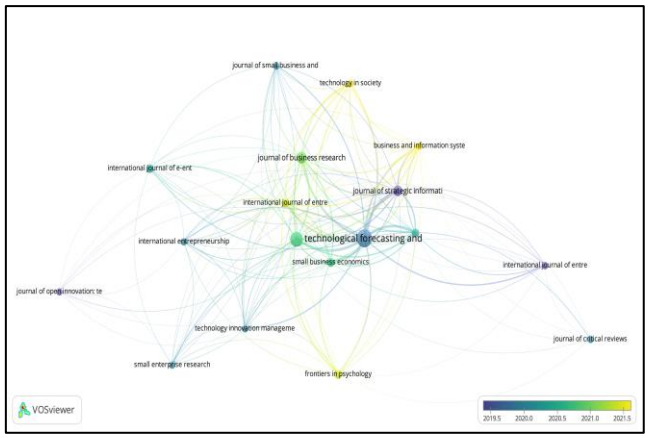

Figure 6. Scientific journals analysis of digital entrepreneurship

3.2.1 Clusters of digital entrepreneurship

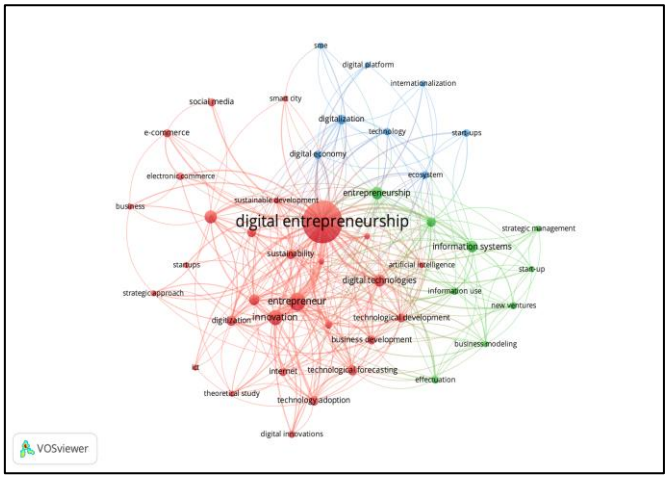

Figure 7. A minimum of 10 co-occurrence for author's keywords

The authors sought to gain an overview of the primary lines of research, and therefore resorted to the usage of the method of keyword co-occurrence analysis for the process of uncovering of key topics within the knowledge base of digital entrepreneurship to get the data that was desired. The researchers were able to cohere the most frequent topics being studied into three significant themes of relation with digital entrepreneurship and business, following the research effort of studying 693 keywords, out of which 46 were in congruence with the desired threshold and a minimum 10 co-occurrences per keywords were found as depicted in Figure 7. The researchers wish to state that, depending on the analysis, the same article can be grouped into multiple groups if the keywords contained within it arise from numerous groups. The top 5 keywords are shown in Table 5, along with their number of occurrences and keywords.

As emerged from the analysis Figure 8. The overall co-occurrences pertain to three themes: 1. Digital business framework and digital ecosystems (red cluster), 2. Technological development and sustainability of businesses (blue cluster), 3. Digital transformation and innovation in digital entrepreneurship (green cluster).

