

Funding landscapes in Technical and Vocational Education and Training (TVET): A bibliometric analysis

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Abstract: Technical and Vocational Education and Training (TVET) institutions play a pivotal role in equipping the workforce with practical skills, yet their effectiveness is strongly influenced by funding availability and allocation. This study aims to trace advancements in TVET research and identify existing knowledge gaps through a bibliometric analysis. A descriptive quantitative approach was employed, using data retrieved from the Scopus database and analyzed with Scopus Analyzer, SciVal, Biblioshiny, and VOSviewer. Keywords such as TVET, regulation, vocational, funding, and trainingfund guided the data collection. The analysis combined performance analysis to assess research contributions with science mapping and network analysis to explore relationships among research constituents. The results reveal that TVET research has grown significantly since 2015, with Malaysia emerging as the leading contributor, while Africa remains underrepresented. Furthermore, the focus of TVET scholarship has shifted from traditional themes toward emerging areas including technology integration, digital learning, and gamification. Despite these advances, funding models remain insufficiently studied, leaving a critical gap for future research.

Keywords: TVET, Vocational education, Funding models, Training fund, Bibliometric analysis, Performance analysis, Science mapping, Network analysis, Digital learning, Skills development, Education policy

1. Introduction

In the current age of globalization, Technical and Vocational Education and Training (TVET) is widely recognized as essential for building a competitive and skilled workforce. TVET plays a pivotal role in preparing individuals for the demands of modern economies. Thus, promoting TVET has become a cornerstone strategy for achieving prosperity globally (Tusiime et al., 2022). TVET refers to the post-school higher education sector that combines both theoretical and practical teaching. It is an education directed at equipping learners with knowledge and abilities that can be applied to real-life situations after graduation. Much of this training is practical, involving demonstrations by instructors that learners replicate, thereby acquiring job-ready skills. To ensure quality outcomes, sufficient and sustainable funding is critical, as it enables institutions to provide the competencies required by labor markets. In Namibia, for example, TVET funding is primarily sourced from the government, supplemented by levies collected from companies.

Drawing from research in seven Pacific countries, confirms that government remains the principal financier of TVET (Seitamaa & Hakoköngäs, 2024). In some cases, however, financing is supported through public-private partnerships (PPPs), where costs are shared, fostering collaboration between government and industry. The importance of TVET institutions extends

beyond education. Their graduates contribute directly to economic development by building infrastructure such as roads and bridges, manufacturing goods such as furniture and clothing, and delivering services in sectors like hospitality. Agricultural-focused TVET also acts as a catalyst for food production and poverty reduction. Yet, as Chepkoech et al. (2020) observe, inadequate or obsolete training infrastructure and tools compromise education quality, leaving graduates ill-prepared to meet industry needs. TVET is also one of the most expensive forms of education, primarily due to the costs of machinery, raw materials, spare parts, and consumables required for training. Chepkoech et al. (2020) highlight how underfunding of institutions in Kenya has constrained investments in skills training. Furthermore, as TVET evolves, institutions face growing costs associated with transitioning from traditional training equipment to emerging technologies such as simulations and gamified learning tools. Seitamaa and Hakoköngäs (2024) underscores that how TVET institutions are financed significantly affects their management, administration, and ability to deliver high-quality training systems.

Proper administration of TVET funding requires equitable and transparent distribution of limited state resources across both public and private providers. Policies must adhere to principles of equality and inclusion to ensure that all institutions can produce competent graduates ready for the workforce (Asa et al., 2022; 2024). Determining how to allocate funds fairly necessitates an accurate calculation of the cost of training provision, which in turn depends on identifying key cost drivers. Developing a suitable funding model is therefore essential to align resources with institutional and trainee needs. Against this backdrop, the present study aims to map the intellectual structure of TVET research, trace advancements, and highlight existing knowledge gaps using bibliometric analysis. This approach is particularly suited to the task, as it enables the synthesis of large volumes of metadata in a concise manner. The analysis employs performance analysis, science mapping, and network analysis to address the following research questions:

1. What are the emerging concepts and funding in TVET research?
2. Which are the most dominant authors, institutions, sources and countries in TVET research?

2. Theoretical Background

Funding shortages remain one of the most pervasive and multifaceted challenges facing TVET systems globally. TVET institutions face insufficient funding, which constrains research and innovation while undermining institutional sustainability (Madwe et al., 2020). They further emphasize that addressing these shortages requires more than increased government allocations. Structural reforms to funding mechanisms are necessary, including the equitable distribution of resources, the development of alternative funding streams, and the creation of institutional support systems (Nautwima et al., 2022) to ease the financial burden on individual lecturers. Similar concerns are echoed by Seitamaa and Hakoköngäs (2024), who highlights how economic constraints limit the ability of governments, such as in Trinidad and Tobago, to adequately finance TVET. The lack of resources directly affects institutions' capacity to procure essential machinery, consumables, and training equipment, inputs that are central to the delivery of quality vocational education.

The high cost of TVET delivery underscores the importance of establishing accurate costing structures for different trades and programs. Madwe et al. (2020) found that South African TVET colleges lack inclusive costing mechanisms to determine the true expenses of their courses. They propose Activity-Based Costing (ABC) as a more effective model for capturing the detailed costs of training, which could inform funding formulas and ensure better resource allocation. The funding challenge is not confined to one region. Onwumere and Modebelu (2020) note that in Nigeria, increasing student enrollment in TVET requires additional government and non-governmental support for tools, equipment, and workshops. Likewise, Jaca and Marongwe (2023) show that in South Africa's Eastern Cape Province, inadequate funding prevents students

from being placed in Work-Integrated Learning programs upon graduation. The conditional grants provided by Sector Education and Training Authorities (SETAs) exclude students over the age of 35, further limiting opportunities. Shortages of machinery and consumables make it extremely difficult to teach technical and vocational subjects effectively, leaving institutions dependent on government support to sustain training provision.

Across national and regional contexts, the common thread is that insufficient funding undermines training quality, constrains research capacity, and disadvantages both students and trainers. Joshua (2015, as cited in Murwira, 2024) reinforces this point, arguing that the implementation of vocational and technical education programs will remain unattainable without substantial investment in workshops, training materials, maintenance, and cutting-edge equipment. Collectively, these studies highlight that funding shortages are not isolated but a global phenomenon, with significant implications for the relevance, quality, and sustainability of TVET systems.

