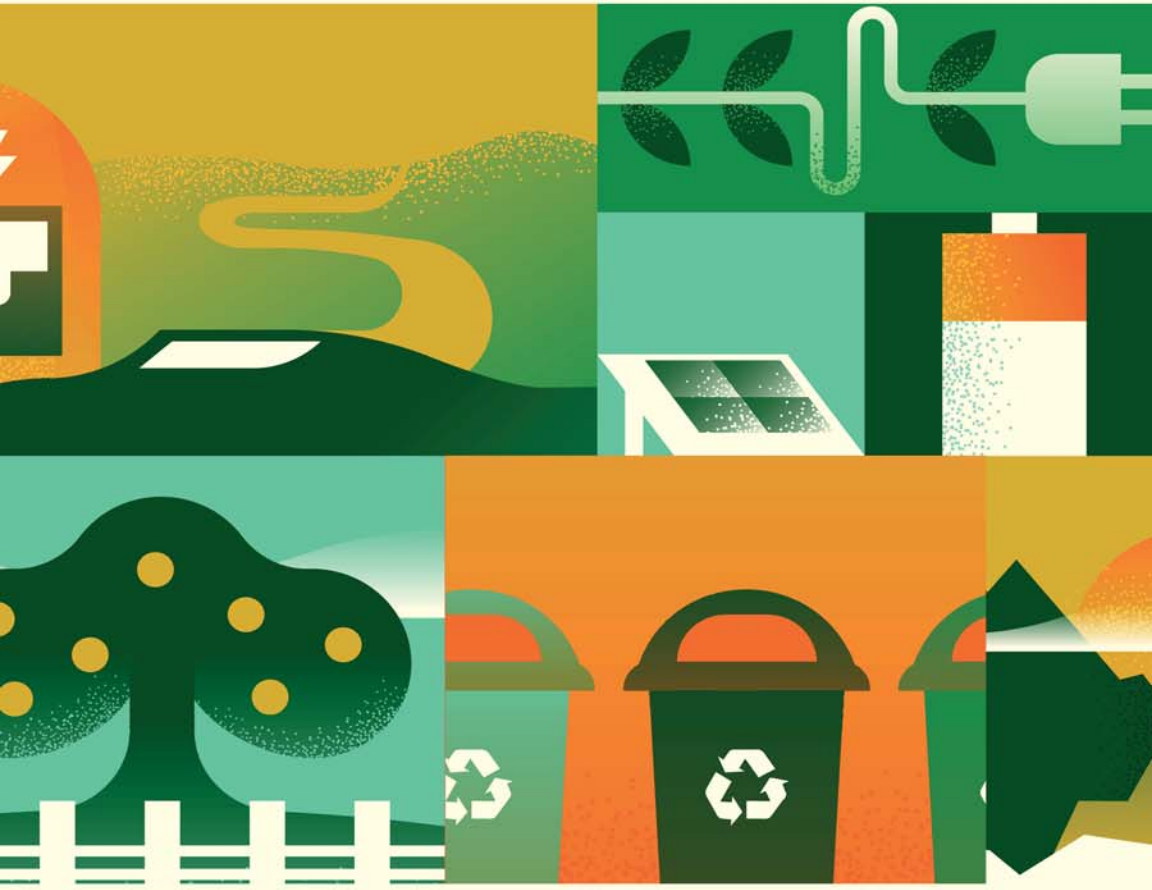
FOSTERING SUSTAINABLE DEVELOPMENT IN THE AGE OF TECHNOLOGIES



Edited by

ROHIT SHARMA • ANJALI SHISHODIA • ASHISH GUPTA

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Foreword

In the wake of the COVID-19 pandemic, many supply chain professionals have faced unprecedented challenges in dealing with endless supply chain disruptions and geopolitical tensions. One of the best ways to handle such challenges is by adapting various digital technologies designed to harmonise supply chain ecosystems. Drs Rohit Sharma, Anjali Shishodia and Ashish Gupta collected beautiful pieces of research articles that can be trendsetters for enriching the body of literature in the fast-emerging fields of supply chain technologies in the digital era. I have no doubt that their edited book will be an invaluable source of building knowledge bases and inspiring future research efforts for those who pursue academic careers in sustainability and technology areas.

