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Technological interventions in social business: mapping current research and establishing future research agenda

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Abstract: Social businesses, despite having a huge potential to generate substantial and sustainable value, are often structurally and financially fragile. Technological interventions, such as social media analytics, big data, Internet of Things, and blockchain can help social businesses by leveraging the practices towards financial and operational sustainability. This study is the first of its kind in that it analyses existing scholarly works on social businesses using bibliometric analysis. In so doing, this paper presents an in-depth statistical analysis of the literature on technological interventions in sustainable social business, showcasing the development of the scholarship, major themes, and possible future research trajectories. The SCOPUS database is used to identify a large section of articles. The study shows that most of the work in social business has been done by scholars based in developed countries, with limited contributions emanating from developing countries. The study proposes a framework for the use of technology in sustainable social businesses with focus areas of research such as social innovation, digital technology, information systems, and decision making for sustainability. The results show that digital technologies are increasingly being accepted as tools for the sustainability and scalability of social businesses. The paper offers useful recommendations for future research in relevant fields.

Keywords – Technological Intervention; Sustainable Social Business; Industry 4.0; Big Data; Sustainability; Bibliometric Analysis

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1. Introduction

Social business (SB) as defined by Yunus (2007) is a market-based business which exclusively focuses on social causes and gives priority to social benefits instead of gaining profit for self-interest (Spieth et al., 2018). Creating economic, social, and environmental value is imperative for developing a business that integrates the potent pool of resources (Hahn, 2012; Gold et al., 2020). Therefore, SBs redefine the purpose by strategizing cost recovery and attain sustainability to achieve the goals associated with social values (Babu et al. 2020; Engelke et al. 2015; Yunus et al., 2010). These ventures are a combination of businesses that aim to achieve social goals while simultaneously ensuring commercial success by playing a dual role of a business and a charity organization (Battilana and Lee 2014; Wilson and Post 2013). According to Yunus (2007), there are two types of SB. The first category involves the businesses that prioritize social benefits over profit maximization. These are run mostly by the investors who intend to work on poverty reduction for the unprivileged populace. A poor individual or community who intends to maximize profit owns the second type of business. In such businesses, dividends and equity growth are utilized to aid the poor by improving their quality of life. Technological intervention can support both forms of SB (Rahman et al. 2019; Dey et al. 2018).

Building a sustainable community is becoming a key goal of modern business ventures (Jabłoński and Jabłoński, 2019; Wulandhari et al. 2021). In the current scenario, the business models are often less prioritized in social and public services (Ashraf et al., 2019). While balancing economic, social, and environmental goals, the consideration of business and financial sustainability ought to be highly imperative. Hence, the concept of sustainable social business (SSB) has received increased attention amongst researchers and practitioners (Chesbrough 2010; Foss and Saebi 2018; Neumeyer and Santos 2018). In order to achieve sustainability, digital technology is considered to be of great significance (Gouvea et al. 2018; Luthra et al. 2018; Acquiera et al. 2017), where it leverages the business ecosystem by creating favorable conditions for implementing the constructs of the SB (Presenzaa et al. 2019; Täuscher and Abdelkafi, 2018; Dora et al. 2020). Digital technologies extend the social benefit ecosystem for the population existing at the bottom of the pyramid (BOP) thereby bringing services, such as social health insurance, education subsidy, fertilizer subsidy, and the public distribution system under one umbrella (Dey et al. 2016). These technologies also aid organizations in achieving sustainability in many ways. For example, cloud computing allows

small business organizations access to significantly large computing power (Domdouzis, 2015). Hence, it can be claimed that SSB thrives with the use of appropriate technologies.

The successful operations of an SB entail information exchange, knowledge management, business acceleration, and product and service innovation (Yunus, 2007). Digital technologies, such as the Internet of Things (IoT), blockchain, cloud computing etc., play a crucial role in efficient and creative knowledge management (Ferreira et al., 2015; Calabrese et al., 2020). Hence, technology use by small organizations can bridge the digital divide between large and small enterprises and support balanced development across the economic spectrum (Peerally et al., 2019; Purcell and Toland, 2004). The economy based on digital technology enables the implementation of inclusive tools, such as the sharing economy (Frenken and Schor 2017), the IoT (Metallo et al. 2018), big data (Brock and Khan, 2017), and the concepts of the circular economy (Geissdoerfer et al. 2018). These tools and concepts are considered as the drivers of SSB (Spieth et al. 2018; Vendrell-Herrero et al. 2018).

SB research is in a nascent stage; hence, it requires a comprehensive picture representing the growth of the field across various dimensions (Babu et al. 2020). There is limited evidence of review articles on SBs in leading business and management periodicals. Ariza-Montes and Muniz (2013) reviewed the virtual ecosystems in SB incubation where a review of social entrepreneurial empowerment was performed with a specific focus on identifying the projects that use technologies to deliver services and obtain information about a large number of communities with no limitations. Irene et al. (2016) reviewed various accounting frameworks with respect to the indicators and metrics applied to measure the performance of SB sectors. They presented the strengths and weaknesses of several models, used from the point of view of their capability to address the goals and motivation of various stakeholders involved in SB ecosystems. Ashraf et al. (2019) performed a systematic literature review of SB articles published in the context of emerging economies. They used a narrative synthesis of the variations existing in social-oriented models, frameworks, and interventions. Chaudhuri et al. (2020) carried out a bibliometric analysis to provide a synopsis of scholarly research on SB enterprises. Their work attempted to identify thematic clusters of research in the field. However, there is a lack of evidence in review articles that trace the growth of the literature on the use of technological interventions in SSB from the various disciplines of science, engineering, and business, despite the significant surge in scholarly works in this area. Therefore, there is a pressing need to carry out quantitative research to formulate a premise and

characterize a framework that can exhibit the underlying research themes and prescribe directions for future research in the context of SSB.

With these goals, a plethora of bibliometric and econometric tools are applied in this paper. Bibliometrics are used to standardize and analyze varied sources of information (Gil-Doménech et al., 2020; Baker et al., 2020). Bibliometric analysis is used to summarize the most representative results of a set of bibliographic documents (Martinez-Lopez, 2018). In this paper, bibliometric analysis is used to obtain an overview of existing research work on the use of technology for SSB so as to define the current trend and future research trajectories in the relevant scholarship. This paper identifies and analyzes prominent researchers, academic journals, and their semantic association and intellectual clusters. Also, the underlying thematic areas enveloping the framework and future directions are proposed. This bibliometric study contributes by delivering answers to the following research questions:

RQ1. How has the scholarship on technological interventions in social businesses evolved?

RQ2. What are the underlying themes of research in the technological interventions in sustainable social business?

RQ3. What external conditions are responsible for the evolution and growth of the scholarly works in the relevant areas?

RQ4. What is the underlying framework for the use of technology in sustainable social businesses?