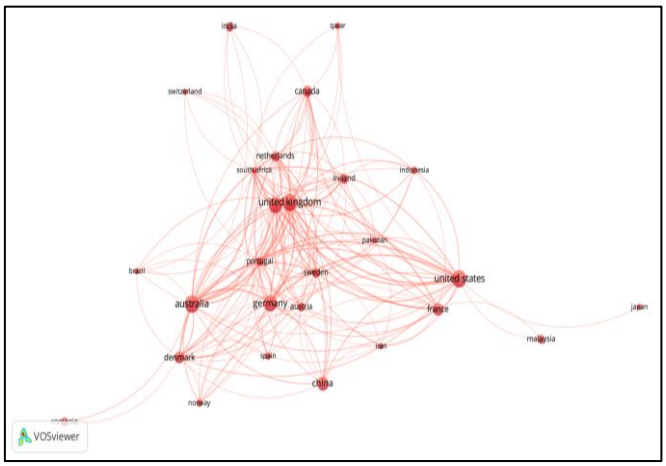

Figure 8. Country-wise analysis of digital entrepreneurship literature

Table 5. Top 5 most relevant keywords

Rank	Keyword	Occurrence	Link Strength
1	Digital Entrepreneurship	126	182
2	Entrepreneur	23	91
3	Innovation	16	72
4	Digital Technologies	11	33
5	Digital Transformation	12	39

Source: Authors' Compilation

3.2.2 Cluster 1: Digital business models and digital ecosystems

Cluster 1 discusses digital business models predominated in the current literature. The majority of the articles either directly or indirectly addressed the emergence of new business models [17, 41]. The articles, on the other hand, take a different approach and cover a variety of various business topics. This is because of the reason that the phenomena of digitalization have caused a large number of ramifications by means of hyper speed, disruptive changes. Entrepreneurs and Businessmen have a fundamental reason to familiarize themselves about the associated consequences and side effects of the pace of digitization and the emerging opportunities created as a result of the disruptions. Entrepreneurs and businessmen who do not make hay while the sun is shining, may risk having the opportunity being seized by their competitors while they are left high and dry.

The authors discuss not only new business models that have emerged as a result of digitalisation but also the obstacles and the opportunities that have been created as the result of the development of the new models of digital business and entrepreneurship. Nambisan [15] focuses on reimagining opportunities for digital entrepreneurship. A further investigation into the realm of possibilities that have been realized as an effect of the present era of digitalization was carried out by Davidson and Vaast [12]. Whereas Dutot and Van Horne [42] investigate opportunities made possible by digital consumption. According to Hair et al. [43], the significantly lower transaction costs of the digital economy make digital ventures far more accessible than traditional ventures.

The online sharing economy (also known as the sharing economy), according to Richter et al. [44], is a key source of innovative business models. The untapped capacities people offer to others in exchange for a benefit, whether monetary or non-monetary, are the foundations of the sharing economy [44, 45]. The sharing economy arose as a result of the opportunities made available to users by digital environments [44]. However, idle talents not only contribute to sharing economy-based business models, but entrepreneurs such as photographers and graphic designers use the sharing economy to market their work [46]. This has led to the birth of the digital business model, who is one of the most popular models today, the online sharing economy model. There is scope for research in the realm of entrepreneurship wherein determination can be done to identify whether sharing economy solutions hosted on digital platforms create new models of business in the market or are they the result of the replacement of old models with new ones. Popular examples in this area are the ride sharing app, Uber, the house and room sharing app Airbnb and the popular online knowledge platform, Wikipedia. These are but a few examples of solutions who carry out activities that are well known, but have transformed themselves in order to work on digital spaces and have been supplemented by the ways and

means of sharing private equity by means of the other players in the digital space, in the initial stage of growth of these models of businesses and platforms that allow users to share digital data without transferring actual storage objects were used.

According to the majority of the articles, digitalisation is causing an obstructive revolution in various domains of entrepreneurship. Hull et al. [11] distinguish between mild digital entrepreneurship, moderate digital entrepreneurship, and intense digital entrepreneurship when evaluating digital business models. The authors state that the distinction progresses from the process of employment of digital assets for various business processes towards managing a business completely online without any physical, brick and mortar, shop front location and the assessment of the amount to which the operation of these businesses has been enabled. Platforms also allow for greater flexibility when it comes to connecting features and individual digital configurations. This adaptability fostered entrepreneurial activities focused on developing innovative systems for use with digital technology [47].