Warmest regards
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Preface

This book is a collection of pioneering research and insights from experts across various fields, all focused on exploring the intricate relationship between digital technologies and holistic, sustainable development. In an era defined by rapid technological advancements, it is paramount to understand how these innovations can be harnessed to address pressing global challenges and shape a more sustainable future for all. Chapter 1, 'The Role of Digital Technology in Achieving Sustainable Development Goals (SDGs): A Systematic Literature Review, Bibliometric Analysis and Content Analysis' by Arushi Bathla, Priyanka Aggarwal and Kumar Manaswi, sets the foundation for our exploration. Through meticulous analysis, the authors comprehensively understand the role digital technology plays in achieving the United Nations' SDGs. Moving forward, Chapter 2, 'Digital Technologies, Sustainable Development Goals and The Grand Societal Challenges in the Context of Slum Dwellers of Kolkata, India' by Atiba Batul, Keya Das Ghosh and Swapnamoyee Priyabhasini Palit, delves into the context of slum dwellers in Kolkata, India. The authors examine how digital technologies can be harnessed to address the grand societal challenges faced by these communities and achieve sustainable development goals. Chapter 3, 'Applications of Disruptive Technologies in Professional Services' by Chandan Kumar Jha and Amit Sachan, explores the transformative potential of disruptive technologies in various professional service industries.

The authors shed light on how artificial intelligence (AI), blockchain and automation can enhance sustainability and drive innovation. In Chapter 4, 'Confrontation Strategy for Evolution of Future Employment' by Donghun Yoon, the impact of technological advancements on the future of employment is examined. Yoon offers a confrontational strategy to navigate the evolving employment landscape and ensure sustainable employment practices. Chapter 5, 'Framing the Digital Transformation Journey for Sustainability Based on the Lenses of Integrated Skills and Competencies for Future Work' by Joseph Odhiambo Onyango, focuses on the skills and competencies needed to leverage digital technologies for sustainable development effectively. This chapter provides valuable insights into integrating skills and competencies into the digital transformation journey. Chapter 6, 'Role of Social Networking Technologies in Developing Public Services Supply Chain During COVID-19' by Kali Charan Sabat and Som Sekhar Bhattacharyya, highlights the role of social networking technologies in developing resilient public service supply chains during the COVID-19 pandemic. The authors explore the transformative potential of

technology in crisis response and service delivery. Jasmandeep Kaur, Kirandeep Kaur and Ramanjeet Singh, in Chapter 7, 'Adopting Technology for Sustainable Development: Reflections on Innovative Ecosystem', reflect on adopting technology for sustainable development. This chapter offers insights into the innovation ecosystem that drives transformative change in various sectors. Chapter 8, 'Exploring the Relationship Between Digital Initiatives, Dynamic Capabilities and Market Performance: A Conceptual Framework' by Lan Phuong Ho Dang, presents a conceptual framework for understanding the relationship between digital initiatives, dynamic capabilities and market performance. This chapter guides organisations in leveraging digital technologies to enhance market performance and sustainability. In Chapter 9, 'Reverse Logistics: Rebuilding Smart and Sustainable Transformation Based on Industry 4.0', by Leena Wanganoo and Rajesh Tripathi, the authors delve into reverse logistics. They discuss how Industry 4.0 technologies can rebuild intelligent and sustainable transformation, optimising resource utilization and reducing environmental impact. Chapter 10, 'Reflections on Sustainable Development, Sustainability and Business Practice: Lessons From Measurement, Scalability and Bias in Artificial Intelligence (AI)' by Luisa F. Melo, offers critical reflections on sustainable development, sustainability and business practices. This chapter examines the challenges and opportunities of applying AI in sustainable development, focusing on measurement, scalability and bias.