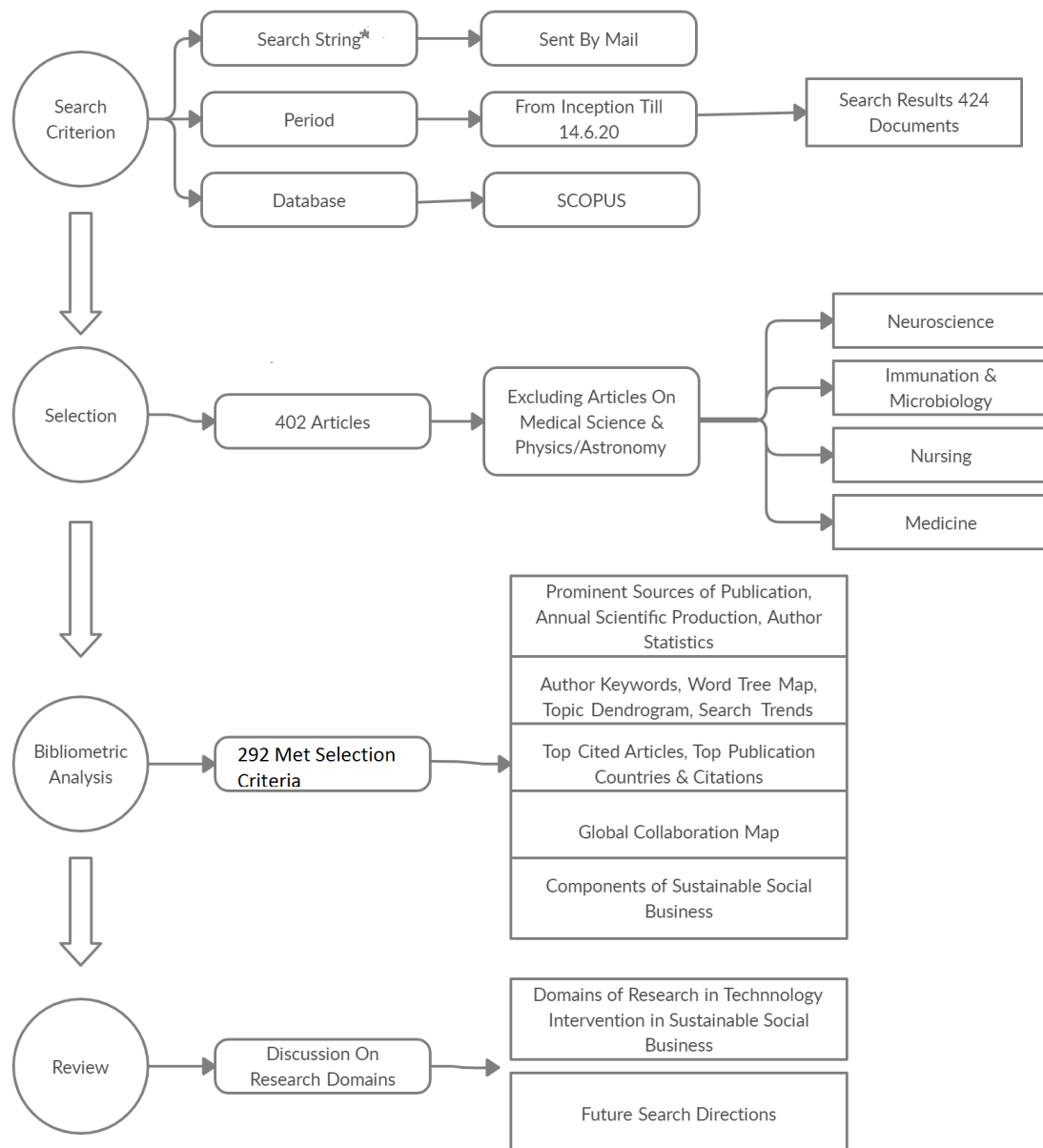
RQ5. What should be the direction of future research in this domain?

The paper is structured as follows: the next section describes the methodology of bibliometric analysis. Subsequently, the following section presents bibliometric analysis. The framework on the use of technology in SSB is unveiled in Section 4. Critical discussion on the findings along with contributions of the paper are presented in Sections 5 and Section 6 respectively.

2. Methodology

Bibliometric analysis is a process of examining the state of research in a given field (Gaviria-Marin et al., 2019; Randhawa et al., 2016; Cobo et al., 2011; Chao et al., 2007). It maps the terrain of the research and its evolution. According to Zupic and Cater (2015), the

methodology of bibliometric analysis comprises five essential stages: design of a research, preparation of a sample of articles, presentation of the data, analysis of the data, and presentation and interpretation of the results. The review methodology for this paper, developed following the relevant literature (Zhanga et al., 2020; Zupic and Cater, 2015), is presented in Figure 1.



* String: ALL (("social business" OR "social enterprise") AND ("sustainability" OR "sustainable" OR "circular economy" OR "recycling")) AND ABS ("blockchain" OR "IoT" OR "Internet of Things" OR "industry 4.0" OR "artificial intelligence" OR "machine learning" OR "neural network" OR "digital technology" OR "information and communication technology" OR "ICT" OR "big data" OR "social media" OR "analytics" OR "data analysis")

Figure 1: Review methodology (adapted from Zhanga et al., 2020)

The design of this research is based on the research questions posed at the beginning of the paper. The preparation of sample articles starts with the selection of keywords. Since the study is based on bibliometric analysis in the domain of SB, 'social businesses' was used as a search keyword on the Scopus database (Oakleaf, 2010). The search returned 4,487 results. However, another possible keyword close to 'social business' (SB) as it is used in the literature is 'social enterprise' (SE), which returned 15,168 results. As per the objective of this research, the role of sustainability in technology-enabled SB needed to be investigated. Thus, another set of keywords were included in the search: 'sustainability', 'sustainable', 'circular economy', and 'recycling'. The search returned 8,005 results. Subsequently, in order to focus on the technological interventions in sustainable SB or SE, another set of keywords was included in the search string. The new set included 'blockchain', 'IoT', 'Internet of Things', 'industry 4.0', 'artificial intelligence', 'machine learning', 'neural network', 'digital technology', 'information and communication technology', 'ICT', 'big data', 'social media', 'analytics', 'data analysis' in abstract (the complete search string is given in in Figure 1). The final search string in Scopus resulted in 424 articles. In this sample, some of the articles were not related to the topic under investigation, such as those in medical journals. A total of 292 articles were found to be relevant to the investigation and which had been published between 2005 and 2020.

After designing the research phase, the second stage involved the application of an open source statistical software R studio with the *bibliometrix* package to carry out a bibliometric analysis of the aggregated sample articles. The analysis and subsequent stages are given in the next sections.

3. Bibliometric Analysis

The analysis starts with a basic presentation of descriptive bibliometric statistics. The latter part of the analysis involves author statistics, some important indicators of the research field, and the country statistics of the publications.

3.1 Bibliometric statistics (descriptive)

The basic descriptive data of bibliometric statistics is presented in Table 1.

Table 1: Statistical summary of data

Description	Results
Timespan	2005:2020
Sources (Journals, Books, etc.)	292
Average years from publication	3.29
Average citations per documents	10.09
Average citations per year per doc	2.033
References	31505
<i>Document types</i>	
Article	239
Article in press	1
Book	23
Book chapter	39
Conference paper	71
Conference review	1
Editorial	2
Note	1
Review	16
Short survey	1
<i>Document contents</i>	
Keywords plus (ID)	1288
Author's keywords (DE)	1222
<i>Author's data</i>	
Authors	1002
Author appearances	1074
Authors of single-authored documents	68
Authors of multi-authored documents	934
<i>Author's collaboration data</i>	

Description	Results
Single-authored documents	73
Documents per author	0.393
Authors per document	2.54
Co-authors per documents	2.73
Collaboration index	2.91

The earliest work of Nicholls and Opal (2005) marks the beginning of the use of technology to achieve sustainability in SB. The authors of the book presented a compendium of fair-trade practices in supply chains and the digital technologies that can help in establishing standards in international supply chains. A total of 292 sources (including journal articles (238), conference papers (71), book chapters (39), books (23), editorials (2), notes (1), reviews (16), and short surveys (1)) were found covering the topic. The number of phrases appearing frequently in these articles is 1,222 while the number of authors is 1,002 with only 68 single-authored and 934 multi-authored articles. The lack of difference between the keywords plus (i.e., words frequently occurring in titles) and the authors' keywords gives an indication of the accuracy of the search criteria which appear close to these figures. Another interesting indicator is the collaboration index (CI), which gives the ratio of the number of authors in the articles that have more than one author and the number of articles which have more than one author (Elango and Rajendran, 2012), which was calculated to be 2.91 in this case. This indicates that, on average, every article published in this area has approximately three authors. It indicates the existence of a good collaborative network in this area of research.

Table 2 indicates the top 20 prominent sources of publication. It can be observed that the majority of the prominent journals, such as *Sustainability* (Switzerland), *Journal of Cleaner Production*, *Technological Forecasting and Social Change*, *Journal of Business Ethics*, *Computers in Human Behavior*, and *Journal of Business Research*, promote research in SSB while other technology-oriented journals on information systems (IS)/management focus on the applications of digital technologies as an aid to help SBs perform. Table 2 indicates the top 20 prominent sources of publication.

Table 2: Top 20 prominent sources of publication

Sources	Articles
Sustainability (Switzerland)	13
ACM International Conference Proceeding Series	10
Information Technology for Development	7
Electronic Journal of Information Systems in Developing Countries	6
International Journal of Information Management	5
Journal of Cleaner Production	5
Journal of Islamic Marketing	5
Technological Forecasting and Social Change	5
IFIP Advances in Information and Communication Technology	4
Journal of Business Ethics	4
Computers in Human Behavior	3
Economics: Concepts Methodologies Tools and Applications	3
Information and Management	3
International Journal of Sociology and Social Policy	3
Journal of Business Research	3
Journal of International Development	3
Proceedings of the Annual Hawaii International Conference on System Sciences	3
Social E-Enterprise: Value Creation Through ICT	3
2018 Open Innovations Conference OI 2018	2
20th Americas Conference on Information Systems AMCIS 2014	2

Figure 2 represents a list of annual scientific productions. The very first article came in 2005, but the rate of publications is slower in the initial years compared to the period beyond 2015. The rate of publication increased after 2015, which may be attributed to the increasing focus on sustainability along with the rise of technological interventions, such as IoT, blockchain technology, use of social media for businesses, machine learning (ML) etc.

