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Review

Migrant Workers in the Construction Industry: A Bibliometric and Qualitative Content Analysis

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Abstract: The construction industry, a major global employer, increasingly relies on migrant construction workers (MCWs) to mitigate labor shortages and enhance cost efficiency. Despite their vital role, MCWs face numerous challenges, including exploitation during recruitment, safety risks, health issues, and difficulties with social integration. Current research into MCWs is dispersed across various disciplines—such as occupational safety, health, and social issues—and lacks a cohesive review of achievements and gaps. To address this, the present study employs bibliometric and qualitative content analysis to evaluate research progress, domains, hotspots, and trends from 2004 to 2024. The dataset, sourced from the Web of Science (WoS), includes 112 publications. The analysis reveals a steady growth in MCWs research, divided into two distinct phases, with significant contributions from 307 authors across 30 countries. The study also examines robust international collaboration and the prominent role of influential research institutions. The research identified ten key areas of focus and engaged in discussion. This comprehensive overview of MCWs research provides valuable insights for future studies and policy development, aiming to enhance conditions for MCWs and inform effective intervention strategies for this vulnerable workforce.

Keywords: migrant construction workers; safety; health; social integration; cultural integration; bibliometric analysis

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1. Introduction

The construction industry is a critical global employer, accounting for approximately 7% of the world's workforce [1]. In numerous countries, this sector increasingly relies on migrant construction workers (MCWs) to address labor shortages, improve cost efficiency, and maintain workforce availability in nations like the U.S., European nations, Singapore, South Korea, Australia, New Zealand, and Malaysia [2]. For example, in the U.S., Hispanics represent approximately 30% of the construction workforce [3]. MCWs often contribute diverse racial and cultural perspectives, along with significant experience and skills, enhancing project timelines, costs, and quality, which ultimately contribute to the success of construction projects [4,5].

MCWs face substantial challenges, including exploitation during recruitment and employment, safety risks, health concerns, language barriers, and difficulties with social integration [6–8]. Recent reports indicate that MCWs frequently experience recruitment abuses, such as excessive fees and misinformation concerning working conditions. MacLennan [9]

highlighted wage discrimination between migrant and local workers, further exacerbating MCWs' vulnerabilities. Short-term employment contracts, often tied to specific projects, make it challenging for MCWs to voice complaints without risking the non-renewal of their contracts [10]. Furthermore, MCWs are particularly susceptible to workplace accidents and injuries [2,11]. In the U.S., the fatality rate for foreign-born construction workers stands at 74%, compared to 26% for local workers [12]. Given their critical role and the challenges they face, a growing body of research is aimed at addressing these issues and developing targeted interventions.

Despite the increasing attention to MCWs, research in this area remains fragmented across various domains, such as occupational safety, health, social integration, and recruitment practices. Reviews tend to concentrate narrowly on such aspects as safety and health (e.g., Guan et al., 2024; Peiró et al., 2020; Fitzgerald et al., 2013) [13–15], leaving a significant gap in comprehensive analyses encompassing the full spectrum of challenges MCWs face. This fragmentation impedes the development of a holistic understanding of the complex issues surrounding MCWs, limiting the ability of researchers and policymakers to create well-rounded and effective solutions. In response to this gap, the present study aims to offer a comprehensive review of the research landscape on MCWs within the construction industry. Research published between 2004 and 2024 in the Web of Science (WoS) database was reviewed. The period 2004–2024 was selected because prior to 2004, research on MCWs was relatively scarce, and attention to their challenges in the construction industry was limited. However, starting from 2004, there has been a notable increase in studies focusing on MCWs, reflecting the growing global awareness of their issues. This time frame captures this upward trend and ensures a thorough analysis of both the foundational and recent developments in the field. The main research objectives of this study include (1) conducting a science mapping analysis to examine the distribution of countries/regions, journal sources, keyword co-occurrence, and citations related to any research on MCWs; (2) identifying and analyzing key research topics and trends within the broader literature on MCWs; and (3) pointing out the limitations of existing research and proposing future research directions.

The significance of this review lies in its capacity to consolidate fragmented research efforts and provide a holistic understanding of what has been accomplished and what remains to be conducted for MCWs in the global construction industry. The critical knowledge gaps are addressed by presenting a comprehensive overview of the literature, and researchers and policymakers are equipped with the insights necessary to formulate more cohesive and effective strategies to improve the working conditions, safety, and integration of MCWs. Additionally, congruent with the United Nations' Sustainable Development Goals (SDGs) 3, 8, and 10, this review supports global initiatives to promote sustainable and inclusive work environments. It also contributes to more efficient use of human capital and improving working conditions in the construction sector. This study provides an important foundation for advancing research and policy interventions that will enhance the well-being of MCWs and encourage a more sustainable construction workforce.

