

**DIGITALISATION, GENDER, AND CAREER INTENTIONS:
KNOWLEDGE MAPPING**

Mavis Mensah Senyah

Abstract. The study aims to investigate the relationship between digitalisation, gender stereotypes, and digital skills on gender discrepancies in career intentions. The study uses the VOS viewer tool to present data from the Scopus database and perform analyses on gender and career intention and science mapping. Harzing's Publish or Perish software is used to analyse the performance of publications involving digitalisation, gender, and career intentions. The study uses the VOS viewer tool to present data from the Scopus database and perform analyses on gender and career intention and science mapping. The study shows that in about two decades of the emergence of interest in publications around digitalisation, career intentions, and gender, about two hundred publications have been produced. An annual growth rate of 8.5; 1596 citations emerged from these publications with a yearly average of 72.55. The results showed a persistent increase in research by nations, authors, funding organizations, etc., with the US emerging as the nation with the highest research output. The study concludes that there is a persistent increase in research on digitalisation, gender, and career intentions. The US has the highest research output in this area. The study highlights the need for more research in this area to address gender discrepancies in career intentions. The study also suggests that policymakers should focus on providing equal opportunities for women to access digital skills and education to bridge the digital gender divide.

Keywords: career; decision making; training; gender; career intentions; digitalisation; technology; digital divide; employment; gender equality; social media.

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1. Introduction

Digitization is the process of converting analogue information into digital formats and incorporating digital technology into other fields. With the advent of digitalisation, there have been changes in how individuals work, interact, and get information [1–8]. Digitalisation could be a powerful tool to advance gender equality and sustainable development [9–13] by increasing access to education [14–20], healthcare [21–22], and economic opportunities, especially for women and marginalized groups. Likewise, gender equality is essential for harnessing the full potential of digitalisation and achieving green [23–31] and inclusive [32–35] economic development. As digitalisation continues to transform the workplace, it is crucial to understand the implications for gender equality in career aspirations. As a result of digitalisation, there is a greater need for digital skills across all industries. According to research, there are gender differences in the acquisition of digital skills because women commonly encounter barriers, such as biases and preconceptions that prohibit them from adopting technology [36]. Gender inequality would persist if women were less likely to seek employment in fields where a strong demand for digital skills exists.

The way that people pick their jobs is significantly influenced by gender stereotypes. According to established gender stereotypes and biases, males are often linked with technology-related businesses, whilst women are frequently urged to pursue caring or humanities-related occupations. According to [37], these stereotypes may influence people's career aspirations and contribute to gender inequality in the digital sector. Gender stereotypes need to be destroyed to motivate more women to pursue professions in technology and related fields. The "digital gender divide" refers to the disparity between men and women in terms of access, use, and ownership of digital technology. For women, particularly in developing countries, accessing and using digital tools and resources might be more challenging [38]. Women may not be able to take advantage of digital possibilities or pursue jobs in industries that significantly rely on technology because of the gender gap in the digital world. Digitalisation affects gender and career intention in both positive and negative ways [39–41]. While the digital era presents new opportunities for job advancement, it also widens the gender divide that already exists. Closing the digital gender gap, helping women develop their digital skills, and dispelling gender stereotypes are all necessary for promoting gender equality in career aspirations. To address these issues and build an inclusive digital workforce, further research and legislative reforms are required to give more in-depth insights into the factors that contribute to gender disparities in career intention. With the help of network analysis, this paper intends to investigate gender, career intention, and digitization as they relate to the intellectual relationships and structural networks among research elements. Thus, demonstrating the intellectual and bibliometric architecture of the research field. To achieve this goal, the remaining paper structure is as follows: The literature review is presented in Section 2, the study's data and methodology are described in Section 3, the empirical findings are discussed in Section 4, and the research's conclusions are presented in Section 5.

2. Literature Review

Because of the rapid advancement of digital technology, the workplace has experienced considerable changes [40,41]. As digitalisation permeates society, it is crucial to examine how these developments affect people's intentions for their careers and if gender plays a role in these

choices. The link between gender, career goal, and digitalisation is examined in this review of the literature by using previously conducted research. The advancement of digital technologies has led to the creation of new employment opportunities, notably in technology-driven industries. As a result of digitization, jobs have been generated in sectors such as data analytics, artificial intelligence, and software development [42,43]. These possibilities can appeal to people with a range of skill sets and interests [44–50].