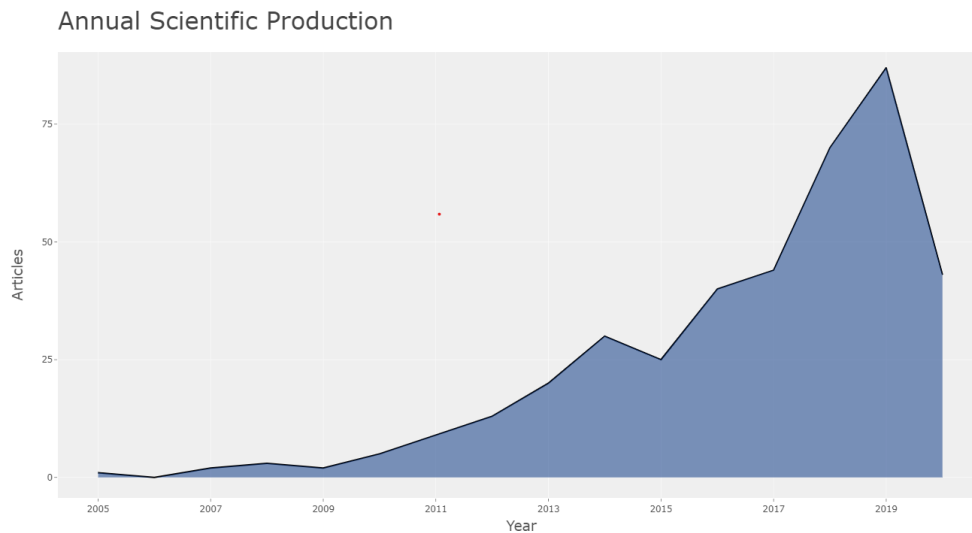


Figure 2: Annual scientific production

3.2 Author statistics

This subsection lists the most prominent authors, who published on leveraging sustainability in SB using technological aids. Significant author(s) keywords, factor of dominance ranking, along with their citations are presented here. Table 3 represents the number of articles by the top 20 authors.

Table 3: Number of articles by top 20 authors

Authors	Articles
Bonomi S	4
Ricciardi F	
Rossignoli C	
Achtenhagen L	3
Ahmed A	
Anouze Al	
Duane A	
Henoch B	
Lokeshkumar R	
Luong Q	
O'reilly P	
Osman Ih	
Andreev P	2
Aoun C	
Ariza-Montes Ja	
Asongu Sa	
Benitez-Amado J	
Benitez J	
Benyoucef M	
Bernardino S	

3.3 Keywords search

The link between the various keywords of the study, such as ‘social business’, ‘social enterprise’, ‘sustainability’ and various technology-related keywords, is investigated. The purpose of such analysis is to find out underlying trends, gaps in knowledge, and associated fields of research, which may be of interest to the reader. Table 4 presents the 20 keywords most frequently used by (s) ranked in order of occurrence.

Table 4: 20 keywords most frequently used by author(s)

Words	Occurrences
Social media	47
Sustainability	17
ICT	14
Blockchain	12
Social enterprise	12
Social entrepreneurship	12
Social innovation	12
Case study	9
Development	9
Crowdfunding	8
Business model innovation	7
Facebook	7
Innovation	7
Social enterprises	7
Twitter	7
Big data	6
Digital divide	6
Social business	6
Entrepreneurship	5
ICTs	5

The ranking presented in Table 4 is based on the elements used in the search string explained earlier. Some notable aspects include issues such as social media, social innovation, crowdfunding, digital divide and ICTs. Innovation is increasingly being considered an integral component of effecting sustainable change in a society. Hence, we can see the increased use of the word ‘innovation’ in the literature on SBs. In order to bring about sustainability in SBs, it is important to be innovative with the use of IT strategies, such as crowdsourcing, social media and blockchain technologies.

The Word Tree Map (in Figure 3) is an indicator of the prominence of keywords in the searched area.

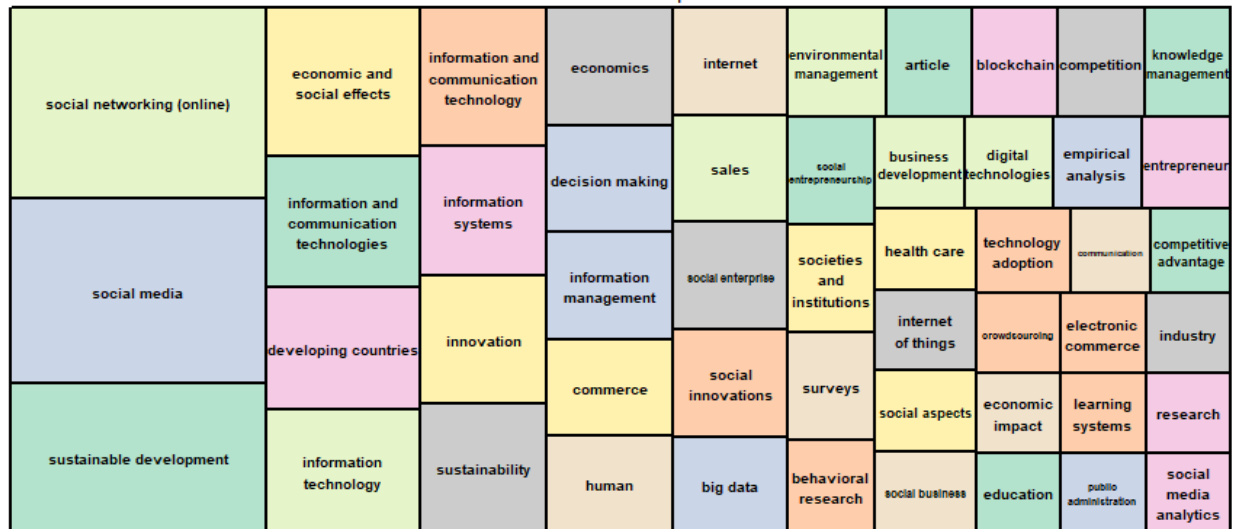


Figure 3: Word Tree Map

It is evident that social networking (SN), social media (SM), and sustainable development (SD) are primary keywords, while social media analytics, electronic commerce, knowledge management, Internet of Things etc. appear at the other end of the spectrum.

Figure 4 presents a topic dendrogram, which is a depiction of the possible relationships between various keywords. It is an estimate of the approximate number of underlying classes of subject-specific clusters which define the research domain (Andrew, 2003). In the research area of achieving sustainability in social businesses with technological aids, there are two strands in the dendrogram. The first strand, in red, collectively represents ‘business research’ as a whole, containing keywords such as ‘industry’, ‘commerce’, ‘competition’, ‘surveys’, and ‘competitive advantage’. In contrast, the second strand, which is much wider, represents the ‘social’ component of SBs with keywords such as ‘economic and social impact’, ‘developing countries’, ‘sustainable development’, ‘social aspects’ etc. and other supporting technology words, such as ‘blockchain’, ‘crowdsourcing’, ‘big data’, ‘information management’ etc.

SB is about developing a model that is self-sustaining, that sells goods and services, and that repays its owners' investments but whose primary purpose is to serve the society (Yunus et al., 2010; Gali et al., 2020). A continuous extraction of non-renewable sources of raw materials and energy has led to severe sustainability problems around the world. However, the essence of sustainability remains at the core of any SB and underpins its philosophy. The components of sustainability are defined in terms of economic aspects, social aspects, and

environmental aspects. Some keywords, like ‘entrepreneur’, ‘business development’, ‘innovation’, ‘learning systems’, ‘public administration’, and ‘health care’ in the dendrogram, are indicative requirements for innovation in the new form of business (Giudice et al., 2019), which is often driven by technological aids, such as the use of ‘information and communication technology’ where ‘social media’ plays a larger role in disseminating the ultimate goal of an SB, i.e., to serve the society. The cost efficiency for SBs cannot be achieved without an efficient use of technological aids, such as blockchain technology, information and communication technology, artificial intelligence (AI)-driven ML, big data-driven decision support systems, and IoT. From the dendrogram, one can also find an evidence of work in healthcare and education, which is at the forefront of bringing SB into the limelight.