3. Methodology

3.1. Search Criteria

The bibliometric dataset was retrieved from the Scopus database on 21 April 2024 using a comprehensive search string that captured terms related to technical and vocational education, funding, training funds, institutions, and regulation, generating 1,327 records. To refine the sample, exclusions were applied for subject areas outside business, economics, social sciences, engineering, mathematics, and related fields (144 removed), document types other than articles, conference papers, book chapters, and reviews (29 removed), and non-English publications (13 removed). Erroneous records without valid author information and duplicates (11 removed) were also excluded. The final dataset comprised 1,130 documents, which were used for VOSviewer mapping and SciVal analysis.

Table 1: Search criteria

Filtering criteria	Exclude	Include
Search engine: Scopus Search date: 21 April 2024 Search term: {technical AND vocational AND education AND Fund AND trainingfund AND institutions AND regulation AND model AND money AND trainee AND cost} OR "TVET" OR "VTET" OR "higher AND education"		1 327
Subject area: Business, Management and Accounting; Economics; Econometrics and Finance; Social Sciences, Engineering, Mathematics, Agriculture and biological science	144	1 183
Document type: Articles, Conference papers, Book Chapters and Reviews	29	1 154
Language screening: English only	13	1 141
Used in Graphs in Scopus analysis		1 141
Erroneous records screening: Include documents with valid author information only, and delete duplicates, no authors	11	1 130
Total Selected Documents for VOSviewer Analysis and SciVal		1 130

Source: Authors' computation (2024)

3.2. Techniques for Analysis

Bibliometric studies utilize quantitative methods to summarize the bibliometric capital of a field by analysing the intellectual, social, and conceptual relationships between various scientific items (e.g., papers, authors, keywords, journals, institutions) (Öztürk et al. 2024). Therefore, this study uses quantitative research methods. The data will be collected by using the Scopus

database and analysed by utilising the Scopus analyser, SciVal as well as the Vosviewer analysis tool. According to a study by Donthu et al. (2021), bibliometric analysis is a popular and rigorous method for exploring and analysing large volumes of scientific data. It enables us to unpack the evolutionary nuances of a specific field, while shedding light on the emerging areas in that field. Bibliometric analysis can provide a visual map that enables us to analyze the strength of links between different items in the network. Bibliometric analysis can also provide insights into the research progress made in a specific field of study.

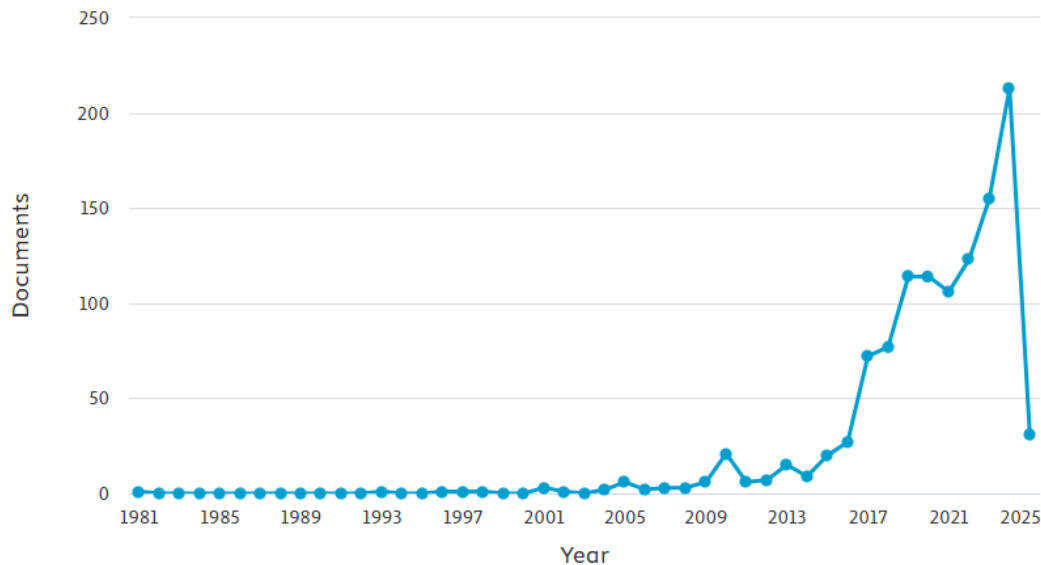
VOSviewer is a programme that has been developed by Van Eck, N and Waltman, L for constructing and viewing bibliometric maps. To analyse the data it pays special attention to the graphical representation of bibliometric maps and is especially useful for displaying large bibliometric maps in an easy-to-interpret way, according to (van Eck & Waltman, 2010). They further espouse that, Vosviewer use metadata to construct maps based on authors, journals, sources, co-citation data and keywords based on co-occurrence data. SciVal is a research performance assessment tool that provides analysis of publication and citation data included in Scopus. Scopus is a citation database, that plays a vital role in academic research. Elsevier launched Scopus, a renowned abstract and citation database, in 2004. It indexes over 69 million records from over 25,000 titles, including books, conference proceedings, and peer-reviewed journals. Scopus offers advanced search capabilities, author and affiliation profiling, and citation monitoring. Its features also include Journal rating, metric analysis, and visualization tools (Elsevier, 2024), the data for this research has been extracted from Scopus by using an institutional membership as this is more affordable and we had the ability to download it in a format compatible with VOSviewer i.e. csv.

4. Results

The bibliometric analysis was performed in Scopus, on 1141 publication and those used in Vos viewer and Scival, after erroneous review screening were 1130 publications. The publication based on search keyword, was supposed to include key terms as indicated in the methodology. The findings are supported by graphs and tables, to aid a better understanding. The results of the study are indicated below.