Chapter 11, 'Digital Healthcare and Patient Transformation: Review Research and Future Agenda' by Nimesh P. Bhojak, Suresh N. Patel and Mohammadali K. Momin, provides a comprehensive review of research on digital healthcare and its impact on patient transformation. This chapter explores the current state of digital healthcare, identifies future research directions and envisions the potential for improved patient outcomes through technology-enabled solutions. In Chapter 12, 'A Comparative Framework Analysis of the Strategies, Challenges and Opportunities for Sustainable Smart Cities' by Oluwagbemiga Paul Agboola and Meryem Muzeyyen Findikgil, the authors present a comparative framework analysis of strategies, challenges and opportunities for sustainable smart cities. This chapter offers a holistic perspective on integrating technology into urban environments to create more sustainable and livable cities. Chapter 13, 'Leveraging Blockchain Technology in Adopting Digital Tokenisation of Green Bonds' by Pulak Chugh, explores the potential of blockchain technology in adopting the digital tokenisation of green bonds. This chapter highlights how blockchain can enhance transparency, efficiency and accountability in sustainable finance, facilitating the transition towards a greener economy. 'Digital Technologies and Education for Sustainable Development' by Renji George Amballoor and Shankar B. Naik, in Chapter 14, sheds light on the transformative power of digital technologies in education for sustainable development. This chapter examines innovative educational approaches and technologies that can empower learners and foster sustainability-conscious mindsets and behaviours. Chapter 15, 'Safety Management in the Era of Emerging Industrial Revolution: The Conceptualisation of Safety 4.0' by Shatrudhan Pandey, Kirtika Kiran, Shreyanshu Parhi, Abhishek Kumar Singh and Sanjay Kumar Jha, focuses on safety

management in the context of the emerging industrial revolution. The authors conceptualise Safety 4.0, emphasising integrating digital technologies and advanced safety practices to ensure a safe and resilient working environment. 'Spiritual Approach Among Techies: An Approach for Achieving Sustainable Development' by Snehal G. Mhatre and Nikhil K. Mehta, in Chapter 16, offers a unique perspective on sustainable development by exploring the role of spirituality among technologists. This chapter emphasises the importance of ethical values, mindfulness and compassion in harnessing technology for sustainable outcomes. Chapter 17, 'The Evolution of Manufacturing: A Comprehensive Analysis of Industry 4.0 and Its Frameworks', by Somayya Madakam, Rajeev Kumar Revulagadda, Vinaytosh Mishra and Kaustav Kundu, delves into the realm of Industry 4.0. The authors present frameworks that guide organisations to adopt and implement Industry 4.0 technologies to enhance productivity, sustainability and competitiveness. In Chapter 18, 'Application of Industry 4.0 Technologies in Climate-Smart Agricultural Practices' by Soumya Sucharita Panda, Sudatta Banerjee and Swati Alok, the focus shifts to the agricultural sector. This chapter explores how Industry 4.0 technologies can be applied in climate-smart agricultural practices, enabling sustainable food production, resource optimization and environmental conservation. Chapter 19, 'The Digital Revolution – Implications of Digital Technologies on Women's Workforce Participation' by Tanaji Pavani Prabha, Swati Alok, Rishi Kumar and Swati Singh, examines the implications of the digital revolution on women's workforce participation. The authors explore the opportunities and challenges that arise as digital technologies shape the future of work and gender equality. 'Building Resilience Against Ongoing and Future Pandemics: Blockchain Technology to the Rescue' by Taab Ahmad Samad and Yusra Qamar, in Chapter 20, explores the potential of blockchain technology in building resilience against ongoing and future pandemics. This chapter highlights the role of blockchain in enhancing healthcare systems, ensuring supply chain resilience and facilitating effective crisis response. Finally, Chapter 21, 'Impact of Awareness on the Adoption of Electric Vehicles: A Systematic Literature Review' by Divya Singh and Ujjwal Kanti Paul, delves into the impact of awareness on adopting electric vehicles. The authors conduct a systematic literature review to understand the factors influencing consumer awareness and adoption of electric vehicles, offering valuable insights for sustainable transportation strategies.

Each chapter presents unique perspectives and insights into how digital technologies can drive sustainable development across various sectors.

We extend our gratitude to the authors for their invaluable contributions, and we hope that this compilation inspires readers to engage with the possibilities offered by digital technologies, fostering a more sustainable, equitable and prosperous future.

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Acknowledgements

Dr Rohit Sharma: I dedicate this book to my mother, (Late) Mrs Neelam Sharma. And my family who have been the force behind me in all my endeavours.
Dr Anjali Shishodia: I dedicate this book to my family for their unwavering support and understanding.
Dr Ashish Gupta: I dedicate this book to my family (Pooja Gupta, Aradhay Gupta and Ayansh Gupta) and parents (Mr Ramesh Chandra Gupta and Mrs Kamla Devi Gupta) for their constant love, support and motivation.