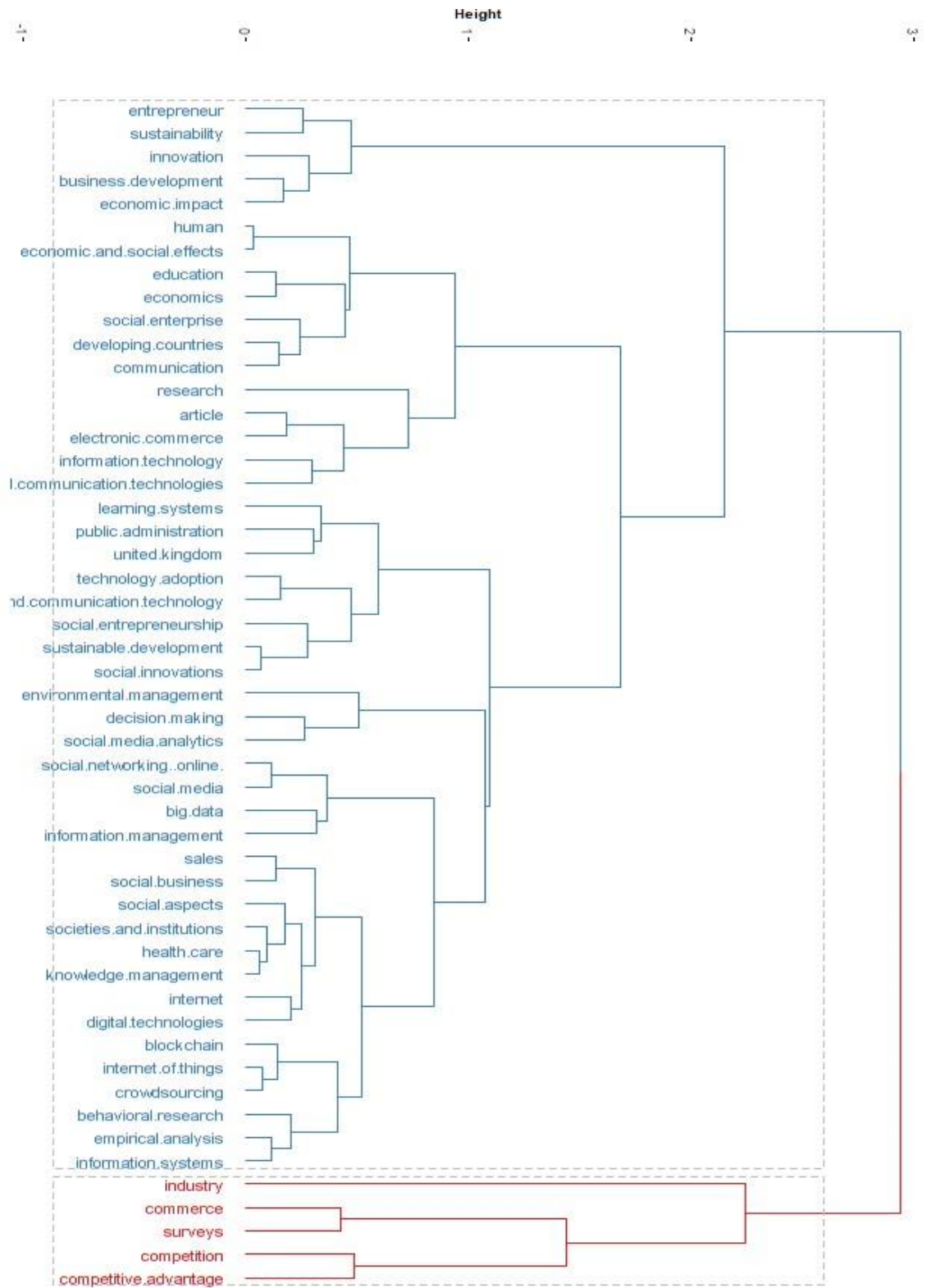


Figure 4: Topic Dendrogram

Search trends on the basis of keyword analysis are presented in Figure 5. It covers the period of growth in the literature from 2012 onwards. In the left side of the figure, one can observe that keywords such as ‘information and communication technology’, ‘developing countries’, and ‘information technology’ are used. However, over time, keywords like ‘social media’, ‘blockchain’, and ‘sustainability’ have become much more prevalent. Figure 5, thus, helps in identifying an underlying trend in the use of keywords and possible paths for the evolution of scholarship in the relevant fields. It seems that the advent of information technology laid the foundation of the research on SBs. Kiron (2012) argued that the organizations who intend to change their cultures to be more compatible with SBs consider the use of IT tools such as social software. The respondents of their study commented that in the coming years, IT interventions would be much more popular in SBs related to energy and utilities (46.8% of respondents), manufacturing (50% of respondents), and financial services (58.4% of respondents). This trend is evident in Figure 5, where communication technology permeates across SBs. Besides social media software, IT tools also include communication technology, such as mobile telephony.

Another impetus of growth was provided by the advent of big data analytics in 2016. Abundant data on social problems can be facilitated by big data analytics and ML. In the post-2017 literature, social media has also gained prominence and become a significant element in the growth of the concept of SB, which also incorporates customer and business engagement (Babu et al. 2020). Since SBs are predominantly driven by collaborative communities, the readymade support provided by social media makes it a formidable tool. It enhances the scalability of business in collaboration with communities that are creating and supporting their own ecosystem (Dey et al., 2019; Dora, 2019). The business processes with the use of social media are easily maintained, refined, and updated. It also facilitates the forums of change and impact across an organization, thereby removing isolation (Dey et al., 2018).

All the above-mentioned factors have made social media an integral part of SB (Yusuf et al., 2018). In addition, social media reduces the cost of interaction and extends the reach and audience of SBs. Social media platforms like Facebook, Instagram, and Twitter can improve and intensify the interaction between SBs and their target audience (Mukkamala et al., 2018). It helps involve the customers in understanding the importance of SBs (Yusuf et al., 2018). The latest development is the use of blockchain technology, which is used to leverage the trust, transparency, and auditability of SB operations (Mukkamala et al., 2018 a, b). In the context of social causes like poverty, community healthcare, and other social welfare activities,

blockchain can play a major role by helping SBs improve their trust-based relationships with social investors and sponsors. Due to blockchain technology, SBs currently are not simply an intermediary in the financial transactions; they now also have an opportunity to become a trusted and strategic stakeholder within the business ecosystem (Mukkamala et al., 2018a, b; Arena et al. 2018).

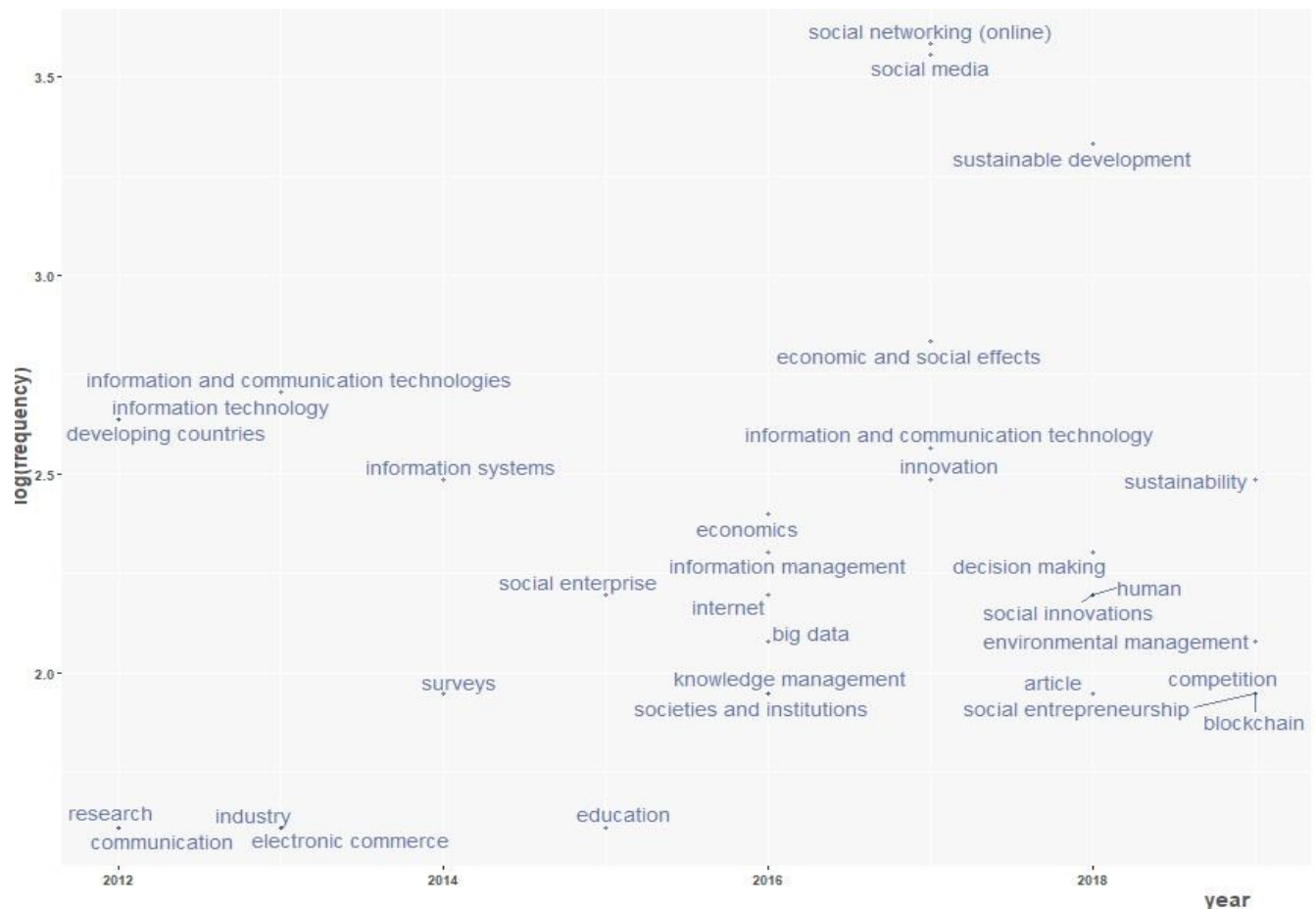


Figure 5: Search trend

3.4 Country

This section highlights the geographic dispersion of research in technology use to aid SSB. It covers published articles in various regions of the world, the total number of citations, and the network of collaboration with respect to region and researchers.