4.1. Year-wise Publication Trend

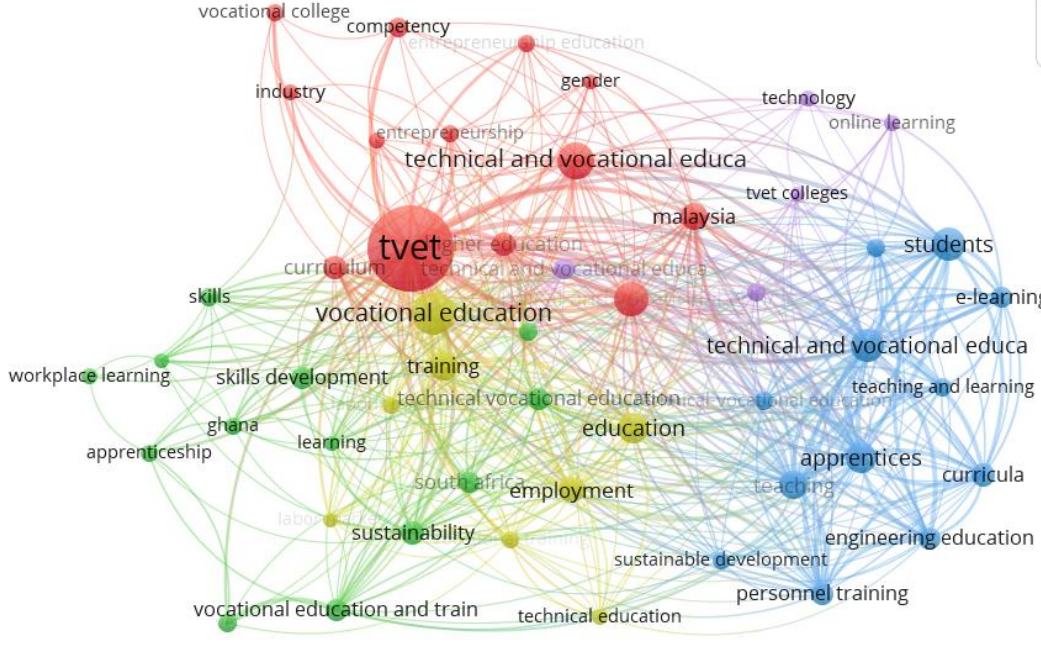
Figure 1 illustrates the genesis of research in TVET in 1981. In 1981 only one paper was published and then for the next ten years until 1992, no paper was published. Since then, sporadic publications took place of less than 10 papers per annum, with some years producing zero or one paper up until 2009. Vocational education was always trivialised and was not regarded as an important qualification, whereas focus was placed on obtaining university degrees and diplomas. The most notable increase in scholarly work in this field happened in 2010, when 21 papers were published, and since then publications were on a gradual increase. The possible reason for this is that in 2000 the United Nations millennium development goals (MDGs) were introduced, of which goal 2, prescribed to reach universal primary education for all by 2015, (United Nations, 2015). As we were drawing closer to 2015, it appears that scholars were researching more and exploring the possibilities of TVET becoming a bridge for those who did not complete formal schooling. To support this statement, we look at the research leading up to 2010 and found that Oketch, (2007) in his study stated that vocational education was branded as useless and only useful for those with less aspiration for better paying jobs. Some studies have driven policies in Africa in favour of vocational education and training to be a cure to youth unemployment (Nautwima & Asa, 2021). With the advent of the Sustainable Development Goals (SDGs) in 2015, particularly SDG4 which focused on TVET, Watrionthos. (2024), found that there is a subtle increase in policy-focused research. This was due to the 2015 adoption of the Sustainable Development Goals (SDGs), and this highlights the responsiveness of TVET scholarship to global policy frameworks.



Source: Authors' computation from Scopus extracts (2024)

4.2. Emerging concepts and funding in TVET

Keywords are essential in scholarly publications to understand the research trends and research emphasis and direction. Figure 2 shows the co-occurrence analysis with author keywords, based on keywords with a minimum of ten words to interrogate the network visualization. There are five clusters with cluster 1 being the biggest indicating that TVET is the prominent term. Cluster 2 is Skills Development, Cluster 3 is Technical and vocational education, Cluster 4 is vocational education and Cluster 5 is technical and vocation education. All these clusters refer to the same concept, TVET, with different permutations and TVET with all its permutations has been used approximately 498 times.



Source: Authors' computation from Scopus extracts (2024)

4.2. Emerging concepts and funding in TVET by year

Co-occurrence depicting the overlay visualization, with all key words, has been prepared with a minimum of 5 words, as shown in Figure 3. We used five words, in this instance, to increase the number of keywords in the visualization, with TVET being used the highest number of times i.e. 318 times. This analysis shows the emerging concepts in TVET as per the table below. The list of new concepts that warrants further studies are shown in Table 2. The areas marked yellow and light green in Figure 3 are the newer concepts as they correlate with the year 2021- 2022. The darker areas indicate the more traditional concepts before 2021. It is also noteworthy to mention that TVET and Technical Vocational Education and Training have been mentioned a combined time of 498 times and is by far the most mentioned word. This also supports our analysis in figure 1 that shows that TVET with all its permutations, has the highest strength in the clusters with the strongest links in relation to other concepts in the network.

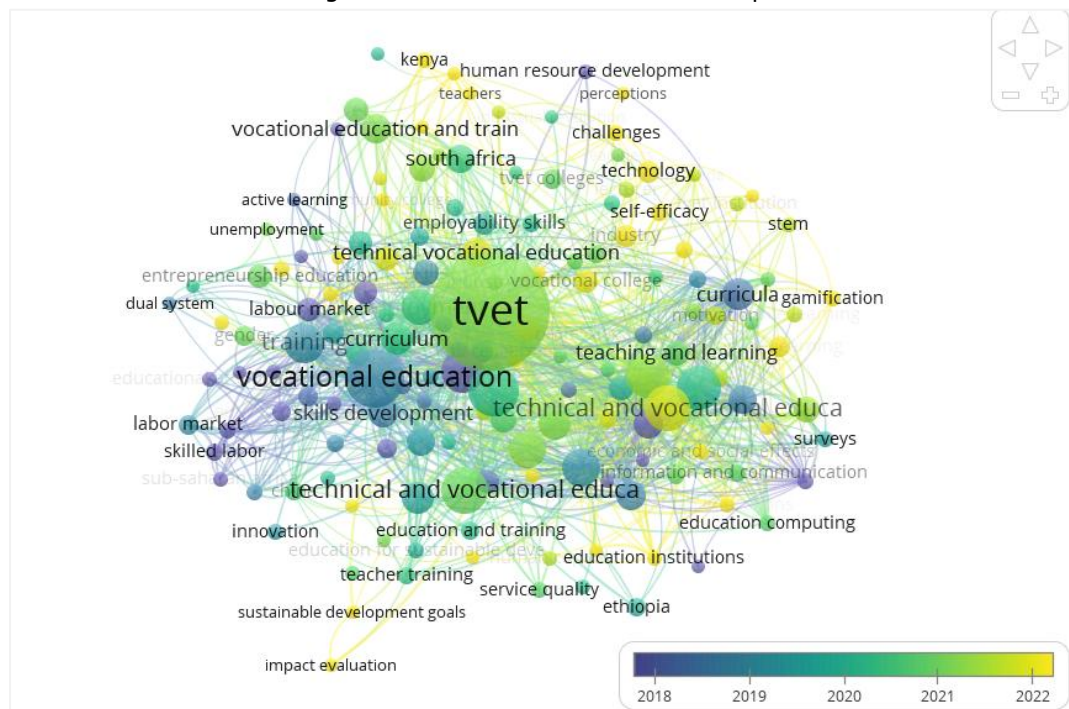


Figure 3: Emerging concepts and funding in TVET by year
Source: Authors' computation from Scopus extracts (2024)

