

Research trends of Technology Integration by MSME/SME sector: Bibliometric Analysis

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Abstract:

The study revealed a bibliometric analysis focusing on the innovative technology integration by micro, small, and medium enterprises (MSMEs) as covered in SCOPUS database during the period of 2018 to 2022. A total of 1000 published articles were found in the SCOPUS database during the period in the subject area. The study examines the country-wise productivity, most productive source titles, most-cited source on the topic, top-most keyword occurrences, and annual research output trends on this area. The study result shows that United Kingdom, India, Indonesia, Malaysia, and China are the most productive countries in the field of research output on the topic. The investigation also unfolds that the top-most source title on the topic is technological forecasting and social change and frequently used keyword is smes. The findings of the study are limited to SCOPUS database only. The outcome of the study is useful for the academicians, researchers, policy makers, who are searching for answers to the topic.

Keywords: MSMEs, technology integration, bibliometric, industry 4.0, scopus, VOSviewer

1.0 Introduction:

Since the micro, small and medium enterprise (MSME) sector is plying important role in industrialization of the economy globally, it is necessary to implement innovative technologies for enhancing the productivity, improving process quality, and marketing ability etc. The first Industrial Revolution (Industry 1.0) started through mechanized production using repurposed water and steam power. Industry 2.0 achieved mass production by using electric power. Electronics and information technology is used to enhance the productivity in third Industrial Revolution (Bahit Mohammad et al., 2020). Now fourth Industrial Revolution is in progress where technology integration plying a vital role in the production of goods and services. Currently MSMEs or SMEs are the vibrant sector in terms of creation of employment, producing national output, enhancing exports, and alleviating poverty of an economy. This sector is known as the backbone of any economy in the world (Singh et al., 2015). MSMEs are contributing considerably in sustainable economic growth. Recently covid pandemic hit the hardest to the small and medium businesses worldwide (Shaikh, 2021). As a result the sector encountered lots of obstacles in conducting their business as well as contributing to the economy (Sahoo P. and Ashwani, 2020). Technological innovation and implementation of the advanced technologies can reduce the problems encountered by MSMEs significantly (Srinivasan & Kunjangad, 2019). The researchers across the globe are trying to find the way of sustainable economic development. The MSME sector has the potentiality to meet the sustainable development goal. Micro Small and medium enterprises (MSMEs) need relatively lower capital to run the start-up compared to large-scale industries. So the policy makers, researchers, and government have been focusing on the growth and development of the sector for long run sustainability of their economy.

Many researchers, academic institutions, publishing houses are engaged in publishing literature on MSMEs' growth and the impact of technological adaption of the sector. Research data on this important topic is growing rapidly as the researchers are trying to find the solution towards long run sustainability in industrialization. Bibliometric technique is being used to find the research progress and trends of various research areas (Hossain, 2020). This study is an attempt to conduct bibliometric analysis on technology integration in MSME or SME sector for the

economic development and sustainable growth of the economy of any country in the world based on important aspects like subject area, authorship, journal, country, annual research output, citation etc.

2.0 Literature Review:

The most important factors affecting the decision of new technology adaption is financial benefits of technology innovation over conventional technology used by the enterprises. Another important factor is employee perception regarding new technology. So, innovative technology adaption decision largely depends on the benefit cost ratio and owner-manager's perception towards new technology (Kumer S. and Sharma P., 2021). If the MSME sector can efficiently adapt new technologies, then their productivity, profitability, and market share will be prolonged significantly. (Prakash B. et al., 2021) studied on barriers and potential solutions for MSMEs in developing economies and the researchers identified major significant obstacles encountered by the sector. The found inefficient technological adaption is one of the most prioritized barriers that can slowdown the growth and development of MSME sector as well as the economy of any country.

(Restrepo-Morales J. A. et al., 2019) researched on the Determinants of Innovation in Colombian micro, small and medium enterprises. The researchers found that SMEs are not benefited from research and development (R&D) activities rather their performance is depended on internal innovation focused on product development and process development. Moreover, the study reveals that the imitators get a performance higher than that of an inventor and the SMEs concentrating product development are getting better performance. (Herve A. et al., 2020) investigate how digital transformation of MSMEs support decision making in conducting international business. The study conclude the digital technology support the firm to become more innovative, dynamic, and risk-bearing to capture larger international market share and the firm can enjoy the competitive advantages through digital transformation. (Lestari I. R. et al., 2019) conducted a research on the effect of information technology in MSMEs of Indonesia. The study result showed that the usages of information technology affect positively on the performance and growth of MSME sector in Indonesia.

Scopus database is highly recognized indexed research database which is internationally accepted. We can easily find articles, journals, book chapters, conference proceedings, and reviews on our field of study. Scopus can map research output based on area of study, author's keywords, publishers, year of publication, funding sponsors etc. (Thaha A. R. et al., 2021).

3.0 Objectives:

The main objective of the article is to analyze the chronological research output in the field of technology integration by MSME sector during 2018 to 2022. The article identified the trend of research output on the topic in the same period. The article also examined the research trends considering countries, citations, journal publications, and keywords.