In Table 6, the top 20 countries with regard to the total number of articles published are presented. The leading country in this research is the USA with 100 articles. Nine countries in the top 20 list are from the European region. In addition, China (44), India (30) and Malaysia (27) are amongst the Asian countries in the list. However, scholars from developing and

emerging countries have limited representation in the list. Indeed, the concept of SB with technological aid seems to be more prevalent amongst the scholars based in the West.

Table 6: Top 20 countries w.r.t total number of articles published

Sl.No.	Region	Frequency
1	USA	100
2	UK	71
3	Australia	55
4	China	44
5	Spain	34
6	Italy	33
7	Brazil	30
8	India	30
9	Germany	27
10	Malaysia	27
11	South Africa	23
12	Indonesia	20
13	Canada	18
14	Netherlands	12
15	France	11
16	Portugal	11
17	Sweden	11
18	Finland	10
19	Ireland	10
20	Austria	8

Country scientific production is shown in Figure 6, which indicates the country of affiliation of the first author of each paper. The research can be clearly seen to be prevalent in the USA, Canada, some parts of South America, Australia, New Zealand, India, China, the Middle East, Europe, and some parts of Africa. This pattern indicates the higher awareness of the West of SB initiatives. However, some developing countries, like India and parts of South America, also exhibit growing interest in SB, which can be attributed to the uptake of technology, such as smart devices and social media (Ramani et al., 2017; Sonne, 2012, Ashraf et al., 2019). Grey regions in the world map represent no research at all, while the darker shade of blue indicates the higher frequency of scholarly works.

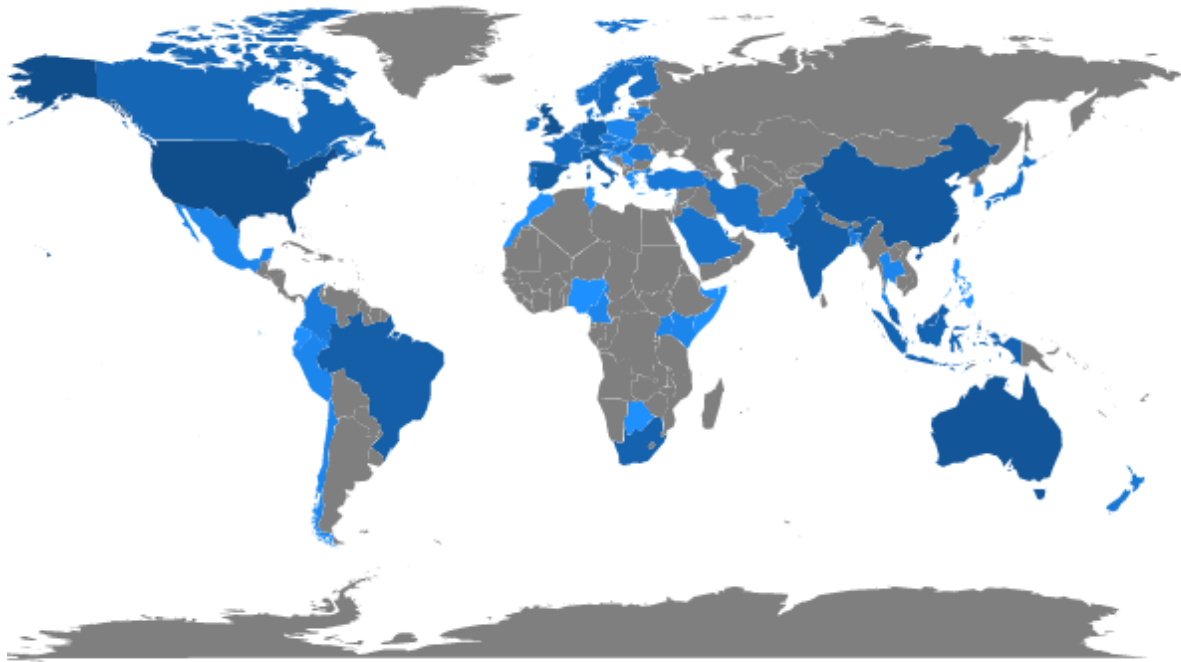


Figure 6: Country scientific production

Table 7 indicates the total number of citations appearing from a particular country. It gives an account of the country to which the first author of a given article is affiliated and thereby provides an indication of the average article citations. This figure signifies the degree of pioneering work done in any given country. As far as total citations are concerned, the UK leads with 346 articles. This is in contrast to what was observed in Table 6, where the USA leads in the number of papers published in the area of research. In addition, average article citation is significantly higher in the case of Finland (91), while for developing nations, such as India, Bangladesh, and Brazil, the figures are very low, which also indicates the inadequate growth of research in these regions. We can generally observe such patterns in most of the research fields where the number of articles published in developed countries is higher than in developing countries. Contrary to trends in other management disciplines, the presence of India, Bangladesh, and Brazil as pioneering countries provides an indication of the popularity of technology-mediated SBs. A lack of representation of Sub-Saharan Africa and most parts of South America is also disappointingly notable.

Table 7: Country and their citations

Sl.No.	Country	Total Citations	Average Article Citations
1	United Kingdom	346	57.67
2	USA	290	18.12
3	Germany	187	26.71
4	Brazil	125	15.62
5	Finland	91	91.00
6	Netherlands	72	24.00
7	South Africa	71	14.20
8	France	64	16.00
9	New Zealand	63	21.00
10	Ireland	52	26.00
11	Italy	39	4.88
12	Singapore	38	19.00
13	Belgium	26	13.00
14	Korea	25	8.33
15	India	24	3.43
16	Spain	22	4.40
17	Australia	21	10.50
18	China	18	3.00
19	Bangladesh	10	10.00
20	Norway	10	10.00