People need to have a certain level of digital literacy and aptitude to flourish in the job market in the digital age. The authors of two studies [51,52] found that individuals with higher levels of digital competence are more likely to plan to work in the digital industry. The acquisition of digital skills can have a significant impact on the pursuit of digital careers and professional goals. Gender stereotypes have a huge impact on people's career goals. Society's expectations and perceptions of gender roles have an impact on career decisions, which leads to occupational segregation [53]. People, particularly women, may be discouraged from pursuing careers in technology and closely related industries by conventional gender stereotypes. The career objectives of men and women differ, according to several studies. Men are more likely than women, according to studies, to indicate interest in technical and engineering-related occupations [54]. Several things, including social expectations, self-efficacy views, and exposure to role models, might be blamed for these discrepancies. Despite the growing need for digital skills, there are still gender inequalities in the digital industry. Per [55] and [56], women are underrepresented in leadership roles and tech-related occupations. Stereotypes, prejudices, and structural barriers that keep women from pursuing and advancing in digital occupations are the cause of these discrepancies.

Several variables influence gendered professional ambitions in the digital era. These include gender biases, educational and cultural backgrounds, mentorship opportunities, and workplace dynamics [57]. These problems must be resolved in order to create an environment that encourages people of both genders to pursue careers in technology. To ensure that people of all genders have equal access to high-quality education and digital skills training, efforts have been made to promote STEM (science, technology, engineering, and mathematics) education among girls and women and support their participation in technology-related fields [58,59]. It may be extremely important for educational institutions and training programs to play a part in giving people the digital skills they require to seek digital careers. Efforts must be made to dispel stereotypes and misconceptions about gender and digital jobs. The establishment of gender-neutral performance assessments, inclusive recruiting processes, and unconscious bias training are just a few examples of the practices and policies that organizations may use to enhance diversity and inclusion [60,61]. It is possible to create a more welcoming environment by dismantling gendered stereotypes in career counselling and school courses. In recent years, the scientific community has paid increased attention to gender, career intention, and digitization. The following are the primary literary axes of the body of literature: gender and career intention: [62–67]; among others. Several scientific papers [68–75]; among others also aimed at analysing digitalisation in the dynamics of gender and career intention.

The abovementioned show that deeper research should be realised on gendered career intentions in the context of digitalisation using bibliometric analysis despite extensive research on these concepts.

3. Methods

The use of bibliometric analysis in social science research has significantly increased in recent years [76–82]. Indicators of the popularity of bibliometric analysis include the development, accessibility, and availability of tools like VOS viewer, Publish or Perish, CiteSpace, Bibliometrix, CRExplorer, and databases like Scopus, PubMed, Web of Science, Microsoft Academic Search. Additionally, information science has replaced commercial research, and bibliometric analysis in scientific development is rapidly growing in this field [77]. The popularity of the bibliometric technique in social science research is not a reflection of a particular trend but rather demonstrates how successfully it can be applied to manage enormous volumes of scientific data to produce high-impact research [77–81]. The scientific community has received the Scopus database favourably since it offers thorough coverage and is easy to use [83–86]. The study employed the Scopus online database for the analysis since it offers the biggest database, the most well-known research papers, and a VOS viewer compatibility for visualization analysis. The analysis takes into account author performance, research subjects, productivity, and output performance. Performance analysis examines how elements of scholarly research have affected a certain field of study [87]. This approach fits the bibliometric research's reputation for naturally descriptive analyses [77–81].

The study applies the following criteria and filters for papers' selection: Publication period: 2001 to May 2023; Input terms for the search were: gender and career and digital and yielded 202 documents, refined to 187; Document type: Article, conference paper, conference review, book, book chapter and editorial; Subject categories: Arts and Humanities, Business Management and Accounting, Decision Sciences, Social Sciences, Earth and Planetary Sciences, Energy, Medicine, Multidisciplinary, Engineering, Environmental Science, Health Professions, Immunology and Microbiology, Materials Science, Neuroscience, Nursing, Economics, Psychology, Econometrics and Finance, Environmental Science, Computer Science, Agricultural and Biological Science, Pharmacology, Toxicology and Pharmaceutics, Dentistry, Physics and Astronomy, Chemical Engineering, Veterinary, Biochemistry, Genetics and Molecular Biology and Mathematics; Language: English. After the filtering, 187 documents were exported to the VOS viewer for visualization analysis.