2. Research Methods

As shown in Figure 1, this review approach is divided into three parts: (1) data collection, (2) bibliometric analysis, and (3) qualitative discussion.

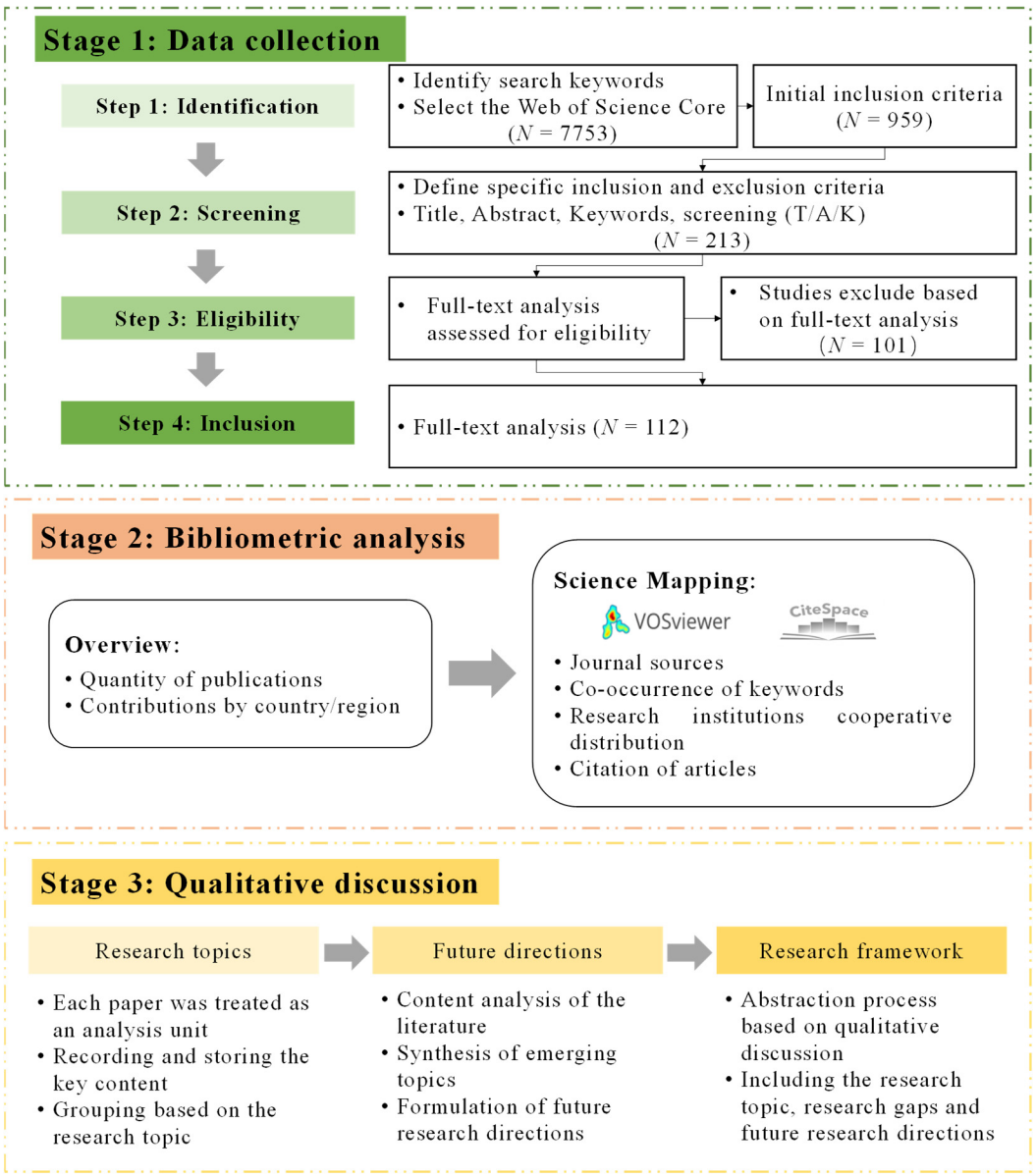

Figure 1. Overall research framework and process.

2.1. Data Collection

To strengthen the validity and reliability of the study, data collection was carried out using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines proposed by Moher et al. [16]. The PRISMA framework includes four key steps (Figure 1): identification, screening, eligibility evaluation, and inclusion. In the identification step, relevant studies were initially gathered through systematic searches in the WoS database. Next, during the screening phase, titles, abstracts, and keywords of the identified studies were reviewed to eliminate irrelevant ones. The eligibility evaluation involved a full-text review of the remaining studies to assess their alignment with the inclusion criteria. Finally, in the inclusion step, studies that met all criteria were included in the systematic review for further analysis. The specific steps undertaken are as follows:

Step 1: Identification

Search keywords were first identified through a detailed review of research into MCWs. By referring to established studies focused on MCWs, including a few reviews related to the safety and health factors of migrant workers, the search keywords were carefully determined. The final search string was constructed across two keyword levels

(Table 1). The search terms were defined as follows: TS = ("emigrant*" OR "migrant*" OR "immigrant*" OR "ethnic minorit*" OR "foreign") AND TS = ("construct*" OR "building" OR "engineering" OR "architect*"). The "TS" field was chosen for the initial data search because of its comprehensive coverage of the topic, including key elements such as titles, abstracts, and keywords. The asterisk at the end of the keywords expanded the scope of the search results. The WoS database was selected for the search, as it is widely regarded as a primary source of information in the fields of construction and engineering [17,18].