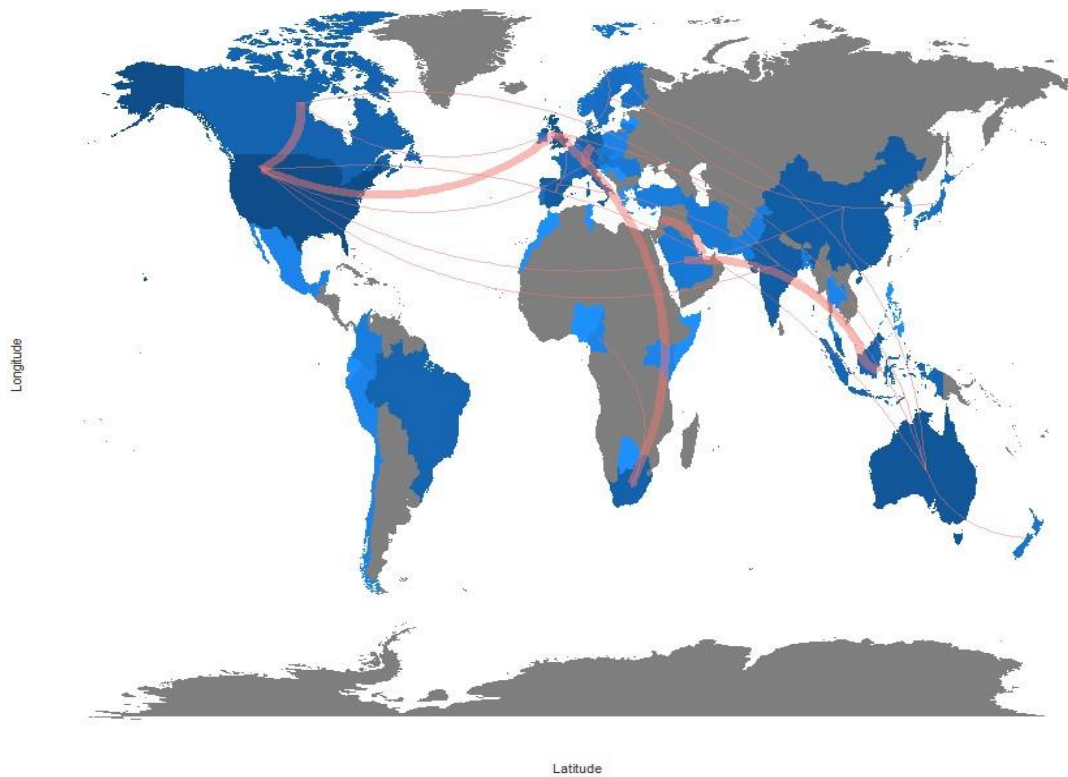


Figure 7: Global collaboration map

Figure 7 presents the global collaboration map. The co-authorship indicates formal collaborations (Acedo et al., 2006), with thicker pink lines indicating greater research collaboration among countries. The strongest collaboration links of the USA are with Canada and the UK, which shares a stronger collaboration with South Africa and Eastern European countries. It is worth mentioning that a stronger collaboration may not attest to an intense academic collaboration. For example, in the collaboration between the UK and South Africa, only three collaborations are reported, namely, between K. Diga, and F. Nuaiwu, Y. Cameroon, and S.A Asongu, and V.R. Rensburg, and M. Jenkins. All these three networks are distinct from each other. Thus, we need to be careful while interpreting the meaning of the lines in the collaboration diagram. The thickness of the lines is relative, and there is a possibility that the difference in the thickness of lines between two countries may be attributed to one or two collaborations only. Australia also shares research connections with New Zealand, China, Middle Eastern countries, and India.

Statistical figures related to the literature on technological interventions in SSB have been presented up to this point. However, unless the content is explored and a way forward is prescribed, a review work remains incomplete. Therefore, in the next section, the synthesis of findings from the word tree map, dendrogram, and keyword analysis are provided to present a framework for technology use in SSB.

4. Framework of the use of technology in sustainable social business

The body of literature on SSB is substantially rich. However, SSB as a standalone concept is still at its nascency. Here bibliometric analysis is used to identify the underlying macro-variables dominant in the field of SSB. Keyword analysis reveals that the research in digital technology use in SBs could be divided into four major areas, i.e., social innovation, digital technology, information systems, and decision making for sustainability. These areas were derived from the use of word tree map and the dendrogram. It indicates that SBs could be taken to the next level with the use of digital initiatives. The elements of technological interventions in SBs are given in Table 8.

Table 8: Technological interventions in social business

Area	Elements
Social Innovation	Competitive advantage Sustainability Societies and institutions Social entrepreneurship Economic and social impacts Business communication for social causes Public administration
Digital technologies	Information and communication technologies Learning systems Technology adoption Internet of Things Blockchain
Information systems	E-commerce Knowledge management Big data Crowdsourcing
Decision making for sustainability	Sustainability development Social media analytics Machine learning and artificial intelligence Empirical analysis Behavioral analytics

Figure 8 represents a framework for the use of technology in SSB. The areas of research and their elements constituting the framework are explained in the subsequent subsections. The areas presented are a broad representation of underlying themes. However, this does not indicate that these themes are distinct, as interaction of these themes does exist, for example, ‘technology adoption’ and ‘Internet of Things’. Even though these are separate themes, there are scholarly works where technology adoption theories have been used to study the use of IoT in SBs (Baka, 2014).

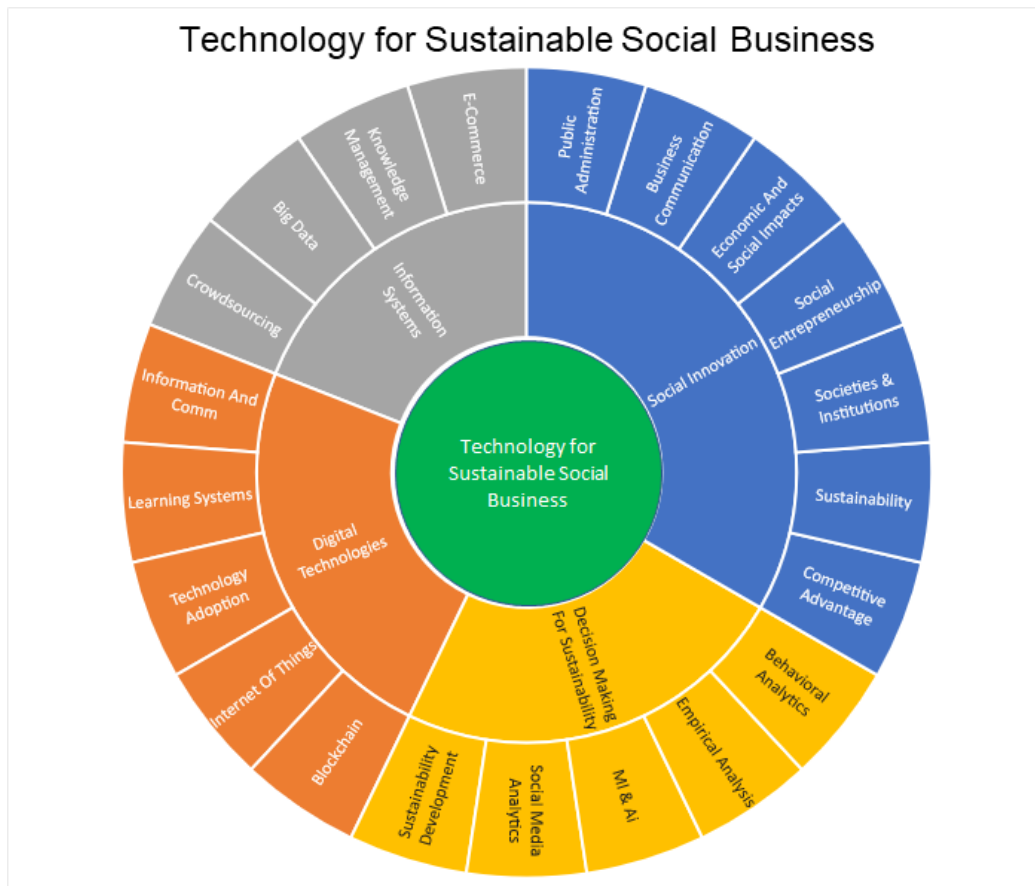


Figure 8: Framework for the use of technology in sustainable social business

4.1 Social innovation

SBs have gained significant importance in recent times because of growing concerns about the delicate situation of economics around the world, coupled with the rising wage inequalities (Hing et al., 2019), leading to social unrest. Salim and Ellingstad (2016, p. 258) define social innovation as “concepts, ideas and organizations that meet social needs of all kinds from working conditions and education to community development and health; and extend and strengthen the civil society”. Social innovation uses technologies to deliver new services and to enhance societal living with innovative processes (Grimm et al., 2013; Desmarchelier et al., 2020) and with novel modes of addressing the efficiency of resources along with considering environmental limitations (European Commission, 2011). Hitachi's social innovation business aims to rapidly co-create solutions while repeating the processes of issue analysis, hypothesis creation, prototyping, and value testing together with customers (Hanaoka, 2016). Hitachi proposes to bolster its growth by using IoT architecture (Lumada) in energy, industry, and urban development initially to construct an ecosystem of social innovations that cuts across various industries (Hitachi, 2018). Similar innovations are being taken up by corporations

which are working towards building an SB (Edwards-Schachter, & Wallace, 2017). According to Dawson and Daniel (2010), traditionally, 'innovation' in business has been linked with gaining profits and obtaining a competitive edge. In contrast, social innovations are initiated in the interest of the members of a society. Here, societal factors provide the impetus for the development of innovative business ideas which aid social upliftment. Eichler and Erich (2019) revealed that the focus on social innovation significantly varies between developed and developing countries. They further classified the types of social innovation organizations into social entrepreneurs, public institutions, civil society, NGOs and non-profit firms, and social enterprises. All such types of organizations have a general focus on achieving sustainability while carrying out their business activities.

Bhatt et al. (2016), reported that many free-and-open source software programs have been developed as a part of the social innovations that aid marginalized communities in developing nations. Such solutions are likely to offer sustainable solutions in contrast to the heavy ICT initiatives proposed by local or state authorities. We can see social innovation in crowdsourcing, which involves community participation in manufacturing, integrating knowledge, innovating openly, mass collaboration towards a single goal, collecting human intellect etc. It empowers the general population to take traditionally outsourced tasks through open source cloud-based software, which can be performed in several ways, such as cloud work, crowd creativity, crowdfunding, the distributed knowledge, and open innovations.