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Chapter 1

The Role of Digital Technology in Achieving Sustainable Development Goals (SDGs): A Systematic Literature Review, Bibliometric Analysis and Content Analysis

Arushi Bathla, Priyanka Aggarwal and Kumar Manaswi

Abstract

Digital technology and SDGs have gained increasing interest from the research community. This chapter aims to explore the field through a holistic review of 188 publications from 2017 to 2022. For the systematic review of 188 articles, a three-step methodology comprising of PRISMA guidelines was performed, bibliometric analysis and text analysis using VOS-Viewer and Sentiment Analysis using RStudio had been undertaken. Bibliographic coupling revealed the following clusters Digital Space (Over all SDG), Localising SDGs, Financial Systems and Growth (SDG 8), Sustainable Supply Chain (SDG 9), Education (SDG 4), Energy Management (SDG 7), Smart Cities (SDG 11 and 13), Gender, Skills, and Responsibility (SDG 5 and 12), Food Management (SDG 1, 2 and 3), Business Innovation (SDG 8 and 9) and ICT (SDG 9). Next, co-occurrence analysis highlighted the following clusters Circular Economy (SDG 8), Higher Education System (SDG 4), Digital health (SDG 3), Industry 4.0 (SDG 9) and Supply Chain Management (SDG 9). Next, text analysis traced the most relevant areas of work within the theme. Finally, sentiment analysis revealed positive sentiments of the field. The research concluded that only a few SDGs had found major focus while the others don't have any solid ground in the literature. This chapter presents a knowledge structure by mapping the most relevant SDGs in the context of digital technology and sets directions for future research.

Keywords: SLR; bibliometric analysis; digital technology; SDGs; text analysis; sustainable development

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Introduction

Sustainability and digitalisation stand as major trends shaping the economy and society (Costanza et al., 2016; Holden et al., 2014). The nexus between both domains foreshows outstanding opportunities to foster a transformation towards sustainable development (Köhler et al., 2019; Osburg & Lohrmann, 2017; Seele, 2016). The United Nations (UN) Sustainable Development Goals (SDGs) 2030 provide a roadmap towards equity and sustainable development (Allen et al., 2016; Liu et al., 2018; United Nations, n.d.). Digitalisation is heralded to be one of the most promising transformations for sustainability (Gouvea et al., 2018) towards tackling the SDGs (Sachs et al., 2019; Seele & Lock, 2017; Walker et al., 2019). Modern digital technologies like artificial intelligence (AI) and machine learning (ML) have grown exponentially, predicted to add 14% to the global economy by 2030 (George et al., 2020). Despite the potential of the SDGs and digitalisation to work in tandem to advance sustainable development, there has been limited research into their connection (Fukuda-Parr & McNeill, 2019; Kostoska & Kocarev, 2019; Vinuesa et al., 2020). This means that many of the opportunities to leverage the power of digitalisation to promote sustainable development remain untapped and unexplored. To further research in this area, there is a need for greater collaboration between scholars, the private sector, governments and civil society. This chapter reviews sustainability and digitalisation literature to see if digitalisation support SDGs. The authors claim that this study is the first to combine SLR, bibliometrics and text analysis.

Methodology

As the SDGs and digital technology research field is just emerging, we chose a qualitative three-step methodology to examine the underlying field. The authors first conducted an SLR using PRISMA (Moher et al., 2015) guidelines. The authors sourced the articles from the Web of Science (WoS) (Falagas et al., 2007; Kullenberg & Kasperowski, 2016). The search string used was: 'Sustainable Development Goals' or 'SDG' and 'digital*' and 'technology*' or 'artificial intelligence' or 'blockchain' or 'AI'. The search process generated 193 academic papers from 2016 to 2022. We thoroughly read and reviewed all full-text publications. Finally, 188 papers were selected for the final review. Please refer Fig. 1.1 for data curation process. Secondly, bibliometric analysis assisted in the development of the thematic structure of the underlying research field (Ellegaard & Wallin, 2015; Valtakoski, 2019). Finally, content analysis was performed by analysing the themes emerging out of bibliographic coupling, followed by text and sentimental analysis of the future research scope of the latest articles.