Emerging concepts indicate the direction of research in the future. They are the concepts that have been researched mostly from the period 2021 and above. They indicate the shift in focus from how TVET was perceived to how it should grow in the future. Terms like augmented reality, continuing professional development, online learning, technology, gamifications, digital skills are all shown as emerging trends, and this is in line with expectations. The world is moving away from once off training to continuing professional development and lifelong learning, to enable stakeholders in TVET to reskill and upskill. We also observed that the term TVET became more prominent around 2021, indicating a shift from older concepts like Vocational education. TVET is shifting priorities from just teaching trades to moving digital skills, online learning etc. A longitudinal study by Watrionthos (2024), where they were exploring evolving research trends from 2013 to 2023, found valuable information on changing priorities and emerging trends within the TVET field. The most striking trend observed is the dramatic ascent of technology integration in TVET research, from a modest 19.5% in 2013 to 27.0% in 2023. They also noted that this trajectory aligns with the broader digital transformation across educational sectors and underscores the growing recognition of technology's pivotal role in shaping future TVET paradigms. These observations are in line with our findings, representing the research in the years 2021 and up.

Table 2: Emerging concepts before and after 2020

Traditional Concepts Before 2020	Occurrences	Emerging concepts 2021 to 2022	Occurrences
Vocational Education	82	Continuing Professional Development	8
Skills Development	21	Technical Vocational Education and trainings	180
Labour Market	24	TVET	318
Skilled Labour	8	High Education	24
Active Learning	5	Education Institution	6
Curricula	25	Online learning	11
Training	37	Impact Evaluation	5
Human Resource Develop	6	Sustainable Development Goals	5
		Gamifications	7
		Augmented reality	5
		Technology	12
		Challenges	7
		Youth	6
		Bibliometric	6
		Digital skills	6
		Perceptions	6

Source: Authors' computation from Scopus extracts (2024)

Although the word funding was part of the searched key words, it has not been mentioned specifically in the metadata, it might be that it has been integrated into other areas. Another reason could be that it is part of the challenges which have emerged in our analysis in Table 2. In addition, the literature review also suggests that funding is one of the biggest challenges in TVET. From this we can deduce that there is a research gap in the literature regarding funding models. Figure 4, representing the word cloud below, illustrates the 50 key phrases by relevance from SciVal. The most prominent phrase is Technical and Vocational Education and Training, which is indicated in green. The colors green indicate that the relevance of that phrase is increasing in the scholarly articles, whereas the blue and grey indicate a decline in the use of the phrases. Some of the phrases that are declining are Vocational training, apprenticeship, and work integrated learning. Again, this indicates the emerging concepts that are of interest to researchers and include terms like electronic learning and problem-solving skills etc.



Figure 4: Key phrases by relevance from SciVal

Source: Authors' computation from Scopus extracts (2024)

4.3. Most dominant authors

Figure 5 indicates the most influential author in the fields of TVET as Rasul Mohamad with 20 Articles. This data was analyzed in Scival. He has written the most articles and is also the most cited per publication. It must be remembered that the information in Scival is only applicable for the period 2019 to 2024.

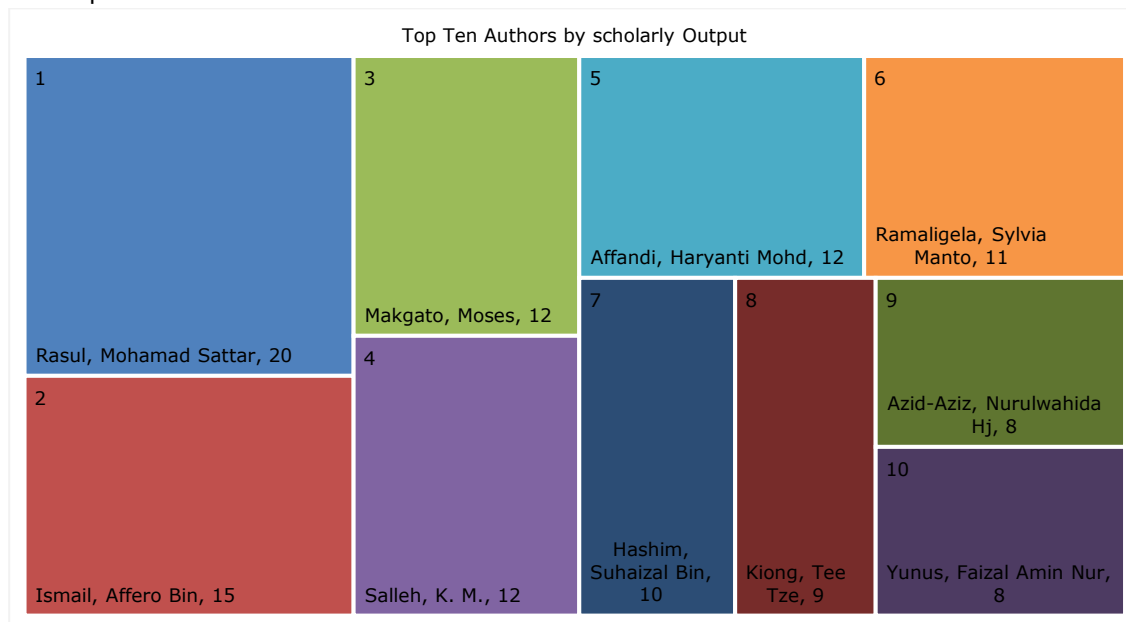


Figure 5: Most dominant author

Source: Authors' computation from Scopus extracts (2024)

Figure 6 illustrates the citations per author and citations per publication. Rasul is the most cited author in terms of overall publications, however he falls short when we consider the Field weighted citation impact FWCI). This is a measure of how the author performed in terms of the world average for similar articles. The most impactful authors are Alias N A and Esichaikul V V, with a score of 9.23 and 9.61 respectively.