Many articles discuss the term entrepreneurial process [48-50]. Business as we know, starts from the entrepreneurs who makes the initial investment and the effort for running the business. The process of entrepreneurship can be defined as the steps and processes the founder/s of a startup need to take from the conceptualization process of the business idea, the growth and development process to the end harvest stage, where they reap the results of the effort put forth by them. The process of entrepreneurship of digital entrepreneurship development is a popular and well debated topic in the realm of digital entrepreneurship. Conduct of a study on a large scale sample of entrepreneurs led to the discovery that the models of digital business are remarkably more different, more dynamic than the models of traditional businesses. The process of development of digital startups can be characterized by the process of repeated steps of redefinition.

One of the most critical phases of a business is the initial stage of growth which decides whether it will thrive or die, and the entrepreneurs and his team are the most vital components in this stage, as they are the ones who will determine the fate of the business. The time frames of entrepreneurial processes have seen a significant impact as a result of digitisation [51]. Digital technologies enabled much faster creation, modification, and replicating of product development phases than previously possible. In today's digital economies, experimentation and implementation processes are accelerated and restarted in much shorter time frames. Furthermore, on digital platforms, each period's beginning and end points are no longer clearly defined [15].

In comparison with the models of traditional entrepreneurship, the models of digital entrepreneurship of the today's world do not comply with the traditional, predefined blueprints of growth nor do they follow a highly defined plans of business. The digital world being a fast paced one, speed is of the foremost importance and thus a digital entrepreneur's behaviour and decisions are shaped throughout the process of entrepreneurship, based on the analysis of the various situations and paradigms they find themselves in. The ongoing, fast paced evolution of technology and interactions with the digital economy has caused, set the pace and has changed the paradigms and models of the process of digital entrepreneurship. As a result, the digital entrepreneur is confronted with increasingly dynamic paths determined by diverse activities with uncertain time frames [15].

3.2.3 Cluster 2: Technological developments of businesses

Being that the digital world is the key, companies cannot afford to be left behind and thus they have embraced the digitization and digital tools and apps in their various processes of business to create, modify and strengthen their processes of business in order to achieve the desired levels of competitiveness in the markets today. Apart from directly benefiting businesses, emerging technologies assist organisations in developing their workplace culture and improving the consumer experience [52]. Companies can use digital technologies to reassess their business operations, align resources, and develop capabilities in order to create a framework to drive innovation in business activities [53]. In addition to business applications, emerging technologies hold great promise for the general public, and many companies have begun to develop services in this area. It can be observed that emerging technologies solve business and public problems and contribute to the development of sustainable and innovative ecosystems for the planet without consuming many resources [54]. Entrepreneurs' digital technology usage can be based on their needs and motivations to use technology features to achieve their goals. As argued above, the entrepreneur's needs and motivations to use the features of digital technologies highlight the IT culture theory [55]. Research on individuals' motivation to use IT is a well-established topic in IS research; motivation is an essential predictor of technology acceptance and usage [56, 57].

During COVID-19, the financial technology (FinTech) sector expanded its services, particularly in emerging markets. Provision of access from the corporate level to the individual level for various financial services can act as a booster shot for the economy, enabling enhancement of the levels of income while increasing the levels of resilience and quality of life. The FinTech sector has also contributed for the process of pandemic relief effort in the time of the Covid and has lent a helping hand for Micro, Small and Medium size businesses (MSMEs). In spite of the fact that COVID-19 acted as a catalyst, accelerating the growth of digital initiatives and developments across the sectors, the benefit has not reached all, within the sectors and is causing many startups and small entrepreneurs to struggle through various financial difficulties leading them to be cautious and wary from taking major level risks ahead.

Several studies have investigated the challenges and opportunities associated with adopting innovative technologies aimed at businesses and organisations [58-60], both of which have been examined at three tiers: community, society, and lifestyle satisfaction. The findings in these studies, can encourage businesses in the development of their own, processes and technologies for business operations and management. Investigations in the nature of innovative technologies has revealed that it has the potential to grow in a rapid, uncontrolled way which can cause disruptions, negatively impacting the ecosystem, both economic and environmental and can cause various socio-economic problems. Increased consumption of resources is not good for the environment, whereas under consumption causes scarcity, affecting the performances of organizations, in the processes of businesses.