Table 1. Selection of search terms.

Initial Retrieval Keywords	Final Retrieval Keywords
"Construction"	"construct*" OR "building" OR "engineering" OR "architect*"
"Migrant" OR "immigrant"	"emigrant*" OR "migrant*" OR "immigrant*" OR "ethnic minorit*" OR "foreign"

Inclusion and exclusion criteria were established to ensure a structured approach and enhance the quality of the insights generated [19]. The inclusion criteria were as follows: (1) articles published between 2004 and 2024; (2) peer-reviewed journal articles to ensure quality and reliability through a rigorous evaluation process [20]; and (3) publications in English. This initial step yielded 7753 articles. Subsequently, three research team members conducted a screening of these articles, mainly excluding those from other fields, such as forestry and geophysics, by filtering the WoS categories. At this point, 959 articles were retained.

Step 2: Screening

The selected articles were further screened according to title, abstract, and keywords (T/A/K). Two primary inclusion/exclusion criteria were utilized: (1) relevance to the construction industry, which led to the exclusion of 519 articles that lacked focus on the construction field, and (2) focus on MCWs, resulting in the exclusion of 227 articles that were not specifically focused on these groups. Consequently, 213 papers remained for full-text analysis.

Step 3: Eligibility

In the final eligibility screening, a comprehensive full-text review was conducted. The inclusion/exclusion criteria used in the previous step were applied to the full-text analysis of the 213 articles. This resulted in excluding 101 articles that fell outside the study scope.

Ultimately, 112 articles were identified as relevant for inclusion. These articles form the basis for the subsequent bibliometric analysis and qualitative discussion. Before analyzing the data, the chosen literature was entered into a Microsoft Excel file for data cleaning [21]. During the cleaning process, several steps were taken to handle inconsistencies: (1) Identifying and correcting coding errors. The dataset was reviewed for any coding errors, such as incorrect entries or misclassified categories. These errors were corrected to ensure consistency and accuracy; (2) standardizing terminology. The data cleaning process involved consolidating information with similar meanings, such as "construction" and "construction industry" or variations in such author names, thereby ensuring the reliability of the data analysis results.

2.2. Data Analysis

2.2.1. Bibliometric Analysis

Bibliometrics, an interdisciplinary field, applies quantitative analysis to knowledge carriers such as publication counts, authorship data, and keywords to interpret and forecast research trends [22]. The bibliometric analysis focuses on four key aspects: journal sources, keyword co-occurrence, collaborative distribution of research institutions, and citation of the article. These dimensions provide a comprehensive overview of the research landscape

in the studied field [23]. *VOSViewer*, a commonly used software for bibliometric analysis has been adopted as it is effective for visualizing large networks and offers robust text mining capabilities [23,24], is employed in this study for the visualization analysis using version 1.6.19. However, *VOSViewer* does not directly capture the evolution of keywords over time. To address this limitation, *Citespace 6.3* was chosen as a complementary tool to analyze the evolution of keywords over time, providing insights into how research topics have developed and interrelated across specific knowledge domains [25].

2.2.2. Qualitative Discussion

Bibliometric analysis of the literature, while valuable, does not offer a thorough understanding of the current state of research [26]. Therefore, in addition to bibliometric analysis, qualitative analysis was conducted to pinpoint research gaps and future needs within the mainstream research areas [27]. Taxonomy is widely employed in the qualitative discussion sections of literature reviews, as it facilitates broad comparisons between studies and assists in identifying blind spots in research [27,28]. Taxonomy categorizes research into MCWs into distinct topics, enabling a more comprehensive understanding of the research findings. The process follows several specific steps:

Proposing Research Topics: To ensure a thorough literature review, each paper is treated as a distinct unit of analysis [29,30]. Each unit is then coded based on criteria such as basic information, research content, and themes. These coded units are categorized into different groups, and the papers within each category are synthesized to identify common sub-topics.

Developing a Research Framework: Drawing on the abstraction process from qualitative content analysis, a research framework was developed that encompasses research topics, existing gaps, and future prospects. The framework is intended to guide future research development of subsequent models, conceptual systems, and diagrams [29,31].