4.2 Digital technology

SB is enabled by digital technologies, such as IoT, blockchain, big data, AI, and ML. Digital technologies support otherwise unsustainable SB models by enabling the removal/substitution of intermediaries in the supply chains (Cholewa and Shanmugam, 2017; Torres and Augusto, 2020). Thereby, small businesses find the ecosystem conducive to their growth. Due to the advent of digital technologies, the market structure and characteristics, including human and organizational interactions, have become extremely dynamic, which requires SBs to have adaptability (Mukkamala et al., 2018a, b). For example, blockchain offers trust, transparency, anonymity, privacy, decentralization, and the auditability of funds. Any SB can work with a higher degree of freedom with such digital aids (Treleven et al., 2017). According to Mora et al. (2020), digital technologies have boosted social commerce and the collaborative economy and have established digital currencies leading to the development of new democratic forms of business models. The participants in such SB models are provided with equity exchanges, greater trust, cooperation, and the equitable distribution of incomes

thereby boosting sustainability. Liaw et al. (2017) elaborated on a case of UNSW Yunus Social Business Health Hub (YSBHH). Established in 2015, it supplemented UNSW Global eHealth program with SB and community participation dimensions. It used mHealth (a digital technology-based platform) which deployed IoT in the context of health services focused on SB and citizen-engagement strategies. According to Goyal et al. (2020), digital technologies play a significant role in deploying last-mile reach and reaching the (BOP) segment especially in rural and semi-urban areas. Information technology enables social enterprises to reach the masses. They provide a direct interface between the suppliers and consumers removing the need for intermediaries, while saving the time and effort of the BOP individuals. Social businesses, such as NEPRA for recycling (in India), GARV for toilets (in India), and Piramal (in India), have utilized digital technologies, such as IoT and cloud-based integration, for managing quality and performance.

4.3 Information systems

Information systems (IS) is an essential component of a modern organization. It has permeated all relevant aspects of business at an unprecedented pace while rendering traditional models of business archaic. Many organizations adopt IS willingly, while others are forced to do so. One integral component of IS social media, which is one of the driving forces for the growth or decline of a business; it may also accelerate organizational transformation and cultural change (Ferreira et al., 2015). Sun et al. (2013) stated that the use of IS plays an important role in the production of goods and their distribution. These technologies have significantly contributed to improving the management proficiency of farming cooperatives around the world. IS facilitates SB operations through aggregated and efficient data management (Sun et al., 2013), information customization (Calegari et al., 2020; Ukpong et al., 2019), intelligent push technologies (Wang and Zhao, 2019), and data transfer information management (Sun et al., 2013). It is argued that SBs that have constraints in scaling up can obtain better support from the use of IS to grow in size and reach.

The seminal article by Jha et al. (2016) pioneered the work of Indian SB organizations that deploy ICT platforms in building sustainable ecosystems for addressing the challenges of smallholder farmer poverty. The developed technological intervention proved to be scalable and exhibited accelerated transformative change in the small farm business. According to Cordella and Paletti (2018), ICT facilitates the co-creation of public services, which empowers NGOs, SBs, or other relevant private companies to participate in offering public services in collaboration with the private sector. ICT enables the formation of novel relationships among

actors or resources which are external to the public organizations, thereby enhancing the path of value creation in SB. In a unique initiative by Seoul metropolitan government to advance a sharing city initiative from 2012 onwards, an aid was devised for those citizens who were in need of a car and facilities such as parking, convention, libraries etc. ICT has played a major role in the success of this sharing economy by offering a sustainable development platform for such SBs (Moon, 2017). Rebehay et al. (2017) proposed an SB idea, aided by an ICT-intensive solution for municipal solid waste management in Brazil. Their SB model is inclusive of individuals at the BOP, and it presents a decentralized approach for micro-cooperative sharing of the varied linkages with public authorities.

4.4 Decision making for sustainability

It is very important that a business setup with the agenda of a social cause is sustainable. The failure of any SB could set a bad example for followers and may discourage prospective entrepreneurs. Thus, the decisions support system used for setting up and running an SB ought to be evaluated for sustainability. Industry 4.0 solutions play a major role in the use of digital technologies for decision making. They facilitate the decentralization of decision making (Ibarra et al., 2018; Torres and Augusto, 2020). Industry 4.0 ensures that the digital platforms are owned and controlled collectively, thereby giving more power to managers who are more in touch with the local market. Such practices can help in leveraging local talents which, in turn, can propel SBs by harnessing local knowledge and expertise (Foramitti et al., 2020). The robustness and resilience of the business model is also a key attribute in achieving sustainability. For an SB, the decision support system should be based on metrics that can assess the robustness and resilience of the business model (Tibay et al., 2018). A list of indicators for resilience include situational awareness, network robustness, adaptation ability, market sensitivity, innovation, and diversity.

Williamson (2014) exhibited a novel style of SB philosophy that inspired political decision-making based on ML techniques which enables the governance of citizens by considering them as the co-creators of customized services. These services are run on algorithms of database software enabled by the big data generated by intermediary public service organizations. This data consists of the personal information and behavioral data of individuals. It has enabled the participation of new kinds of cross-sector intermediaries involved in establishing SB in public sector reforms. Yuan et al. (2017) emphasized the use of ML for decision making in SB promotion by using data such as gender, age, and educational

level as core factors for deriving inferences about users, based on search terms chosen by the individuals who perform transactions in an SB setup.

5. Discussion

The work presented in this paper is a bibliometric analysis of articles on technological interventions in SB. Some prominent technological aids found in the literature included ICT tools, social media, blockchain, big data, Industry 4.0 etc. The analysis uses scholarly works spanning fifteen years. The research trends in terms of authors, key terms, country, journals, and research domains were explored. Some of the prominent authors within this domain (with four publications each) are S. Bonomi, F. Ricciardi, and C. Rossignoli. Bonomi works in the area of ICT application to make smart organizations while Ricciardi's research is focused on internal/external information tools for the more sustainable management of companies and public administrations. On the other hand, the work of Rossignoli highlights the use of social media analytics in achieving organizational sustainability. Despite the differences in their disciplinary backgrounds, they converge with their appreciation and assessment of the use of technology in building SSB.

This paper started its enquiry with five research questions. The discussion below is summarized in respect to the research questions.

5.1 The evolution of social businesses in general and the role of technology in the growth of this sector.

One of the seminal articles in this field was written by Sreekumar (2007), where the author investigated ICT deployment in various regions of rural India to boost social and economic opportunities. Broadbent and Papadopoulos (2009) presented an evaluation framework of digital inclusion to reduce social and economic costs. They also advocated that an ICT infrastructure is key to reducing economic and social disparity. Later, Jacobs and Nakata (2010) traced the growth of Web 2.0 integration with SB activities. They studied Earl's e-business model with respect to the use of Web 2.0 technology in SBs and predicted that its acceptability would continue to grow in the domain of e-commerce-based SB. Gradually, with the prevalence of the internet across the world, it also permeated the realm of SB (Smutny, 2012). Another leap in the use of digital technologies is evident in the work of Osman and Anouze (2014a), where they emphasized the democratization of shared-value knowledge through

electronic services and big data to transfer the loyalty of people from political parties, religious groups, and dictatorships to loyalty to society to achieve smarter communities. Since this article, the growth of work on the applications of big data analytics has experienced tremendous growth mainly to tackle security and proprietary issues inherent in cloud computing-based business models (Kumar et al. 2020). Another big leap in technological intervention in SBs is observed in the work of Schweizer et al. (2017) where they proposed blockchain technology as a solution to several problems of SBs. They designed, developed, and evaluated a blockchain-based crowdlending platform. It has since become apparent that blockchain facilitates the growth of sustainable business models by replacing intermediaries. Since 2017, the use of technologies such as big data, cloud computing, blockchain etc. has substantially increased in order to make SBs sustainable and to propel the growth of social entrepreneurship.

As far as journals are concerned, *Sustainability* (Switzerland) stands out with a maximum of thirteen publications in the research area, followed by *Information Technology for Development* (7), *Electronic Journal of Information Systems in Developing Countries* (6), *International Journal of Information Management* (5), *Technological Forecasting and Social Change* (5), *Journal of Cleaner Production* (5) and *Journal of Islamic Marketing* (5). Furthermore, the ACM International Conference Proceeding series has ten publications. *Sustainability* (Switzerland) provides an advanced forum for studies related to sustainability and sustainable development. *Information Technology for Development* publishes social and technical research on the effects of IT on economic, social, and human development. The *Electronic Journal of Information Systems in Developing Countries* has a focus on design, development, implementation, management, and evaluation of information systems in developing countries. The *International Journal of Information Management* has a varied profile of papers; however, they mostly exhibit social aspects of technology use. *Technological Forecasting and Social Change* is one of the most versatile periodicals. It uncovers studies which use planning tools that interrelate social, environmental, and technological factors. Thus, in this journal, articles can be found on varied areas of sustainability enhancement. The *Journal of Cleaner Production* is also quite similar with its significant focus on production aspects. Lastly, the *Journal of Islamic Marketing* is a generic management journal which has been taking up articles on social business in recent years. While these are quite well-reputed and well-recognized journals, it is noticeable that the top academic journals (i.e., Financial Times 50) in IS and general management have not properly tapped into this area.