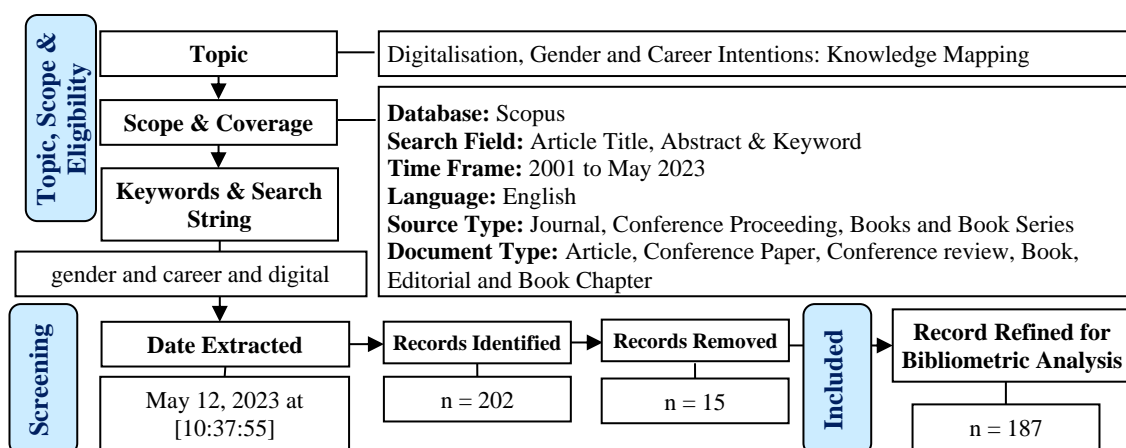


Figure 1. Data extraction process

Source: adapted from [88]

4. Results and Discussion

Researchers employ bibliometric analysis for several purposes, including to identify new patterns in the performance of articles and journals, cooperation styles, and research elements, as well as to investigate the conceptual framework of a particular subject in the existing literature [77,89].

In order to identify patterns and co-citations of a specific theme by year, author, country, journal, and research constituent [82], bibliometric analyses cover a large number of published research articles. Organizations can make data-driven policy decisions as a result. Stakeholders will learn about the trend in gender and career intentions using trend analysis.

Figure 1 illustrates the evolution of 187 documents refined from 202, identified in the Scopus database between 2001 and May 2023, a period of 22 years published in English. The results show an upward growth trend in the publication of works on studies involving digitalization, gender, and career intentions.

Table 1. Metrics for performance analysis

Metric	Description	Result
Publication years	The earliest and latest publication year found in the currently selected results.	2001-2023
Citation years	Number of years from the earliest year found in the currently selected results to the year of the search (usually the current year).	22
Total Publications (TP)	The total number of currently selected results.	187
Number of contributing authors (NCA)	The total number of contributing authors	159
Number of active years of publication (NAY)	The total periods of publications by research area	21
Productivity per active years of publication (PAY)	The total publications/number of active years of publication (TP/NAY)	8.9
Total Citations (TC)	The sum of the citation counts across all currently selected results.	1596
Average citations (AC)/year	The average number of citations per year (i.e., Citations / Citation years)	72.55
Cites/paper	The sum of the citation counts across all papers, divided by the total number of papers. The median and mode are also calculated and available separately.	8.53
Authors/paper	The average number of authors per paper, calculated as the sum of the author counts across all papers, divided by the total number of papers. The median and mode are also calculated and available separately.	3.01
h-index (h)	h Number of documents cited at least h times (a measure of influence)	19
g-index (g)	g Number of documents cited at least g ² times (a measure of impact)	36

Source: generated by the author from the Scopus database using Harzing's Publish or Perish.