3. Research Results

3.1. Overview

Figure 2 illustrates that research into MCWs experienced steady growth from 2004 to 2024, which can be divided into two phases: a slow growth phase (2004–2013) and a rapid growth phase (2014–2023), culminating in a peak of 14 publications in 2021. This trend suggests that research into MCWs is expected to keep expanding in the future. The increased attention can be attributed, in part, to the SDGs introduced by the United Nations in 2023, particularly SDG 3, SDG 8, and SDG 10, which aim to promote a more sustainable and inclusive work environment [32].

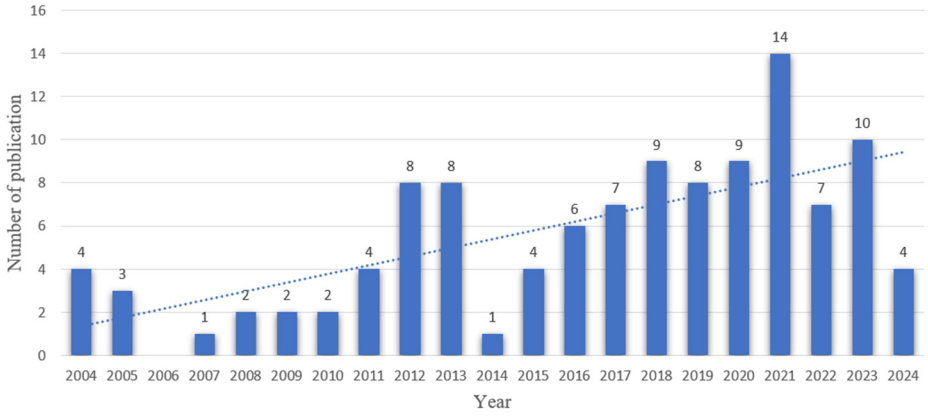

Figure 2. Yearly publication from 2004 to 2024. Contributions by country/region.

A total of 307 authors from 30 countries across 5 continents are involved in this field (Figure 3). Asia emerges as the most representative region, contributing 31.8% of the papers, followed by Europe as the second most represented region, contributing 28.1%.

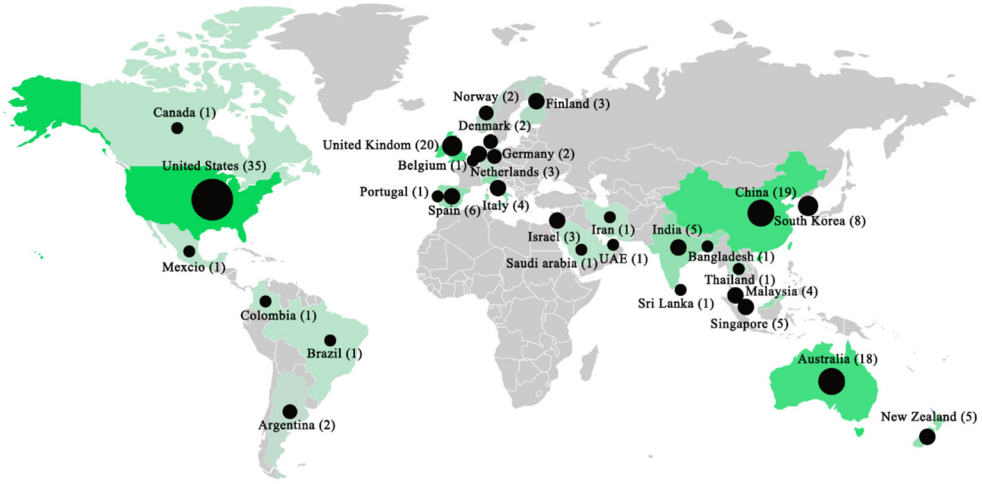

Figure 3. Number of contributions by country/region.

Table 2 presents the top ten most active countries in research into MCWs. Total link strength refers to the sum of the strength of connections between a country's research documents and other research documents, indicating how well-integrated and collaborative the country's research is within the global research network. Approximately 57.6% of the studies were conducted in the U.S., U.K., China, and Australia, with the U.S. showing the highest total citation count (1187), while the U.K. had the strongest total link strength (23). These patterns suggest that research in these countries has been not only frequently cited but also well-connected in the research network. In particular, the U.K.'s higher link strength may indicate stronger collaborative ties within the research community compared to other countries. The U.S. dominates in total citations, reflecting its significant influence in the field, yet it has a relatively low link strength (9), which could suggest that U.S.-based research is widely cited but less interconnected with international research efforts. Other regions contributing significant research output include South Korea, Spain, India, New Zealand, Singapore, and Italy. These countries show relatively lower document counts and citation figures, suggesting a more modest but growing presence in MCW research. Economically advanced regions often encounter labor shortages; thus, they heavily rely on MCWs for construction projects. Meanwhile, developing countries experiencing rapid economic growth and an urgent need for infrastructure development have increasingly turned to MCWs to meet these demands.