5.2 Underlying themes of research in the technological interventions in sustainable social business.

With the use of the word tree map, topic dendrogram, and search trends, four major areas of technological interventions in SB were uncovered, namely, social innovation, digital technologies, IS, and decision making for sustainability. It is also notable here that these four areas did not all emerge together; rather, in the extant literature, articles on social innovation appeared earlier (Morales-Gutiérrez et al., 2013). Subsequently, the advent of e-commerce led to the integration of IS in SB frameworks (Weber and Kauffman, 2011). Later, with mass acceptance of information technologies, data banks were inflated to an extent whereby they could be used for deeper analysis (Hasan, 2014). In order to handle the large data systems and to provide sustainability to smaller SB ecosystems, digital technologies were significantly useful (Ongena et al., 2018). Now, with sustainability taking center stage, the fourth area (i.e., decision making for sustainability) is playing a greater role. It overarches the other three areas, as it is directly linked with the implementation part of the interventions (Miah et al., 2017).

5.3 External conditions that facilitate the growth of technological interventions in social businesses.

Besides uncovering the underlying areas of research, finding the conditions which led to the growth of technological interventions in SB is another important research question which needed to be addressed. Gaining competitive advantage and at the same time catering to the needs of society is the central theme of SB (Pušinaite-Gelgote et al., 2019). Thus, in order to do so, businesses need to be innovative in adopting traditional business practices (Chikandiwa et al., 2013). This led to the adoption of technologies which imbue business communication for social causes and at the same time provide access to the masses (Agarwal et al., 2010). E-commerce was one such platform which could serve the underpinning purpose with the help of the internet (Weber and Kauffman, 2011). Therefore, with these tools, SEs have been better able to reach in inaccessible areas. Later, big-data, crowdsourcing, and knowledge management were seen to be taking the center stage in leveraging SBs, as the requirement for handling larger participation of masses in SBs kept burgeoning (Achtenhagen et al., 2015). At present, consumers are very vulnerable to social media; hence, guiding the customers in the right direction is of prime importance (Jacobs and Nakata, 2010; Chung et al., 2018). This can be achieved with social media analytics based on various AI-based algorithms, which make it

possible not only to target the right customer segment but also to communicate the right message to the right people at the right time (Suseno et al., 2018).

5.4 Underlying framework for the use of technology in sustainable social businesses

In section 4, this paper proposes a framework for the use of technology in SSB (Figure 8), which is very timely, as the concept of SB is attracting attention in the domain of contemporary business and management. It proposes various elements and identifies the essential ingredients to build an SSB using technology. The framework can be tested in various demographic conditions and settings that can be generalized. With this framework, research question 4 is also addressed. Research question 5 is discussed in the following section.

5.5 Implications and future research directions

5.5.1 Implications for society

The research shows the use of digital technologies is increasing, and they are becoming a precursor for bringing scalability and transparency to SBs. However, in developing countries, there is a setback on this front where the majority of the population still lack any basic IT infrastructure and, ironically, there is a significant dearth of SB setups in these regions. India, for instance, demonstrates a high uptake in digital technology adoption along with accelerated macro-economic growth (Jones et al., 2019). However, SBs in India still face formidable challenges in adopting and integrating digital technology and harnessing its full potential, leading to calls for more research to provide contextual understanding and deeper insights into socio-economic and cultural practices.

It can be forecasted that digital technologies will play a pivotal role in the survival and sustainability of SBs. It will also be interesting to see the behavioral change in consumers due to the influence of social media towards accepting and appreciating the fair practices of SB. Here, ML and AI-based decision making algorithms can support in analyzing and formulating strategies for influencing consumers positively towards adopting and trusting the products which are pro-social business.

5.5.2 Implications for researchers

This paper reveals several dimensions of research on the use of technology in SSB. It explores bibliometric statistics showcasing prominent authors, topical keywords for exploring

the literature, technological dimensions interacting with the field of SSB, historical growth in the field according to search trends, and country-wise exploration of the research area, and finally, it proposes a framework for the use of technology in SSB.

The statistics on the publications and the discussion on leading authors give aspiring researchers useful insights into and an indication of the authors they should follow to keep abreast of the growth of the research in this field. The underlying network of authors reveals the interactions of the latent research groups. Keyword analysis reveals the dimensions of the research area thereby helping researchers in forming and testing new theories for studying various phenomenon governing the use of technology for SSB. The historical growth of the field provides scholars with guidelines on the upcoming research opportunities. Finally, the proposed framework lays down a foundation for aspiring researchers to use the suggested dimensions for framing new theories and testing them in various settings, hence moving towards the development of SSB.

5.5.3 Contribution to knowledge

The article has presented a framework which encompasses various areas of research related to technological interventions in social businesses. It is natural for newcomers to be apprehensive about the adoption of new ways of doing business. The same could be said for small businesses which have insufficient financial resources to adopt innovative technological solutions. In both cases, our framework gives an impetus for research towards testing technology adoption theories like the unified theory of acceptance, the technology acceptance model, the theory of reasoned action model etc. These attempts will assist in uncovering the underlying perceived risks exhibited by users in SB. For example, benefits associated with use of blockchain to remove intermediaries in SB have already been established, but it still remains an understudied area. One of the causes for this is the perceived risks to consumers. The instruments of the aforementioned theories could be used to establish the reasons for its scanty usage and thereby take steps to bolster the confidence of consumers in the same. Regarding investigation of the digital technological effects in sustainable social innovation, one could explore institutional theory. Previously, it has been used to analyze the causal relationship between the innovative adoption of organizational changes (Foroudi et al., 2020). It provides a tool for comprehensively tracing transformation occurring in an organization due to new paradigms, such as SE and public sectors (Currie and Guah, 2007; Davidson and Chismar, 2007).

It is also advisable here that comparative studies be conducted between developed and developing countries. Business enterprises in a market economy focus on profit making and not on overcoming social problems. On the contrary, they may exacerbate the conditions with poverty, pollution, corruption, and inequality (Yunus, 2007; Ashraf et al., 2019)., these problems are more evident in developing countries than in developed countries. Generally, it is governments who are held primarily responsible for such social problems. Therefore, comparative studies with adequate theoretical backing may help identify problems specific to developing countries.

6. Conclusion

The paper presents a bibliometric study of research in technological interventions in SSB. The study is based on articles extracted from SCOPUS database and analyzed using the bibliometrix R-package. It explores several bibliometric dimensions ranging from year-wise publications, prominent authors, countries, networks, keyword search, and the underlying dimensions of the research. It has been discovered that this research field is still in the nascent stage and offers huge scope and impetus for future scholarly works. The analysis highlighted four major research areas, namely, social innovation, digital technology, IS, and decision making for sustainability. It is suggested that future researchers may think of developing and integrating a framework for suitable SB using these areas of research and suggested elements. It would also be interesting to find out the drivers and barriers for digital technology (on any type) adoption in SSB. The main contribution of this papers lies in the fact that only a handful of studies exist in the domain of SB that present the state of the contemporary research and that no study has ever been done that synthesizes a framework on the use of technology for SSB. It cannot be ignored that the body of literature on SB is growing, and digital technology is becoming an inseparable component of any type of business. Thus, it is apparent that there is a growing need to have empirically tested frameworks for the use of technology in SSB.

Regarding the limitations of the work, the country/countries of abode of the first and the other authors of a scholarly work may be different, and thereby, it is often hard to reach a conclusive judgement on the geographic origins of the published works. Thus, care must be taken when using and interpreting the results presented in Table 6, which indicates the top 20 countries.

For future research, authors may aim to carry out a systematic literature review diving deep into the dimensions of the topic and so reveal the underlying theories of sustainable social research. One could explore the various dimensions of technology adoption for SSB regarding the interplay of various dimensions, such as social innovation with the use of crowdsourcing, best fitting digital technologies in social innovation in various settings, the role of ML and AI in decision making for achieving SSB etc. It can also be argued that technology adoption theories, such as TAM (Technology Acceptance Model), UTAUT (Unified Theory of Acceptance and Use of Technology) etc., could be applied in this context, and consequent feasibility studies could be carried out in various research settings, such as in developing countries or in unfavorable markets of African nations.

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