Digitalization can be seen as one of the binding mechanisms that provide a coherent connection between the various dimensions of the realms of the socioeconomic system namely

– technological, social, economic and ecological. As a result, digitalisation introduces new challenges to the resilience of socioeconomic systems; on the one hand, it brings opportunities, but it also presents unknown risks and unintended consequences [23]. As a result, addressing such challenges in a long-term and forward-thinking manner (which corresponds to the principles of the Sustainable Development Goals) is critical [61].

3.2.4 Cluster 3: Digital transformation and innovation

Entrepreneurship is increasingly being conducted through the use of digital platforms [62]. This is due to the need to develop digital-based business ventures that can compete in the global marketplace [63]. Digital platforms are a way for buyers and sellers to interact in an online format [38]. The platform itself can be accessed from any geographic location at any point in time, making it easier and more efficient to use [64]. Digital platforms utilise information and communications technology to collect and disseminate information [65]. In order to work effectively, digital platforms need to have several different services available on their websites in order to attract customers [66].

Studies have revealed that digital technologies have been manifested in the form of three distinct and inter related elements namely – 1) Digital artefacts. 2) Digital platforms. 3) Digital infrastructure. A digital artefact is a digital aspect, application, or media content that is part of a new product (or service) and provides a specific functionality or value to the end-user [25, 67]. A digital platform is a shared, standard set of services and architecture that houses complementary offerings such as digital artefacts [68]. In contrast to digital platforms, digital infrastructure has been defined as the sum total of all the digital technology devices, machines, resources and other digital infrastructure that provide a supporting hand for innovation, invention and entrepreneurship by means of capabilities in form of communication, collaboration and computing power. Such digital infrastructures have resulted in the democratisation of entrepreneurship [69].

Digital platforms are a valuable way for entrepreneurs to increase their market reach, enabling greater communication and accessibility for businesses, customers and suppliers [70]. By means of the digital platforms, it is possible for knowledge to be shared across a large number of people and entities and for information to be distributed and disseminated towards those in need of it, enabling the development of communities of practice, causing for the best practices followed across various organizations to be shared with other businesses and entrepreneurs. von Briel et al. [71] have discovered that newly formed social ventures can utilize the benefits of digital platforms as a mechanism that will facilitate them to compete in a better way in the marketplace. It has been observed that the level of penetration of digitization is on the lower side in the rural and farm based enterprises when compared to the urban enterprises where the penetration level is on the higher scale. This is due to many farm businesses relying on direct interaction and communication for sales [28].

With the advent of affordable computing, infrastructure and internet, digital technologies are becoming a vital and integral part of the corpus of entrepreneurial opportunity, both in terms of output and the process. Based on the study [72], entrepreneurial opportunity framework. We can divide digital artefacts, platforms and infrastructure into two distinct stratums namely 1) The Outcome represented by the digital artefacts and digital platforms and 2) The Process represented by digital infrastructure. Digital entrepreneurship is the critical driver behind the system of innovation. The reason behind this is because digital entrepreneurship affects several levels and the aspects of the system of innovation by making changes in the business system's overall structure comprising of the design, goals and network systems [26, 73].

Entrepreneurial activities are becoming the driving force for applying digital potential, making innovations and, as a result, the innovation system a metasystem [74]. By means of this, digital entrepreneurship, both as a process and the result is the road within the ecosystem of entrepreneurship connected with the creation of other ventures or the evolution of the established markets offering the chance for securing exciting and interested ways and means for the creation of value and is a primary driver of the innovation process [75]. The crucial role of digitization as a mechanism, encouraging transformation within the systems of innovation is proven by means of scientific research and policy related surveys. Consideration of the role played by digital entrepreneurship within the systems of innovation is essential for making sense of its potential impact on the areas of transformation and sustainable transitions of such systems.