Table 2. Top ten most active countries.

No.	Country	Documents	Total Citations	Total Link Strength
1	U.S.	35	1187	9
2	U.K.	20	662	23
3	China	19	377	12
4	Australia	18	412	19
5	South Korea	8	117	4
6	Spain	6	173	9
7	India	5	37	4
8	New Zealand	5	106	7
9	Singapore	5	114	3
10	Italy	4	99	8

3.2. Results of Bibliometric Analysis

3.2.1. Journal Sources

The journal clusters and relationships associated with MCWs were visualized in Figure 4 using *VOSViewer*. A minimum publication count of 2 was applied, resulting in 14 journals meeting the criteria out of 68. In Figure 4, larger nodes represent journals with more articles, while connecting lines indicate mutual citation relationships.

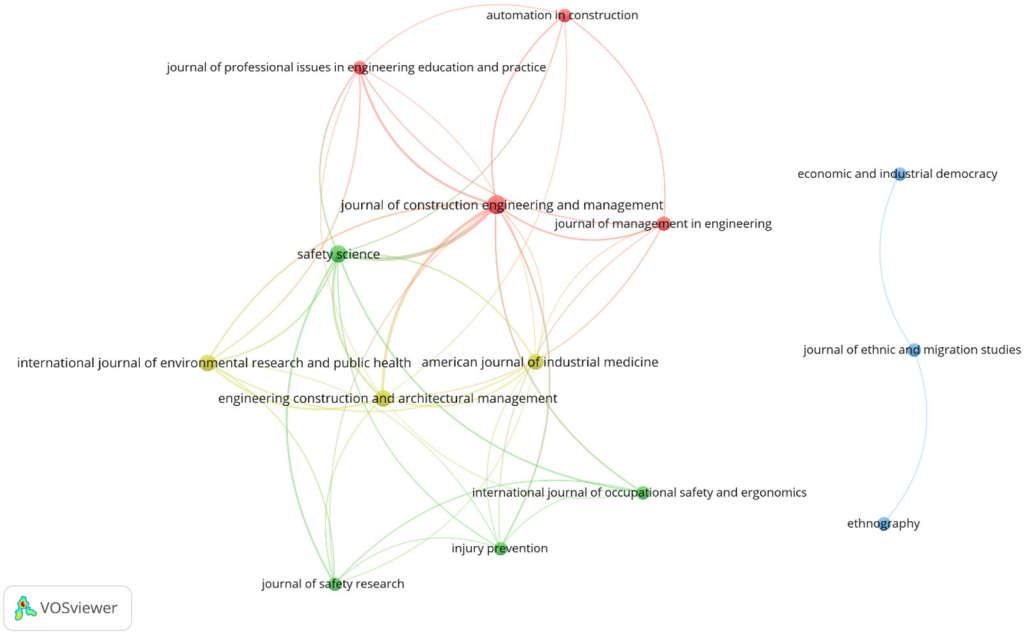

Figure 4. Visualization mapping of influential journals.

Table 3 lists the 14 journals with more than 2 publications. The total link strength reflects the mutual relationships with peer journals. The *American Journal of Industrial Medicine* holds the highest citation count (239), while the *Journal of Construction Engineering and Management* has the highest total link strength (62).

Table 3. Analysis of journal sources.

No.	Journal Title	Documents	Citations	Avg. Citations	Total Link Strength	Journal Impact	
						JCR	SJR
1	Journal of Construction Engineering and Management	12	233	19.4	62	4.1	1.071
2	Safety Science	8	327	40.9	53	4.7	1.282
3	Engineering Construction and Architectural Management	7	61	8.7	39	3.6	0.896
4	International Journal of Environmental Research and Public Health	7	174	24.9	23	-	0.808
5	American Journal of Industrial Medicine	5	239	47.8	15	2.7	1.150
6	Journal of Management in Engineering	3	94	31.3	12	5.3	1.475
7	Journal of Professional Issues in Engineering Education and Practice	2	63	31.5	18	-	0.449

Table 3. *Cont.*

No.	Journal Title	Documents	Citations	Avg. Citations	Total Link Strength	Journal Impact	
						JCR	SJR
8	Journal of Safety Research	2	123	61.5	14	3.9	1.030
9	International Journal of Occupational Safety and Ergonomics	2	26	13	12	1.6	0.510
10	Injury Prevention	2	94	47.0	11	2.5	0.898
11	Automation in Construction	2	5	2.5	9	9.6	2.626
12	Economic and Industrial Democracy	2	69	34.5	1	1.7	0.793
13	Journal of Ethnic and Migration Studies	2	73	36.5	1	2.8	1.348
14	Ethnography	2	8	4	1	0.8	0.500