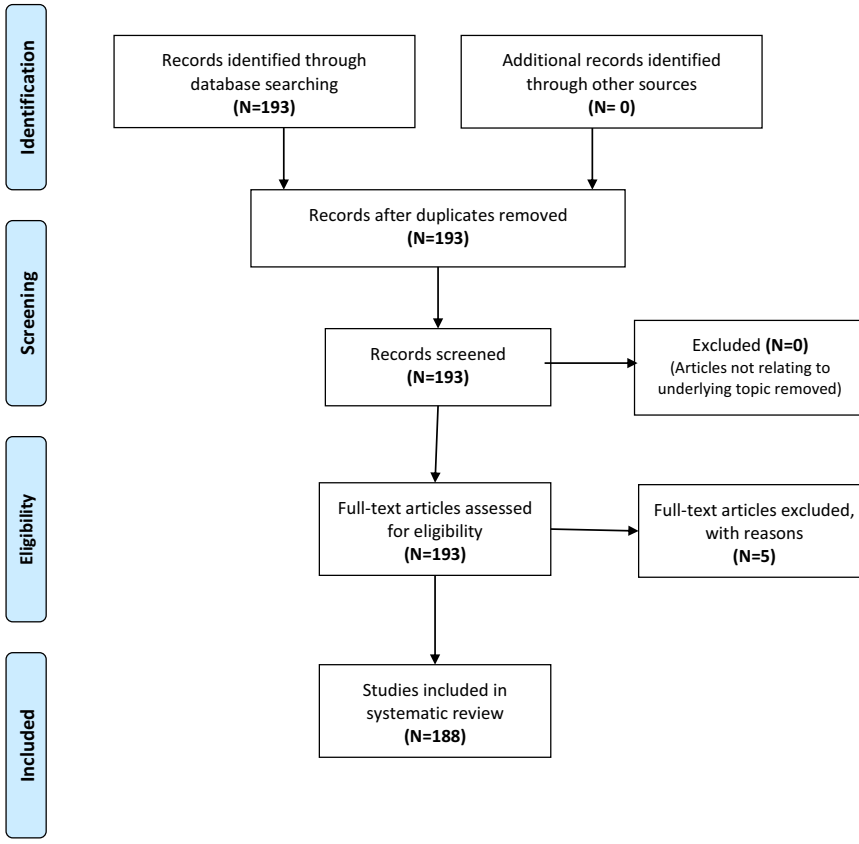

Fig. 1.1. PRISMA. *Source:* Authors Compilation (Adapted from Moher et al., 2009).

Findings

Publications Trend

Fig. 1.2 displays SDGs and digital technologies research articles by year. The topic is novel, as the first traceable article was published in 2017.

Contributing Countries

To gain insights into the most productive countries, we analysed the countries that had minimum of three documents with minimum of three citations (Chakma et al., 2022) in the domain of SDGs and digital technologies; out of 77 countries, 36 have fulfiled this criterion. The most impactful country was China with 30

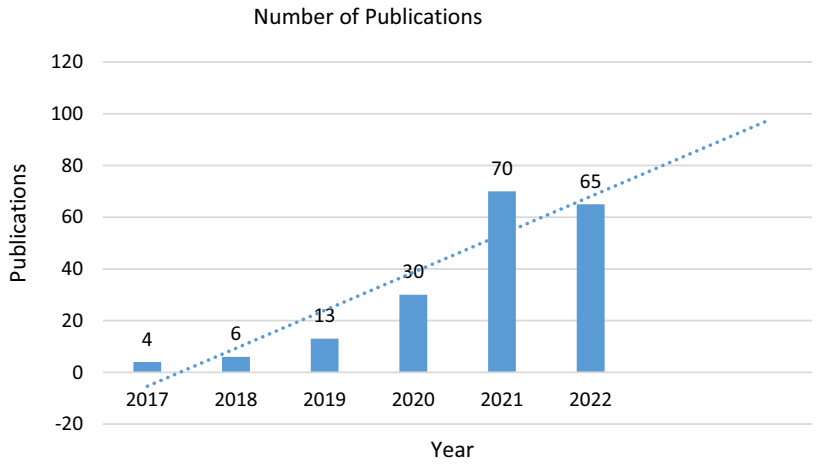

Fig. 1.2. Authors Compilation. *Source:* Data used from Web of Science.

documents and 482 citations. Subsequent productive countries were Australia, England, Spain, the United States and Germany with a large number of citations (see Table 1.1).