4.0 Methodology:

The study is an attempt to analyze the trends of scientific research on technology integration by micro, small, and medium enterprises (SMEs) for the period of 5 years from 2018 to 2022. Quantitative bibliometric analysis method is used for the study (Todeschini & Baccini, 2016). The data were collected from SCOPUS database which is one of the most trustworthy, indexing, and citation databases. The main search keywords of the research were "MSMEs" OR "SMEs" AND "Technology". A total of 1000 published articles were retrieved on June 22, 2022 during the period from 2018 to 2022. Finally the articles were selected for the analysis based on the key parameters including productive countries, citations, document sources, keywords occurrences, subject areas, top source titles, and language on the topic of technology integration by MSME sector. The collected data were analyzed by the authors using VOSviewer to reach the appropriate findings.

5.0 Data Analysis and Interpretation:

5.1 Country productivity:

A total of 54 countries have published 1000 articles concentrating on technology integration by the MSME sector during 2018 to 2022. Table 1 represents the top 10 country's publication report. The United Kingdom has the highest publication having 110 publications (11% of total publication) followed by India with 99 publications (9.90% of total publication). These two countries together published 209 publications (20.90% of total publication) which indicate the greater contribution and research interest in this area. Indonesia occupies third position in terms

of publication followed by Malaysia, China, Italy, United States, Australia, Spain, and France. Table 1 portrays that these ten countries are contributing significantly and showing their utmost research interest in this area.

Table-1: Top-10 country’s publication report

Sl. No.	Country	No. of Articles Published	Percentage
1	United kingdom	110	11.00
2	India	99	9.90
3	Indonesia	91	9.10
4	Malaysia	83	8.30
5	China	82	8.20
6	Italy	78	7.80
7	United states	55	5.50
8	Australia	47	4.70
9	Spain	45	4.50
10	France	36	3.60

Table 2 displays the country-wise citation of research works in this area. Higher citation indicates higher contribution and more research concentration on this area. Besides, citations confirm that the researchers are conducting proper research work and it gives credit to the author of the sources used in the research. Here we found that United Kingdom again holds the top-most position (1520 citations) followed by China, Italy, India, France, Spain, Malaysia, Canada, Germany, United States.

Table-2: Top-most country-wise citations

Sl. No.	Country	Citations
1	United kingdom	1520
2	China	1087
3	Italy	959
4	India	778
5	France	741
6	Spain	650
7	Malaysia	638
8	Canada	613
9	Germany	565
10	United states	534

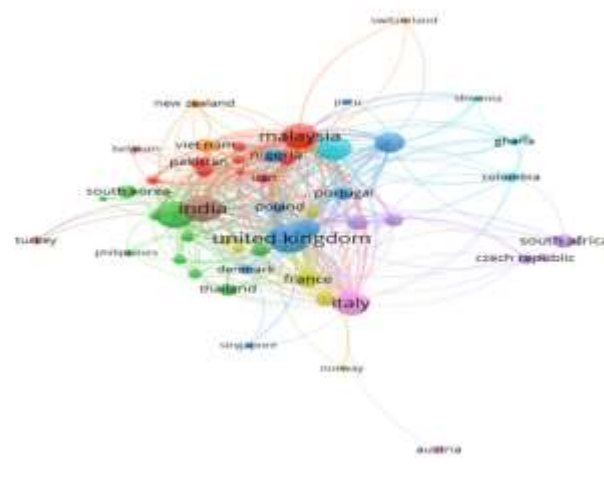


Figure1: Network visualization of country-wise citation

5.2 Productivity from the journals:

The core journals of a specific research domain publish the highest number of publication in the same area. Identification of such journals is very important to review related articles related with the research field. Table 3 depicts top ten core journals in the research field of the study. Among these, Technological forecasting and social change publishes the highest number of articles (26) which is 2.60% of total articles published during the period followed by IEEE transactions on engineering management having 21 publications (2.10% of total publications). Journal of cleaner production and Technology analysis and strategic management holding third position followed by Journal of science and technology policy management, Journal of entrepreneurship, Journal of asian finance, economics and business, Journal of business research, International journal of scientific and technology research, and Academy of entrepreneurship journal.

Table-3: Top-most source title on the topic

Sl. No.	Source Title	Publications	Percentage
1	Technological forecasting and social change	26	2.60
2	IEEE transactions on engineering management	21	2.10
3	Journal of cleaner production	18	1.80
4	Technology analysis and strategic management	18	1.80
5	Journal of science and technology policy management	17	1.70
6	International journal of entrepreneurship	16	1.60
7	Journal of asian finance, economics and business	15	1.50
8	Journal of business research	15	1.50
9	International journal of scientific and technology research	14	1.40
10	Academy of entrepreneurship journal	12	1.20

Table-4: Top-most cited source on the topic:

Sl. No.	Source Title	No. of Citations
1	Technological forecasting and social change	735
2	Journal of cleaner production	691
3	International journal of information management	456
4	International journal of production research	451
5	Journal of business research	270
6	Journal of manufacturing technology management	209
7	Journal of knowledge management	208
8	Management decision	203
9	Journal of enterprise information management	187
10	Technology in society	185

Table 4 shows that the highest citation source title is Technological forecasting and social science (735 citations) followed by Journal of cleaner production (691 citations). Third and fourth positions are occupied by International journal of information management (456 citations) and International journal of production research (451 citations) respectively. The citations for the next six journals range from 270 to 185.