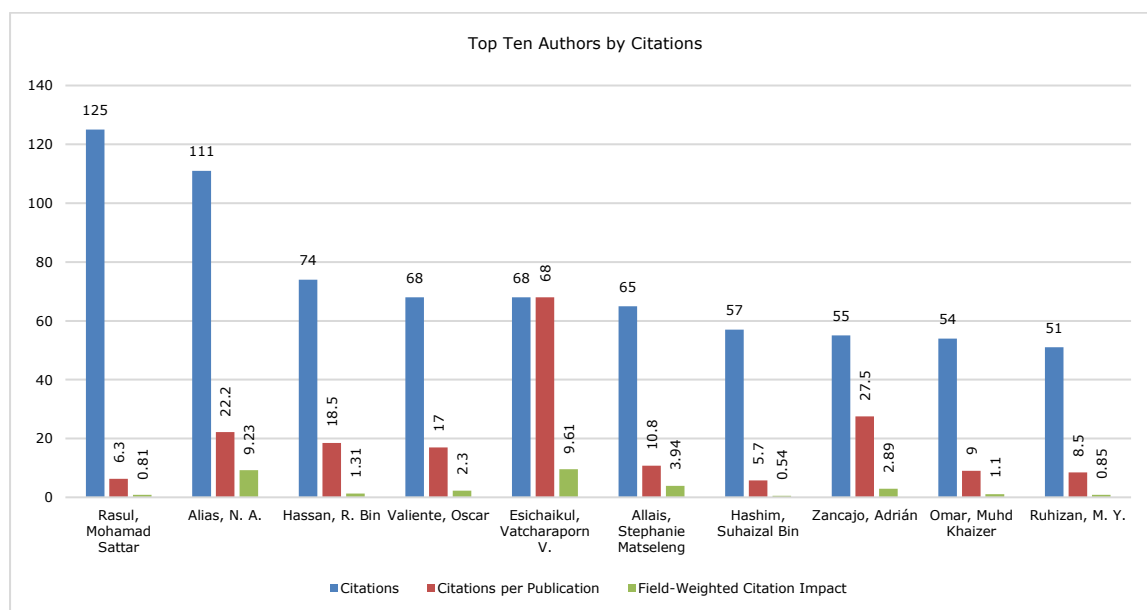


Figure 6: Top ten authors by citations from Scival

Source: Authors' computation from Scopus extracts (2024)

The network in Figure 7 has 25 authors, divided into 6 clusters. Cluster 1, the red cluster, consists of 6 authors and has the strongest alliance among the authors in the cluster. There is also strong co-operation between authors in cluster 2, cluster 3 and Cluster 6. The top joint author is Yunos Jailani md with 10 collaborations, but although he is the highest co-author, he only reached no 10 in terms of publications. The second highest collaborator is King Tee Tze with 8 collaborations and 9 documents, with a total link strength of 12. He is followed by Ismail Aferro with 6 collaborations and 15 documents, followed by Rasul Mohamad Sattar with 3 collaborations and 20 Documents. It is interesting to observe that although Rasul has the highest publications overall, he does not collaborate in his publications and has only co-authored 3 articles.

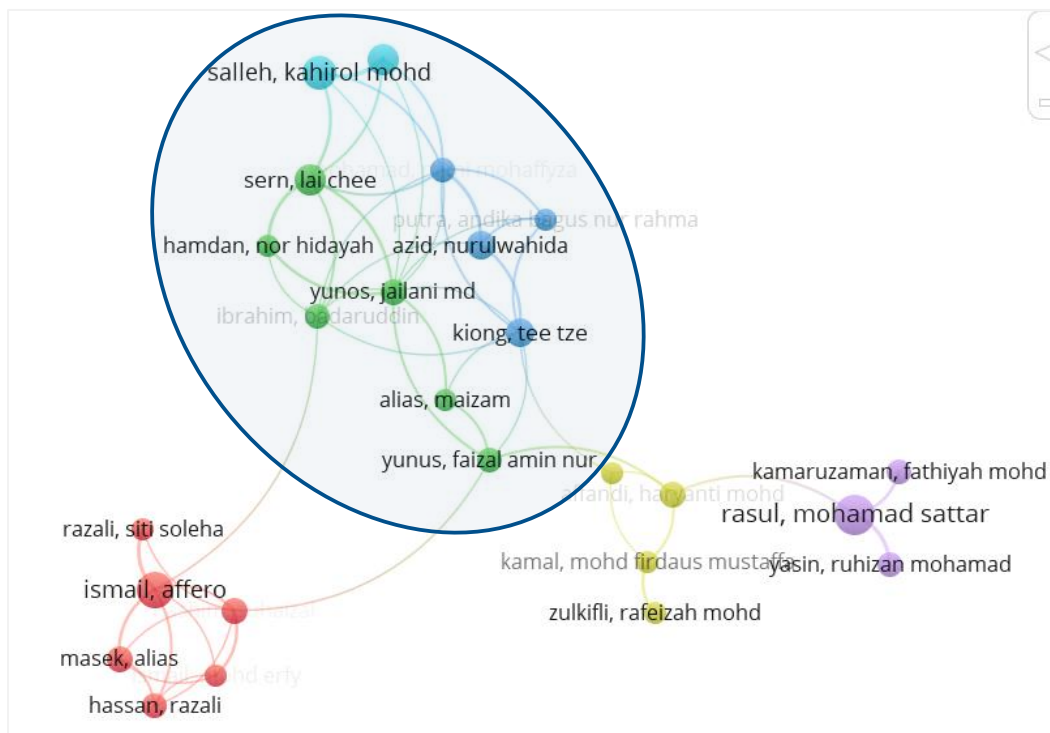


Figure 7: Top ten authors by citations from Scival
Source: Authors' computation from Scopus extracts (2024)

4.4. Most influential institutions

The institutions that are leading in terms of publications are the top three from Malaysia. Universiti Tun Hussein Onn Malaysia (UTHM) is the most productive institution with close to 140 documents, it is also a leading technical university in Malaysia. It is also noteworthy to mention that the top author in TVET, Rasul Mohamad is also affiliated with this University. South Africa represented by the University of South Africa and Tswane University of Technology also made it into the top 10 influential Institutions. According to an article by Majid et al. (2024), they asserted that on the Asian continent, The University of Tun Hussein Onn Malaysia is the only institution actively producing TVET-related articles (67 publications and 64 citations), which is in line with our finding.