In that case, we do not focus on entrepreneurial ecosystems individually [27, 76]. Entrepreneurial intents and subsequent decision-making processes during establishing a company's goals, identifying new ventures, measuring risks, and formulating appropriate business strategies are all influenced by the entrepreneurs' characteristics [77]. Previous attitudes around enterprise, facilitating conditions, perceived behavioural control, external influences, and the company's current digital maturity influence digital entrepreneurial perspectives [73].

The process of digital transformation makes an impact on the socioeconomic systems of the economy, causing changes in the various functions associated with businesses, with specific focus on those relating to resource demands, procedures of networking and the mechanisms of communications within the activities of entrepreneurship. Furthermore, the paradigm changing shifts enabled by digital transformation has an unintended impact on the societal system, which has had an effect on the overall levels of competitiveness, resilience and the viability of the systems of innovation. Digital transformation also plays an encouraging role in the process of development of new models of businesses or by causing changes, enabling in the realignment of the existing business models and has defined digital entrepreneurship as the process or an outcome of business activity.

Entrepreneurial expertise and career ambitions, and new venture development are crucial in determining the motivational process in digital and business involvement [18]. Digital competencies, in general, have become essential predictors of entrepreneurship. Digital abilities, on the other hand, should have been regarded as pre-requisites for consumer interaction, as they determine the ability to participate in the field and remain competitive [61].

Regarding human consequences, digitalisation or digital entrepreneurship can assist ethnic minorities in overcoming social placement and societal hurdles through enhancing family links, especially women entrepreneurs, and expanding opportunities for entrepreneurial activity. Access to inexpensive, dependable, high-speed internet connectivity remains a concern in many parts, including affluent countries. Creating a changing and volatile digital corporate culture and

addressing fears about digital entrepreneurship is also necessary to facilitate the establishment of online systems and applications [73].

These factors are essential for entrepreneurs in general but crucial for women entrepreneurs. Attempting to address issues such as barriers to entry and exit, business closure and creation, access to finance, bankruptcy restrictions, data and data protection regulation, competitive fragmentation—particularly for online and ICT-enabled infrastructure a perceived regulatory bias towards larger firms—all contribute to energising the business environment [22]. However, for (digital) entrepreneurs, inefficiencies in these areas cause friction and expensive regulatory uncertainty. There are also some distinctions between the difficulties that digital entrepreneurs face and those that meet entrepreneurs in general. Many digital entrepreneurs, for example, are "born global" or have the ability to grow and scale across boundaries rapidly. Much of a digital startup's capital is frequently intellectual, which can lead to concerns with Intellectual Property protection. Funding may be challenging when a successful innovation or start-up results from a series of losses [73].

4. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The study covers various publications in the course of this research. However, they have encountered a few limitations which need to be mentioned. There is a need for performance of a review of other databases for broadening the depth of the available bodies of literature and for highlighting the differences and similarities with the analysis presented in the course of this study. The researchers state that usage of various bibliometric indicators for the purpose of investigation into the fields of research could also be of interest in further research to be carried into this field and associated fields.

The use of the VosViewer 1.6.10 software tool for the performance of cluster analysis for distinguishing the boundaries of the available literature on Digital Entrepreneurship for this study. It is a tool that, while it has received widespread support from researchers [29], has some limitations, such as providing a limited number of connections that, based on similarities and co-occurrence methods, only take into account the occurrence of the keywords under consideration. If the search field is overly fragmented, this could be a limitation.

Future research should consider that an increasing number of women are participating in the growth of their businesses, which concerns simple entrepreneurial intent. When viewed from a pure, methodological vantage point of view, the authors anticipate the usage of diversified, mixed, quantitative and qualitative approaches towards research as these approaches may offer a more significant potential in a higher significance for analysis of subtleties and peculiarities that may broaden the depth of available research literature for the analysis of female issues in entrepreneurship. In addition, the growing availability of large data sets enables us to comprehend the potential disadvantages of various groups of entrepreneurs [78].