Keyword Co-occurrence Analysis

The keyword co-occurrence analysis is used for mapping the thematic development of the SDGs and digital technologies field because keywords are great pointers for the central focus or content of an article (Castriotta et al., 2018;

Table 1.1. Contributing Countries.

S. No.	Country	Documents	Citations
1	Peoples R China	30	482
2	Australia	22	318
3	England	32	299
4	Spain	26	253
5	The United States	25	218
6	Germany	13	215
7	France	9	186
8	Brazil	6	133
9	Sweden	10	126
10	India	18	123

Source: Authors Compilation (Data used from Web of Science).

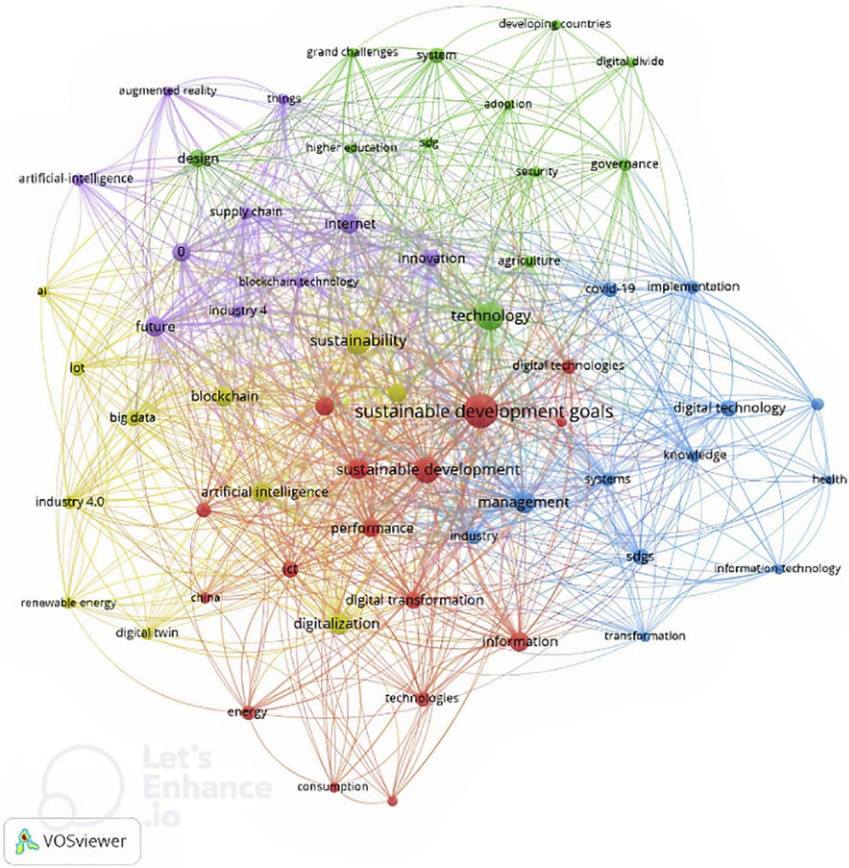

Fig. 1.3. Keyword Co-Occurrence Analysis. *Source:* VOS-Viewer.

Strozzi et al., 2017). Fig. 1.3 shows the clusters of keywords with at least five occurrences. Of the 1,287 keywords, 61 met the threshold. Table 1.2 shows the name and items in these clusters.

Bibliographic Coupling of Documents

In simple words, it relates to the crossover in the reference list (Donthu et al., 2021). The study undertook a threshold of default five citations for a document (Martínez-López et al., 2018; van Eck & Waltman, 2014) and got 86 documents out of which only 76 consisted of the largest set of connected items. We finally got 11 clusters as shown in Fig. 1.4.

An established academic practice of analysing the top 10 cited articles of each cluster (as shown in Table 1.3) to describe the dominant theme of the cluster has been undertaken (Bhandari, 2022; Fahimnia et al., 2015) as shown in Table 1.4.

Table 1.2. Clusters.