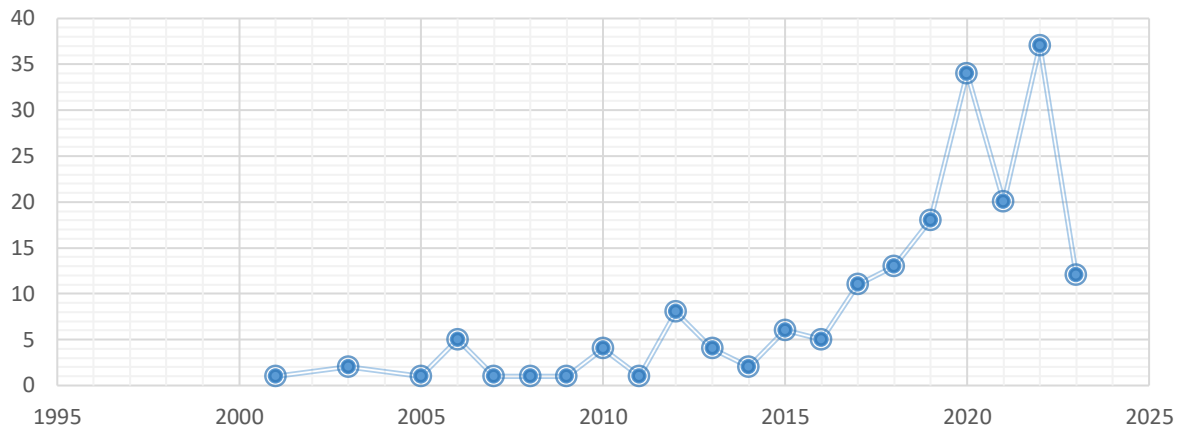


Figure 1. The annual number of publications on gender, digitalisation, and career intentions (2001- May 2023)

Source: generated by the author from the Scopus database using Excel.

The analysis indicates a progressive growth from 2001 to May 2023. The increasing use of digital technologies has changed a variety of societal factors, including opportunities and job options [90]. New disciplines and industries have emerged as a result of the digitalisation era, presenting opportunities and challenges for gendered career ambitions. Also, with the rise of the information economy, remote work, and flexible job options, the workforce dynamics have changed in the digital age [91]. By modifying conventional career routes and providing for more flexibility in work-life balance, these changes have had an impact on gendered professional ambitions, which can have an impact on people's goals and decisions.

Figure 2 shows that, with a minimum of 5 research outputs, the United States of America has 60 publications – the largest among this research element.

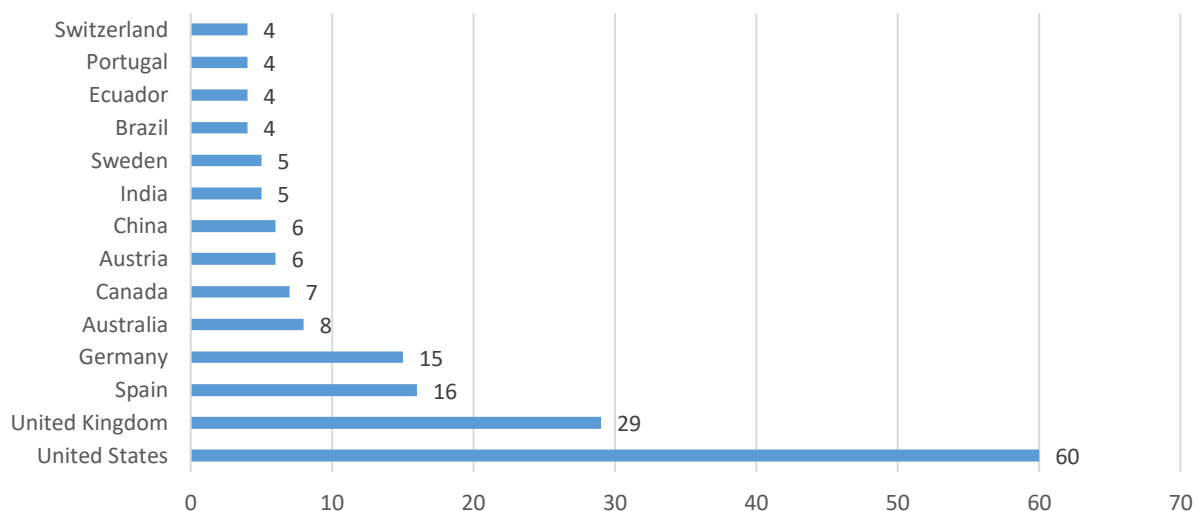


Figure 2. A document by Country or Territory (2001 – May 2023).

Source: compiled by the author based on the Scopus database using Excel.

This suggests that research publication on gender, career intentions, and digitalisation in the US has received considerable attention. With 29 research outputs, the United Kingdom follows the United States as a notable player in this field. This shows that scientists are actively investigating gender, career intentions, and digitalisation in the UK. Spain and Germany follow with 16 and 15 research outputs respectively. The country of origin of 16 research outputs is undefined. There is more clarity on which countries show more interest, explore, and use knowledge to promote better living standards.