More study is needed to evaluate digital entrepreneurship business models. Aside from a better understanding of the fundamental mechanics and effects of platform strategies and social digital entrepreneurship, it is important to understand why, when, and how organisations opt to pursue a mild, moderate, or extreme digital business model. Furthermore, technical advancements such as advanced analytics and improved infrastructure will promote digitalization and the introduction of new business models.

5. IMPLICATIONS

Digital entrepreneurship is a minor component of the wider landscape of digital business research, representing for less than 10% of the sector's overall impact - yet its importance is growing. This study makes a significant addition by presenting the stages of growth in digital entrepreneurship research in the context of the broader literature on digital companies. We also advocate for a new phase of research to fill gaps and correct recognized deficiencies in current research efforts, resulting in greater relevance to practice. In that sense, we anticipate that research objectives in this progressive interdisciplinary subject will expand beyond explanatory research.

6. CONCLUSION

The objective of this systematic analysis was to investigate the scientific literature on the topic of digital entrepreneurship. In this analysis, the researchers studied 122 research articles and papers selected from the SCOPUS database with the help of the Vosviewer tool.

Business opportunities such as asset transfers, services, or the digitization of organizational procedures can enable digital entrepreneurship [79, 80]. The authors believe that the results of this systematic analysis can become an advantageous starting point for the task of contribution, which will cause an increase in the clarification of the scientific literature, which has given forth a wide range of topics for research but is subject to some limitations, a few of them is not easy to define. The authors have made use of the holistic approach towards research in our analysis to provide a speaking voice for the various contributions of theoretical nature that have attempted the explanation the various facets associated with the lines of research. The synthesis of topics of interest of recent date amidst the scholars has led to the formation of several topical clusters and a shift in interest over the course of time, from a study that had placed economic issues as its aim objective towards an analysis that broadens the depth of the factors contributing towards the development of platforms of digital entrepreneurship.

The synthesis of recent topics of interest among scholars has resulted in numerous topical clusters and a shift in interest over time, from a study aimed at economic issues to an analysis that deepens the factors contributing to the development of digital entrepreneurial platforms. The authors state that they have covered various publications in the course of this research. However, they have encountered a few limitations which need to be mentioned. They feel that there is a need for performance of a review of other databases for broadening the depth of the available bodies of literature and for highlighting the differences and similarities with the analysis presented in the course of this study. The researchers state that usage of various bibliometric indicators for the purpose of investigation into the fields of research could also be of interest in further research to be carried into this field and associated fields. The authors state that they had made use of the VosViewer 1.6.10 software

tool for the performance of cluster analysis for distinguishing the boundaries of the available literature on Digital Entrepreneurship for this study.

It is a tool that, while it has received widespread support from researchers [77], has some limitations, such as providing a limited number of connections that, based on similarities and co-occurrence methods, only take into account the occurrence of the keywords under consideration. If the search field is overly fragmented, this could be a limitation.

In this regard, the works found in the literature review addressing the proposed relationships for developing countries are limited. Future research should consider that an increasing number of women are participating in the growth of their businesses, which concerns simple entrepreneurial intent. When viewed from a pure, methodological vantage point of view, the authors anticipate the usage of diversified, mixed, quantitative and qualitative approaches towards research as these approaches may offer a greater potential in a higher significance for analysis of subtleties and peculiarities that may broaden the depth of available research literature for the analysis of female issues in entrepreneurship. In addition, the growing availability of large data sets enables us to comprehend the potential disadvantages of various groups of entrepreneurs [78].

Being that the world of today is observing rapid changes, transformation and paradigm shifts brought as the process of digitization, businesses, entrepreneurs, companies, products and services are rapidly becoming more congruent by enabling such changes today, opportunities, infused with digital technologies are being created in the markets. This is the foundation of the digital research agenda that has been proposed here. Therefore, the research questions and issues raised and discussed in this study can inspire and guide future research contributions to this topic area.

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