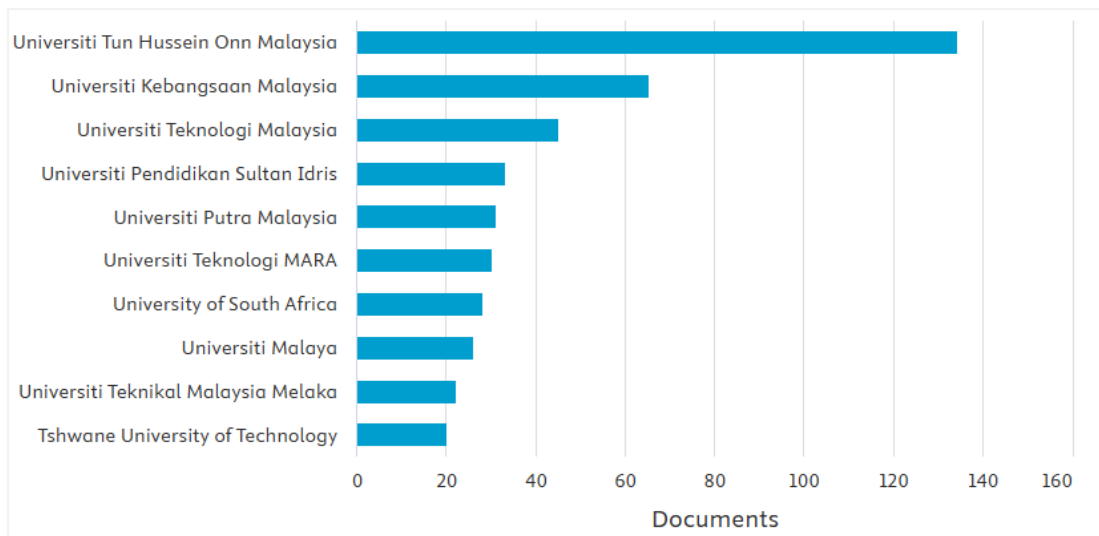


Figure 8: Most influential institutions

Source: Authors' computation from Scopus extracts (2024)

The total publications in this period amounted to 1141 of which 338 are published by the top 5 publications and that is 30% of total publications, whereas the top journal by number of publications was 17% of the total. The Journal with the highest number of publications is from Malaysia and from the Universiti Tun Hussein Onn Malaysia (UTHM). However, in terms of the cite score, they are below the journal of Vocational Education and Training, which has an impressive cite score of 5.2, which translates into 176.8 citations. In addition, this indicates that the journal of Vocational Education and training, which is from the United Kingdom, only accepts papers of a high quality.

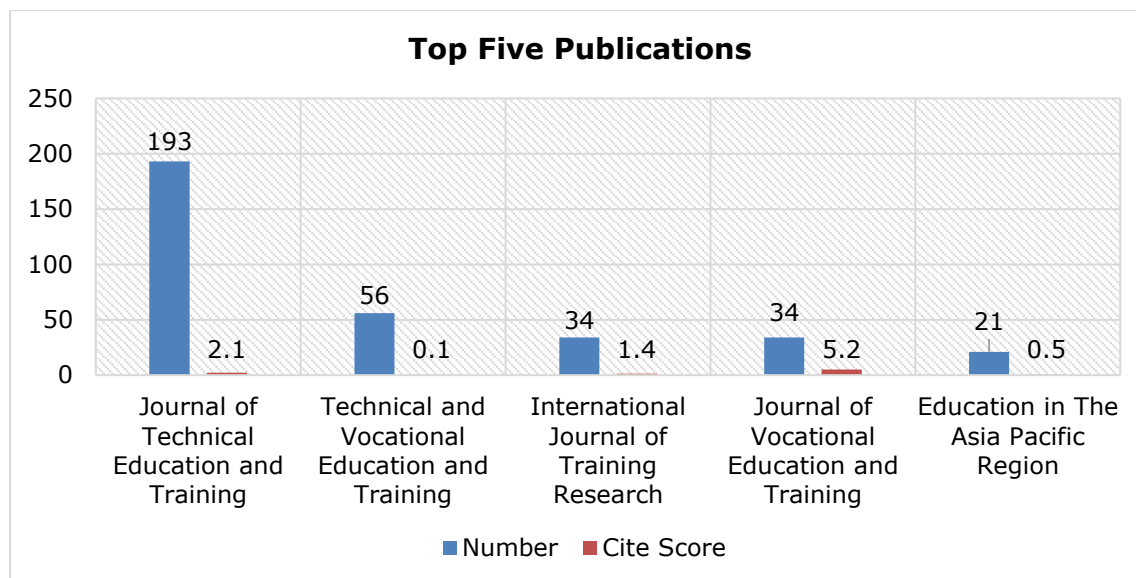


Figure 9: Top contributing sources

Source: Authors' computation from Scopus extracts (2024)

4.3. Most dominant countries

Judging from Figure 10, it is evident that Malaysia is the leader in terms of TVET research. South Africa follows shortly on the heels of Malaysia, however research in TVET in many African countries is scares, with Nigeria being the only other African country in the top 10 countries.

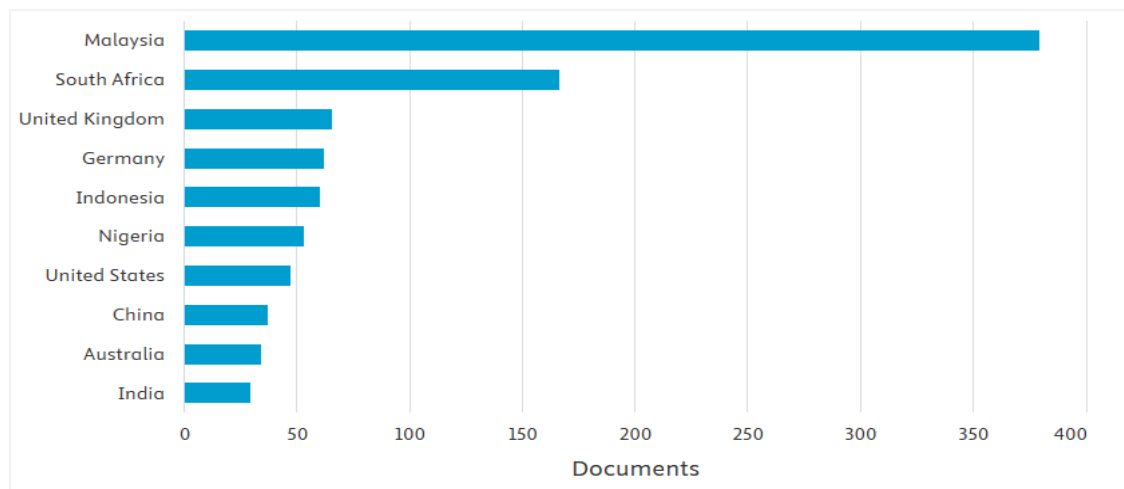


Figure 10: Most dominant countries

Source: Authors' computation from Scopus extracts (2024)

As seen in Figure 11, South Africa seems to be the powerhouse in terms of scholarly articles relating to TVET in Africa. South Africa has co-authored 165 documents with the countries in its cluster. South Africa co-authored mainly with the African countries such as Nigeria, Ethiopia, Uganda, Ghana and Zimbabwe at a lower level, it is evident that Kenya does not co-author with other African countries but rather prefer to collaborate with China in that regard.