Research needs funding and sponsorship. Sponsorship and funding promote the study and the growth of knowledge as stakeholders utilize research findings. Figure 3 is a graph showing the trend for sponsorship growth. Funding sponsors like the National Science Foundation have funded 12 publications, the European Commission has 7 documents under their belt, followed by the European Regional Development Fund and Ministerio de Ciencia e Innovación with 3 each, among others. The remaining nine organizations sponsor an average of 1.

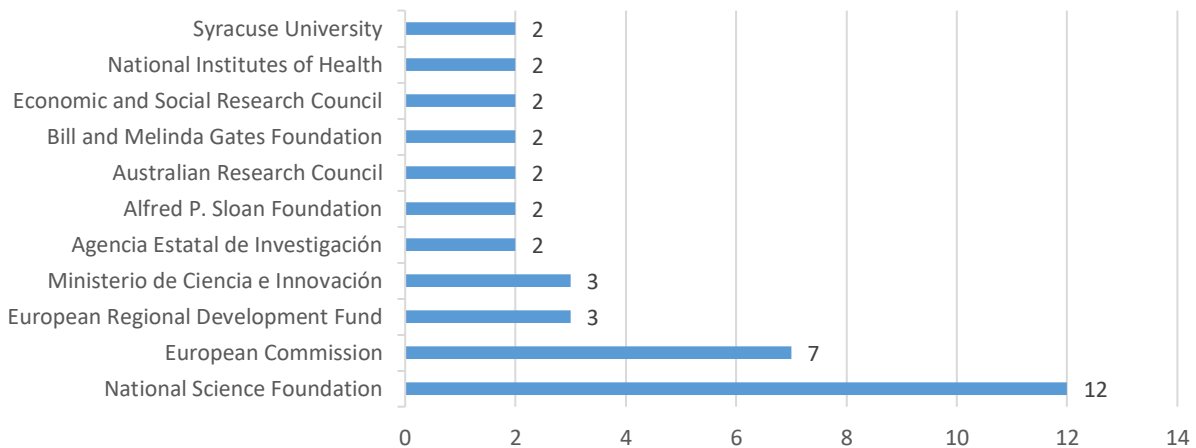


Figure 3. Documents By Funding Sponsor Trend (2001 – May 2023)

Source: compiled by the author based on the Scopus database using Excel.

The dominant keywords in 2016 were education and technology; gender and STEM in 2019, and in 2020, they were diversity and digital technology. Table 2 presents the most cited publications devoted to research on digitalisation, gender, and career intentions.

Table 2. Top 10 cited documents on digitalisation, gender, and career intention

Cites	Authors	Title	Year	Source
309	B.E. Duffy	(Not) getting paid to do what you love: Gender, social media, and aspirational work	2017	Yale University Press
216	A. Lambrecht, C. Tucker	Algorithmic bias? An empirical study of apparent gender-based discrimination in the display of stem career ads	2019	Management Science
81	B.E. Duffy, U. Pruchniewska	Gender and self-enterprise in the social media age: A digital double bind	2017	Information Communication and Society

Cites	Authors	Title	Year	Source
76	E.M. Mercier, B. Barron, K.M. O'Connor	Images of self and others as computer users: The role of gender and experience	2006	Journal of Computer-Assisted Learning
63	J.R. Garcia, A.N. Gesselman, S.A. Siliman, B.L. Perry, K. Coe, H.E. Fisher	Sexting among singles in the USA: Prevalence of sending, receiving, and sharing sexual messages and images	2016	Sexual Health
53	S. González-Pérez, R. Mateos de Cabo, M. Sáinz	Girls in STEM: Is It a Female Role-Model Thing?	2020	Frontiers in Psychology
36	I. Kamberidou	“Distinguished” women entrepreneurs in the digital economy and the multitasking whirlpool	2020	Journal of Innovation and Entrepreneurship
36	T. Sanders, J. Scoular, R. Campbell, J. Pitcher, S. Cunningham	Internet sex work: Beyond the gaze	2017	Internet Sex Work: Beyond the Gaze
29	E. López-Iñesta, C. Botella, S. Rueda, A. Forte, P. Marzal	Towards Breaking the Gender Gap in Science, Technology, Engineering and Mathematics	2020	Revista Iberoamericana de Tecnologías del Aprendizaje
28	U. Pruchniewska	“A group that’s just women for women”: Feminist affordances of private Facebook groups for professionals	2019	New Media and Society

Source: Generated with the data from Scopus database using Harzing’s Publish or Perish.