Colour	Items	Name
Red	Circular Economy, Consumption, Energy, ICT, Integration, Performance, Development	Application of Digital Technologies for Sustainable Development and Circular Economy
Green	Developing Countries, Digital divide, Governance, Grand Challenges, Higher Education, Security	Application of Digital Technologies for Improving Higher Education System
Blue	COVID-19, Digital Health, Information Technology, Knowledge, Management, Systems, Transformation	Application of Digital Technologies for Digital Health
Yellow	AI, Big Data, Blockchain, Digital Twin, Digitalisation, Industry 4.0, IoT, Renewable Energy, Sustainability	Role of Industry 4.0 for Sustainability
Purple	AI, Augmented Reality, Blockchain Industry 4.0, Innovation, Supply Chain	Role of Industry 4.0 for Supply Chain Management

Source: VOS-Viewer.

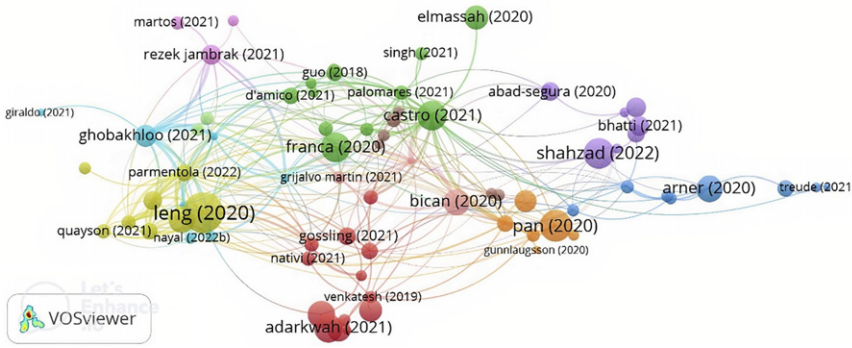

Fig. 1.4. Network Visualisation. *Source:* VOS-Viewer.

Table 1.3. Top 10 Articles of Each Cluster.

1	2	3	4	5	6
Adarkwah (2021)	França et al. (2020)	Arner et al. (2020)	Leng et al. (2020)	Shahzad et al. (2022)	Ghobakhloo et al. (2021)
Portillo et al. (2020)	(del Río Castro et al., 2021)	Ockwell et al. (2019)	Tsolakis et al. (2021)	Bhatti et al. (2021)	Nayal, Raut, et al. (2022)
Asi & Williams (2018)	ElMassah & Mohieldin (2020)	Lagna & Ravishankar (2022)	Khanfar et al. (2021)	Fernandez-Luque & Imran (2018)	Ali & Govindan (2021)
Lembani et al. (2020)	Guo et al. (2018)	Bărbulescu et al. (2021)	Parmentola et al. (2022)	Abad-Segura et al. (2020)	Nayal, Kumar, et al. (2022)
Gössling (2021)	D'Amico et al. (2021)	Frimpong Boamah & Murshid (2019)	Vafadarnikjoo et al. (2021)	He et al. (2021)	Giraldo et al. (2021)
Ajwani-Ramchandani et al. (2021)	Palomares et al. (2021)	Moro-Visconti et al. (2020)	Quayson et al. (2021)	Popkova et al. (2022)	Costa et al. (2022)
Tham & Sigala (2020)	Al-Htaybat et al. (2019)	Treude (2021)	Nurgazina et al. (2021)	Zahid et al. (2021)	
Hoosain et al. (2020)	Gupta et al. (2020)	Goel et al. (2021)	Chivilgina et al. (2020)	Carayannis & Morawska-Jancelewicz (2022)	
Nativi et al. (2021)	Singh et al. (2021)				
Radovanović et al. (2020)	Cioacă et al. (2020)				

(Continued)

Table 1.3. *(Continued)*

7	8	9	10	11
Pan & Zhang (2020)	Baena-Morales et al. (2020)	Režek Jambrak et al. (2021)	Bican & Brem (2020)	Gürdür Broo, Lamb, et al. (2021)
Allam & Jones (2021)	Liritzis & Korka (2019)	Fuster Morell et al. (2020)	Grijalvo Martín et al. (2020)	Gürdür Broo, Boman, et al. (2021)
Dwivedi et al. (2022)	García et al. (2020)	Martos et al. (2021)	Camodeca & Almici (2021)	
Tim et al. (2021)	Oftedal et al. (2019)			
Pournaras (2020)	Kerras et al. (2020)			
Gunnlaugsson et al. (2020)	Parth et al. (2021)			

Source: VOS-Viewer.