9	Performance	33
10	knowledge management	33

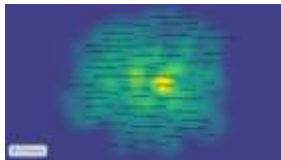


Figure3: Visualization of keywords used for the study area

5.4 Annual Research output on the area:

Table 6 represents the annual research output during the period of 2018 to 2022. The most productive year is 2020 in this regard considering growth rate of publication. The highest number of articles is published in 2021 but the growth rate of the year is 12.4%. The annual research output showed increasing trends from 2018 to 2021. The number of articles published in the year 2022 is the lowest because the data have been extracted from SCOPUS database on June 22, 2022. So, the growth rate of the year has not been calculated.

Table 6: Yearly growth rate of publication

Sl. No.	Year	Publication Number	Growth %
1	2018	152	-
2	2019	166	9.21
3	2020	250	50.60
4	2021	281	12.4
5	2022 (Half year)	151	-

Source: Authors

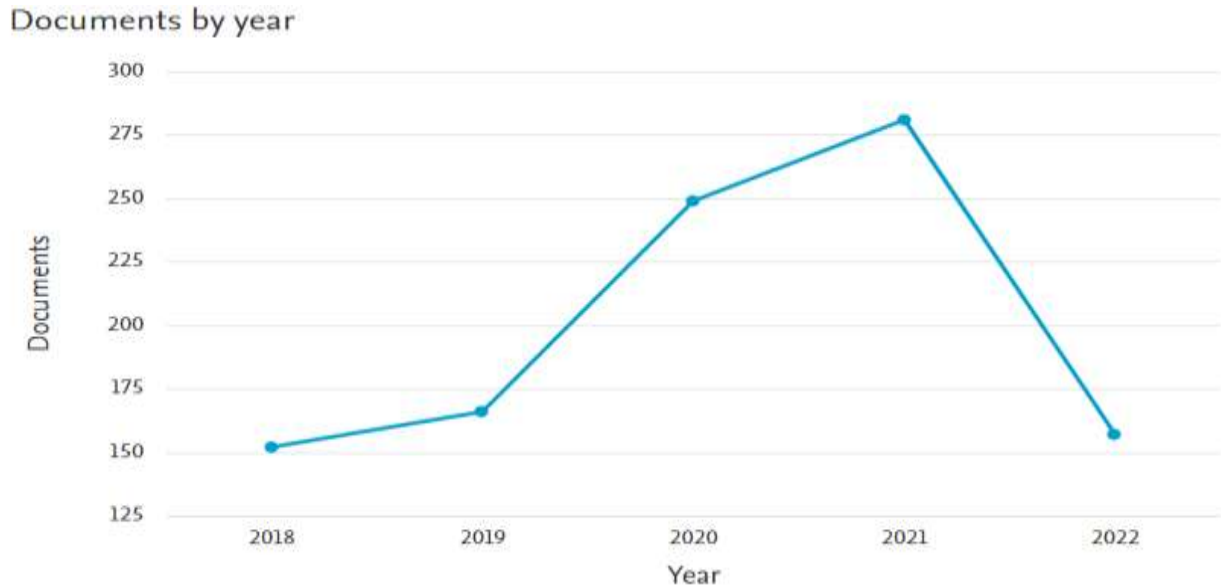


Figure 4: Yearly Publication Chart

6.0 Conclusion:

This bibliometric analysis is an attempt to portray an overview of publication and research contribution of different countries and journals on MSME or SME and Technology in SCOPUS database during the period of 5 years from 2018 to 2022. The study result showed that the United Kingdom, India, Indonesia, China, Italy, and Malaysia have a great contribution to the number of articles and citations on the topic area. Besides, analysis from keywords occurrences revealed that the keyword “sme” has been used for 264 times which is highest in the database and the keyword “innovation” has been used for 2nd highest times during the period. Besides, overall growth rate of annual research output on this field of study has increasing trends. So we can conclude that technology innovation or innovative technology adaption is one of the most significant issues in sustainable development of SME or MSME sector which is essential for economic development of a country.

7.0 Scope for further research:

The research study provides a picture of research trends connecting to the keywords MSMEs or SMEs and Technology. But the findings of the research can't be comprehensive because the study uses data from SCOPUS database only. Future research can be conducted including more information from other database like Web of Science, PubMed, and Dimensions etc. to generalize the study. Another limitation of the study is limited set of keywords. Moreover, the data was extracted from scopus database by limiting the year from 2018 to 2022. Wide range of keywords and extended time period can be used for further research.

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