3.2.2. Co-Occurrence of Keywords

Keyword networks reveal research topics' relationships, development patterns, and intellectual structures [33]. To construct the co-occurrence network, the category was set to "author keywords" with a minimum threshold of two occurrences applied. This threshold was chosen to ensure that only keywords with sufficient representation in the literature were included, reflecting significant and recurring research topics. From an initial pool of 270 keywords, 48 primary keywords were selected (see Figure 5). Keywords were then grouped based on how frequently they appeared together in the different articles. Using *VOSViewer*, the network was constructed with the "Full Counting" option, which counts the total occurrences of each keyword without any weight adjustment. The strength of the relationships between keywords was determined based on their co-occurrence frequency, with closely related keywords appearing in the same cluster [34,35]. In the visualization, keywords belonging to the same cluster are represented by the same color. This color coding serves as an important criterion for identifying and distinguishing clusters within the network. Subsequently, the researchers manually reviewed the specific meanings of the keywords within each cluster and, based on their specific meaning in the original paper, divided the network into five distinct clusters. Clustering analysis enhances data mining, allowing for statistical analysis and the discovery of new knowledge. This method assists in identifying research topics and exploring interrelationships within the field [36].

These clusters provide a comprehensive overview of key research areas related to MCWs. Cluster 1 (#1) focuses on labor market segmentation and labor migration, addressing issues such as security measures from trade unions, integration challenges, and power imbalances affecting MCWs. Cluster 2 (#2) examines social networks and diversified employment, highlighting employment challenges, opportunities, and the impact of social networks on worker rights. Cluster 3 (#3) investigates job satisfaction and the labor market, exploring innovative evaluation tools. Cluster 4 (#4) addresses precarious employment faced by MCWs, analyzing control mechanisms and the effects of bilateral agreements. Cluster 5 (#5) focuses on safety and health, studying strategies for adapting safety systems to multicultural environments and examining the role of safety climate in influencing worker behavior and reducing accidents.

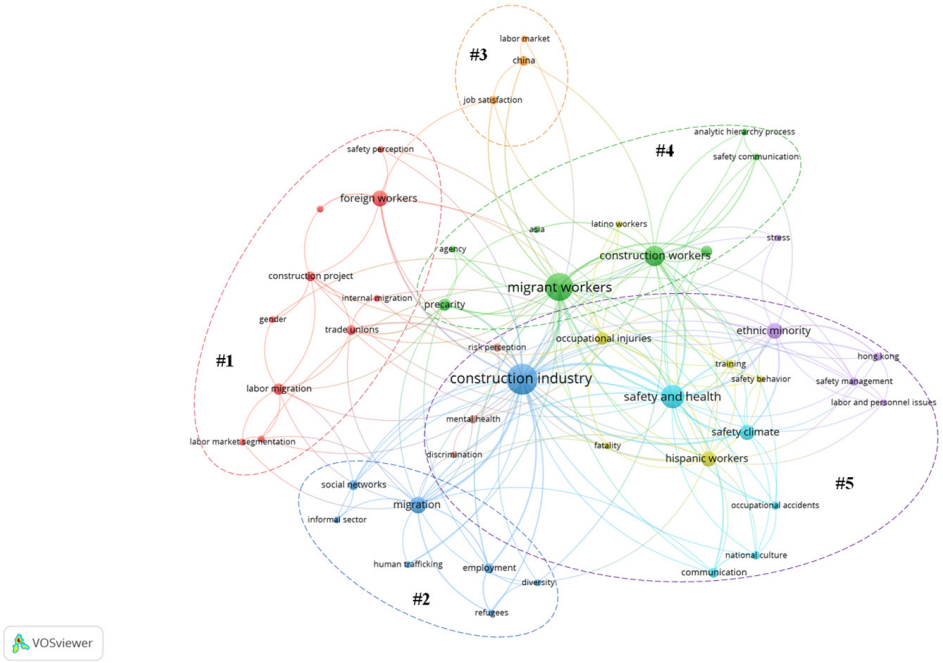

Figure 5. The co-occurrence view of keyword clusters.

A timeline view based on keywords was developed to capture the evolution of research focus over time (Figure 6). The analysis indicates that research into various aspects of MCWs, such as safety, health, job satisfaction, occupational injuries, social networks, and risk perception, has expanded significantly over time. Examination of clustered nodes reveals that current studies emphasize the physical health of MCWs and their mental health and job satisfaction. Additionally, risk perception has emerged as a prominent new trend in the research concerning MCWs.