An essential method for scientific mapping, citation analysis measures the influence of published works by counting the number of citations they have received. It operates under the premise that citations replicate intellectual contributions and have an impact on research horizons [92,93]. This analysis revealed that [72] has the highest citation (309), followed by 216 citations from [68]. The implication is that all things being equal, [72], on average, has the most significant influence in terms of contributions to the research area.

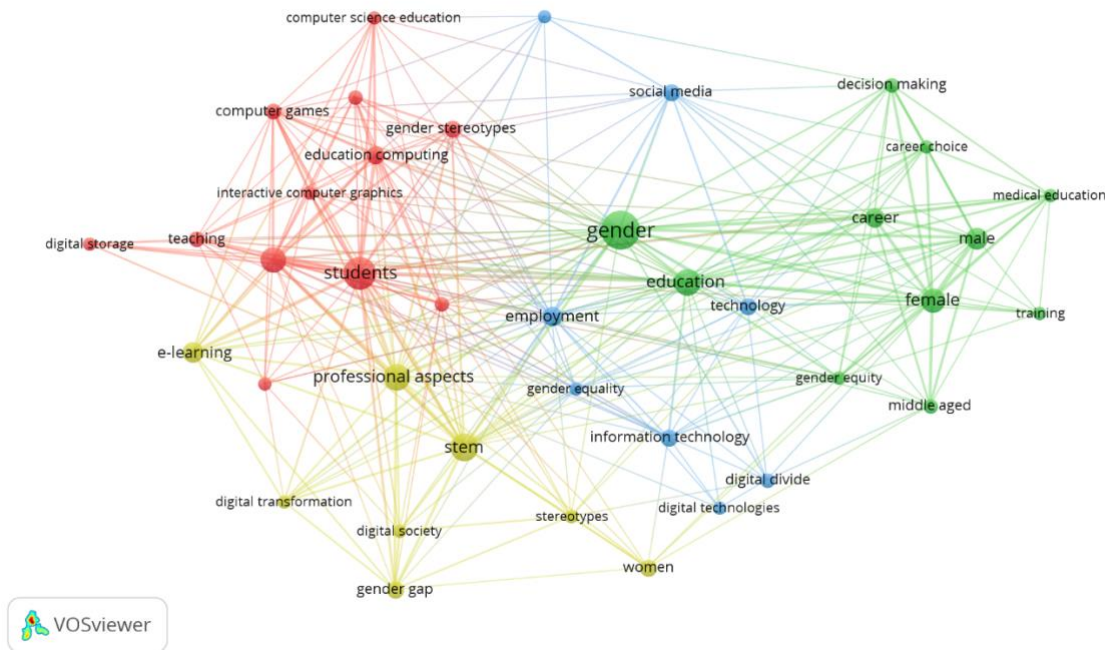


Figure 4. VOS viewer visualization of a term co-occurrence network (Minimum number of co-occurrences of a keyword = 5)

Source: Generated by the author using data from Scopus exported to VOS viewer.

The results of a co-occurrence analysis of keyword networks related to the intersection of digitalization, gender, and career intentions. The analysis identified four clusters that reflect the main study streams in publications within this domain. Cluster one consisted of twelve keywords: computer games, computer programming, computer science, computer science education, digital storage, education computing, engineering education, gender stereotypes, information systems, interactive computer graphics, students, and teaching. This cluster appears to focus on the educational and pedagogical aspects of digitalization concerning computer science and technology-related fields [94–97]. The inclusion of gender stereotypes indicates a likely investigation into how gender biases and preconceptions impact students' experiences and career intentions in these fields. Understanding the relationship between gender stereotypes and educational settings in computer science and related disciplines is crucial for promoting inclusivity and diversifying the talent pool in technology-driven industries.

Cluster two consisted of eleven keywords like career choice, career, decision making, education, female, gender, male, medical education, middle-aged, training, and gender equity. This cluster seems to centre on the career intentions and decision-making processes of individuals with a particular focus on gender dynamics. The inclusion of "gender equity" suggests an exploration of the gender imbalances and disparities that may exist in career choices and opportunities [98–100]. Addressing gender disparities in career choices and opportunities is essential for creating a more equitable and inclusive workforce. Understanding factors that influence career decision-making can help develop targeted interventions and policies.