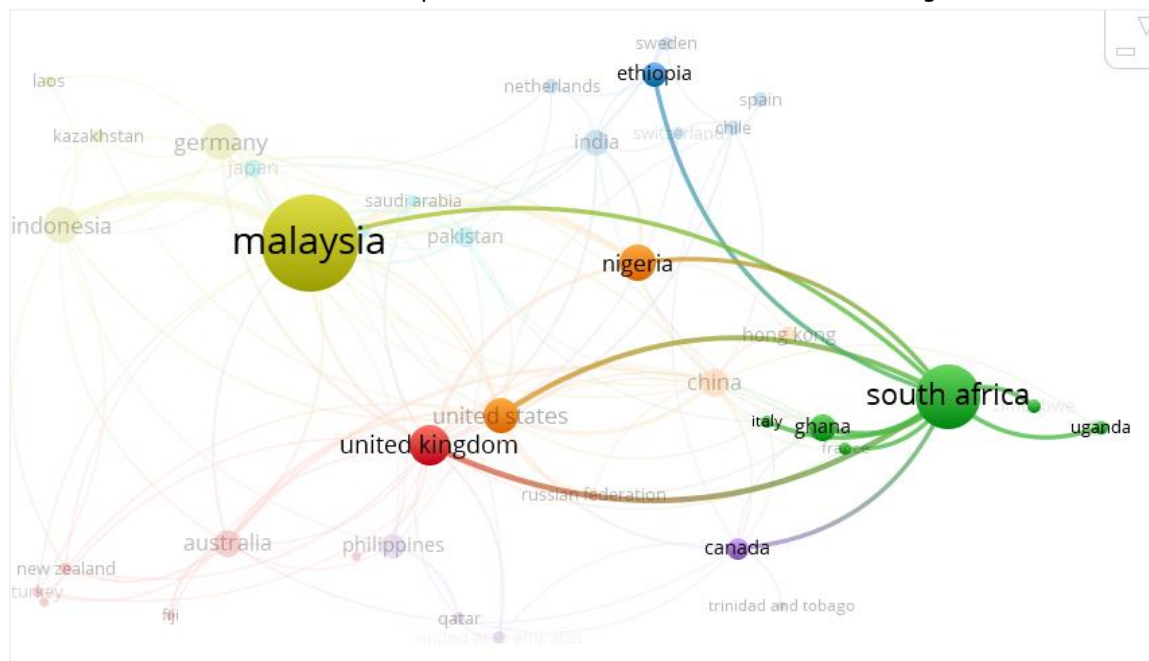


Figure 11: Co-authorship by South Africa from VOSviewer

Source: Authors' computation from Scopus extracts (2024)

In Figure 12, Malaysia produces the highest co-authored papers in the TVET domain, in the world. Co-authorship between countries strengthens knowledge as countries are able to learn from each other. Malaysia cooperates closely with countries such as Indonesia and Germany, but also with other countries such as Nigeria, New Zealand and United States.

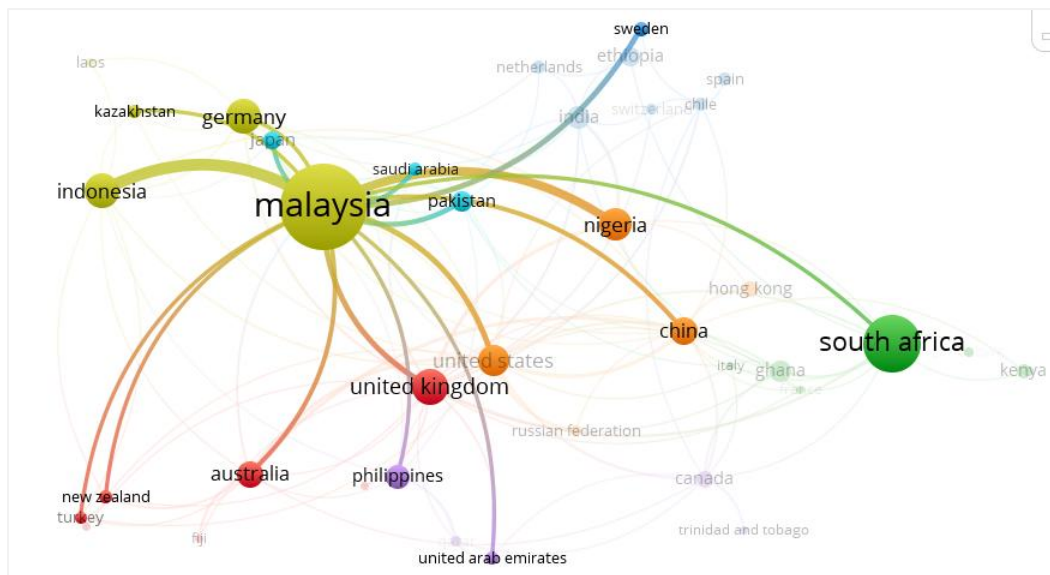


Figure 12: Co-authorship by Malaysia from VOSviewer
Source: Authors' computation from Scopus extracts (2024)

In Figure 13, it is evident that there are seven clusters of co-authorships. The strongest links are South Africa and Malaysia. Which means that they are countries with the highest number of co-authorships. Malaysia has 375 documents that are co-authored, whilst South Africa has 175 documents that are co-authored. In addition to writing papers together, their contribution to scholarly articles is also high, as they are overlapping in co-authoring as demonstrated by the circles around their clusters.