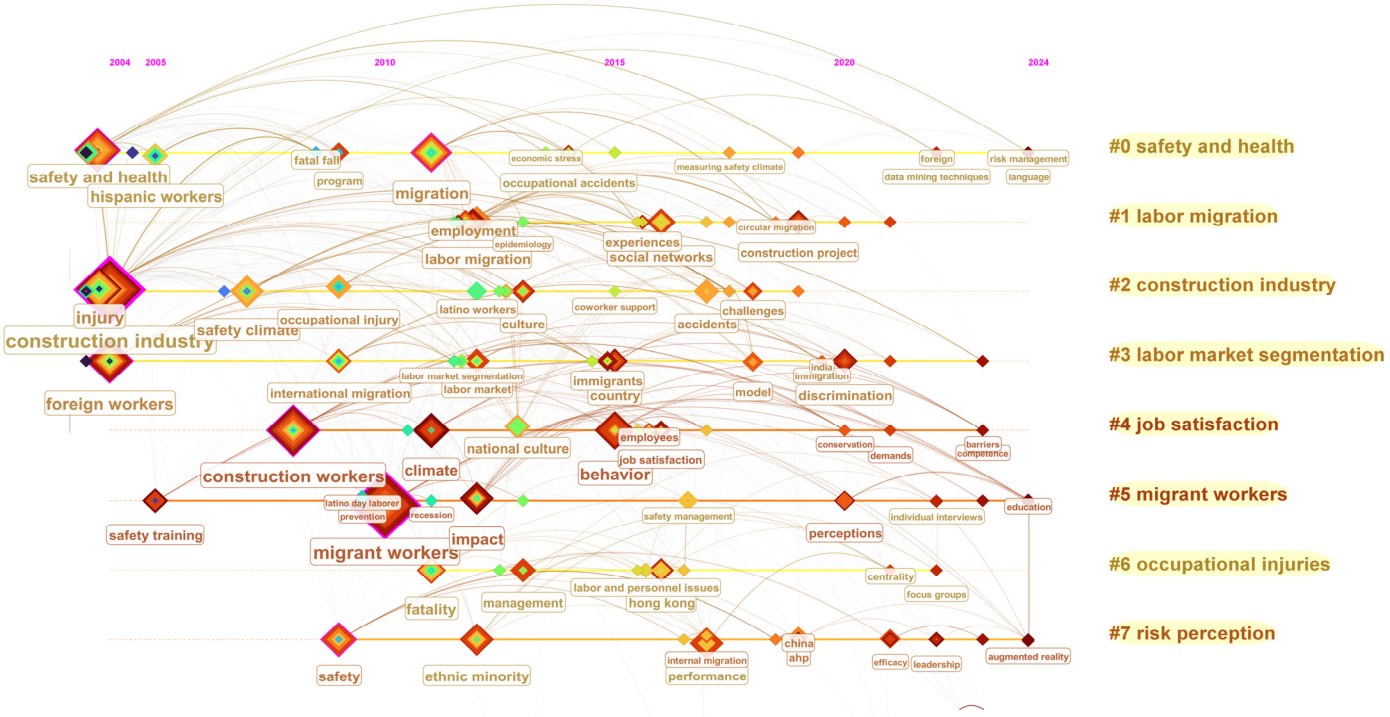

Figure 6. Timeline view of keywords.

3.2.3. Research Institutions Cooperative Distribution

Collaboration between research institutions encourages innovation, facilitates knowledge exchange, and addresses complex global challenges [36]. Constructing a collaboration map of research institutions can reveal which institutions actively engage in research related to MCWs and encourage further intercooperation. Using *VOSViewer* with a minimum publication threshold of 2, 32 out of 170 institutions were selected for visualization (see Figure 7). The institutions with the highest number of papers are the Hong Kong Polytechnic University (N = 8), University of Sheffield (N = 5), Queensland University of Technology (N = 5), and Massey University (N = 5), which also lead in citation counts. Hong Kong is home to several universities that are involved in migrant worker studies, including the City University of Hong Kong, Hong Kong Polytechnic University, and the University of Hong Kong.