Cluster three consisted of eight keywords such as digital divide, digital technologies, employment, gender equality, information technology, social media, social networking, and

technology. Cluster three appears to concentrate on the impact of digitalization on gender equality and employment opportunities. The presence of the "digital divide" suggests an examination of how unequal access to digital technologies can influence employment prospects and gender equality [101–103]. Bridging the digital divide is essential for ensuring equal opportunities for all genders in accessing technology and related employment prospects. Addressing the challenges posed by technology and social media is crucial to promoting inclusivity and reducing disparities.

Cluster four consisted of eight keywords such as digital society, digital transformation, e-learning, gender gap, professional aspects, STEM, stereotypes, and women. This cluster revolves around the broader implications of digitalization on society, with a particular focus on gender gaps and stereotypes. The inclusion of "STEM" indicates a likely exploration of gender disparities in science, technology, engineering, and mathematics fields [104–107]. Promoting gender equality in STEM fields is vital for fostering innovation and maximizing the potential of diverse perspectives. Understanding the role of digital transformation in reinforcing or breaking gender stereotypes can help inform policies that promote inclusivity and gender balance.

5. Conclusions

The current study's findings demonstrated that concerns relating to digitalisation, gender, and career ambitions were constantly urgent. The volume of publications is trending positively. The results made it possible to draw attention to the numerous sponsors (the National Science Foundation supported 12 publications, and the European Commission financed 7 papers, among others) and nations (the US with 60 publications and the UK with 29 publications) looking into the issues of digitalisation, gender, and career ambitions. It is undeniably evident that the majority of this research is coming from the West. The co-occurrence analysis of keyword networks identified four clusters with distinct clusters which highlights the multidimensional nature of the research and emphasizes the importance of understanding gender dynamics in the context of digitalization and career intentions.

Over the last 20 years, there has been an increase in interest in publications on gender, career intentions, and digitalisation, indicating a greater understanding of how these three topics interact and have an influence on numerous facets of society. There has been a large amount of study and intellectual engagement in examining the linkages between digitalisation, career ambitions, and gender, as seen by the approximately 200 papers that have been published in this area.

The 8.5 annual growth rate suggests that interest in this subject has been rising over time. This increased rate shows that more academics and researchers are interested in researching how digitalisation affects career goals and how gender plays a factor in this. The steady increase in publications shows a steadfast interest and emphasizes the significance of this field of research.

The fact that these papers have generated 1596 citations further underlines the significance and relevance of the research done in this area. Citations are proof that a piece of work has been acknowledged and used as a source by other scholars, demonstrating its value and contribution to the larger academic community. The field is receiving a moderate amount of attention and

interest from academics, as evidenced by the average of 72.55 citations each year. The quantity of citations might be viewed as a measure of the research's impact and acknowledgment. It implies that the conclusions and revelations from these works are influencing and guiding future research on gender, career goals, and digitization. The growing number of citations over time indicates that this field's body of knowledge is growing and becoming more well-established. This research has the potential to inform policies, practices, and societal attitudes to create more inclusive and equitable environments in the digital era.

6. Limitations and Further Direction of Investigations

Despite the valuable insights gained from the bibliometric research analysis on digitalisation, gender, and career intention, several limitations need to be acknowledged to ensure a comprehensive understanding of the findings. Moreover, there are promising directions for further investigations that can enhance the depth and scope of research in this area.

The study's findings on digitalisation, gender, and career intentions display a significant concentration of research from Western nations, mainly the US and the UK, indicating geographical bias. This may limit the applicability of the conclusions to regions with different cultural and economic contexts. To address these limitations, future research should aim to incorporate diverse geographical perspectives to ensure a comprehensive understanding of digitalisation, gender, and career intentions.

Future research in the intersection of digitalisation, gender, and career intentions should explore how factors like race, ethnicity, and socio-economic background intersect with gender, shaping experiences in the digital workforce. Besides, it is necessary to consider the globalization process [108–112], analyse the gender and digitalisation within family business [113–115]. Longitudinal studies, qualitative research methods, and evaluating existing policies are essential for creating inclusive work environments and promoting gender equity in the digital domain on a global scale.

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