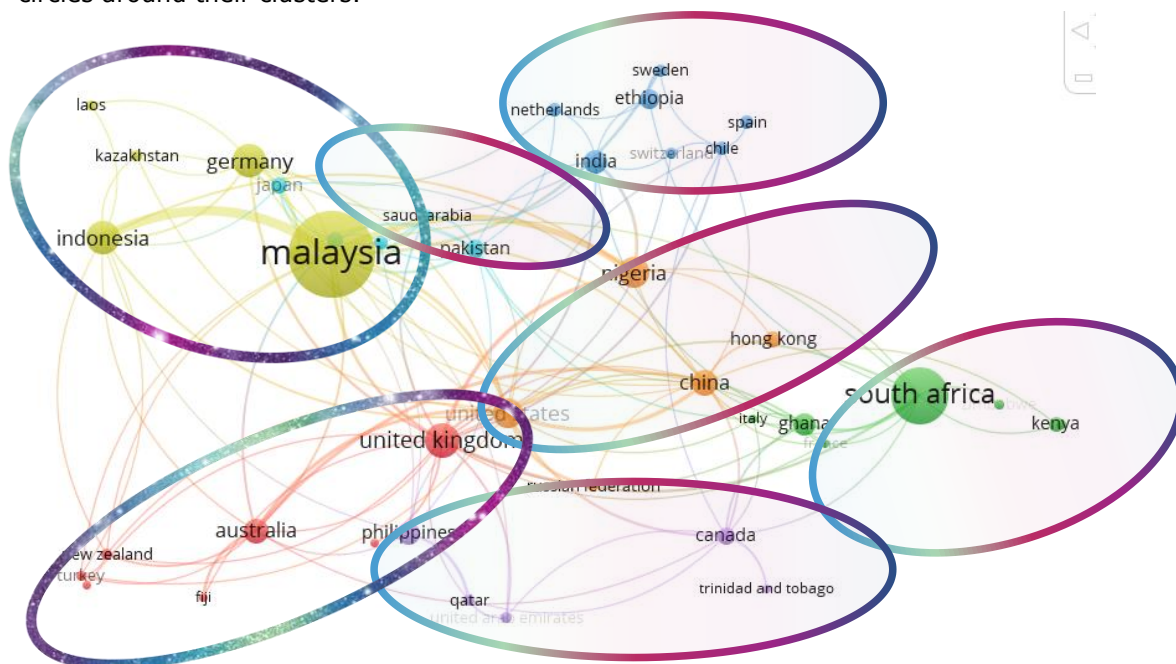


Figure 13: Co-authorship between countries from VOSviewer
Source: Authors' computation from Scopus extracts (2024)

4. Discussions and Conclusions

The study used quantitative methods to collect and analyse the findings. The study successfully addressed the two research questions. The first question was on emerging concepts as well as TVET research on funding. The second question was on finding the most prominent Authors,

Institutions, sources and countries. These results have been discussed in detail below. Research in TVET has increased exponentially in the last 10 years. This could be due to the increased focus on TVET in developing countries by organizations such as the United Nations, that advocates for inclusive and equitable quality education for all. TVET as a discipline is regarded by most countries as a way out of poverty in pursued of an industrialised country. Developed countries such as Germany have used TVET to industrialise their countries.

Scholarly articles in TVET are dominated by journal articles, and books are the second highest. Scholarly articles are preferred, because they have an immediate impact and unlike books, do not take long to publish, therefore information in journals articles is more contemporary. Books are important in TVET, to enable the less privileged access to information as they do not have access to reliable technology all the time. TVET is the most prominent concept in the emerging concepts, because it has the biggest node. This is because it is linked to all research in the field. There has also been a decrease of the usage of the term vocational education and training (VET) and an increase in the usage of the concept technical vocational education and training (TVET), this increased use of the term TVET in research happened around 2020. This change is to reflect the technological aspect and broaden the scope of TVET. The term Technical and Vocational Education and Training was officiated at the Second International Congress on Technical and Vocational Education in 1999 in Seoul, Republic of Korea. The Congress recommended the usage of the term in recognition of the combined process of education and training, and of the common objective of employment as their immediate goal (UNEVOC-UNESCO).

Other emerging concepts points toward technological advancement and requires investment in that regard. Recent research focused more on phrases like impact evaluation, technology and self efficacy. This talks to the modernization and improvement in TVET and areas of possible future research. In a study done by Hassan et al. (2021) it was affirmed that consistent technology area used in 17 publications is "Online Learning" in the last decade. The second most used technology in the ICT functional area in 6 publications is "Internet + Education." The remaining technology/functional areas have 1 to 5 publications in the last ten years. This reiterates our finding of more research to be conducted in this field.

Authors from Malaysia as well as institutions from Malaysia are dominating research in TVET. Although Rasul MS is the top scholar by citation, he is not the top scholar by citation per publication or field-weighted citation impact (FWCI). Esichaikul is the most impactful author as he has the highest citation per publication and FWCI of 9.61. Rasul's FCWI is 0.8 and is below 1, that means it is below expected and the world average for similar publications. It is clear that one needs to focus on quality publication even if they are less, rather than, having many publications with no impact. Collaboration is strong among authors; however, it is also evident that the author with the highest publication is not necessarily the highest collaborator. Rasul has high publications but only three links. One can deduce from this that, that is the reason for the low FWCI on his publications, as he does not collaborate and learn from other researcher. Collaboration has the advantage of sharing expertise leading to quality papers. Universiti Tun Hussein Onn Malaysia is the most influential institution with close to 140 documents. Malaysia supports its researchers and therefore there is increased scholarly output. This University has also high publications, but the FWCI is low at 0.55.

The Journal with the highest number of publications is from Malaysia and from the Universiti Tun Hussein Onn Malaysia (UTHM). However, in terms of the cite score, they are below the journal of Vocational Education and Training, which has an impressive cite score of 5.2, which translates into 176.8 citations. In addition, this indicates that the journal of Vocational Education and training, which is from the United Kingdom, only accepts papers of a high quality and has the most impact. Most TVET publications are in social sciences with 64%, but despite the high publication rate the FCWI is also below 1 and indicates that the social sciences papers are

performing below their peers. The conclusion can be made that the papers do not have an impact in the scholarly domain.

In terms of countries, Malaysia is again at the forefront of being dominant in TVET research. South Africa is in the second place followed by the United Kingdom. One would have expected for Germany to be in the top three countries, considering their dominance in the TVET domain, however it could also be because we limited the sample to English papers, and they might have papers written in German. Collaboration between the top three countries is high as can be seen from the link strength among them. Malaysia has strong collaborative links with Indonesia, but with South Africa could be medium and this can be ascribed to the distance between the countries. Malaysia is arguably the country that invest considerably in TVET research. TVET research is scarce in Africa and more should be done to advance this research. TVET trainers in Africa are normally not highly qualified and therefore they do not participate in research. An additional challenge limiting research is also funding as indicated in our literature review. Although TVET has a long history, it has been neglected and has only receive attention in the recent past. The Sustainable Development Goals of the United Nations played a crucial role in the advancement of TVET.

6. Future Research Directions

The results of this study suggest several avenues for future TVET scholarship. First, the persistence of funding as a poorly researched theme points to the need for more empirical and policy-oriented studies that investigate funding models, sustainability mechanisms, and innovative financing approaches that can strengthen TVET systems globally, particularly in Africa where research output remains limited. Second, the rapid rise of emerging concepts such as digital learning, gamification, augmented reality, and continuing professional development underscores a shift towards technology-driven and lifelong learning paradigms. Future research should therefore focus on how these innovations can be effectively integrated into curricula, teacher training, and institutional governance to improve outcomes. Third, although Malaysia dominates the field, research remains uneven across regions. Collaborative projects that include underrepresented contexts, especially African and low-income countries, are critical to generating inclusive and comparative insights. Finally, the performance of TVET publications in social sciences shows below-average global impact, suggesting the need for higher-quality research designs, stronger theoretical framing, and more international co-authorship to enhance influence. Addressing these gaps will ensure that TVET scholarship not only grows in volume but also contributes meaningfully to policy, practice, and sustainable development agendas.

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