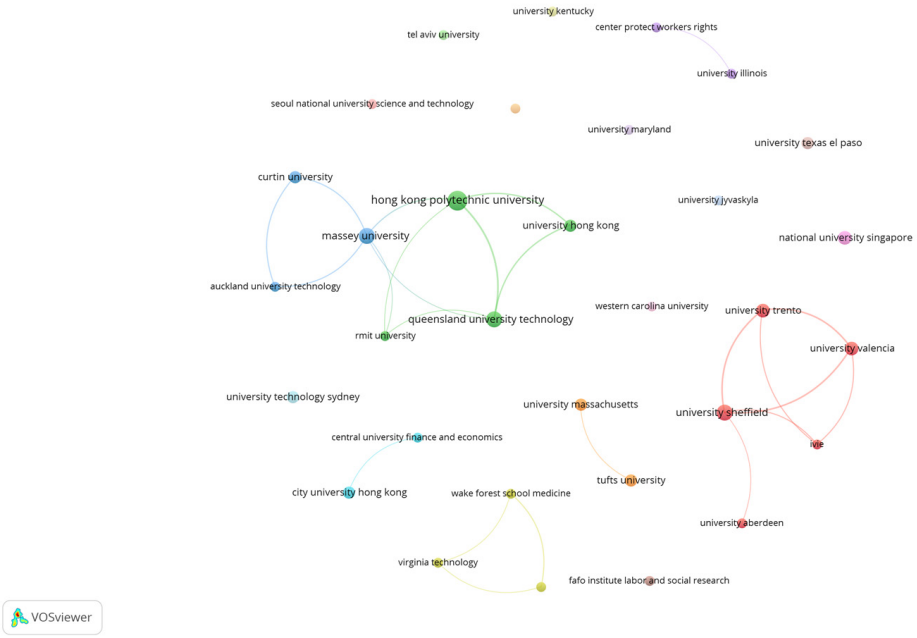

Figure 7. Mapping of research institution collaboration.

3.2.4. Citation of Articles

A minimum citation threshold of 30 was established to identify the most influential publications on MCWs, resulting in 37 out of 112 articles meeting the criteria (see Figure 8). The three most cited articles include those authored by Dong, X. W., and Williams, Q. Dong and Platner [37] investigated occupational injury rates of Hispanic construction workers in the United States between 1992 and 2000, finding that Hispanic workers experienced nearly double the fatal injury rates compared to their non-Hispanic counterparts. Their subsequent study revealed that foreign-born Hispanic workers had notably higher fall-related injury rates than their U.S.-born counterparts [38]. Williams et al. [39] demonstrated that customized, participatory, and peer-led health and safety training positively affected the injury rates of Latino construction day laborers.

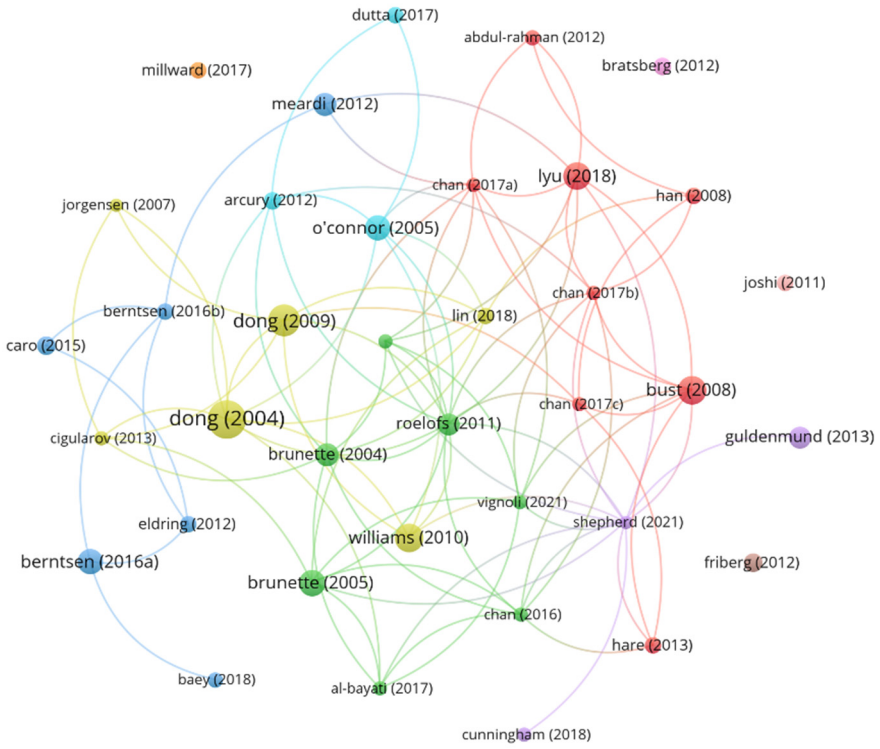

Figure 8. Science mapping of highly cited articles. Note: Only the first author of each article is shown in *VOSViewer*.

4. Qualitative Discussion

4.1. Research Topics

Keyword co-occurrence analysis was employed as a supportive method to identify potential research topics by grouping related keywords. While clustering provided an initial framework, it was not directly equated with the research topics. Following this, a thorough content analysis was conducted to refine and interpret these clusters, leading to the identification of ten distinct research topic groups, which are as follows:

Group 1: Impact of MCWs on the construction sector;
Group 2: MCW-related challenges and their solutions;
Group 3: Cultural integration and diversity management;
Group 4: Trade union strategies for MCWs in construction;
Group 5: Social networks and livelihoods;
Group 6: Employment challenges and opportunities;
Group 7: Safety challenges and strategies for MCWs;
Group 8: Development in safety training for MCWs;
Group 9: Safety climate, safety behaviors, and safety outcomes of MCWs;
Group 10: Physical and mental health of MCWs.

4.1.1. Impact of MCWs on the Construction Sector (Group 1)

Numerous studies have analyzed the diverse effects of MCWs on the construction industry, encompassing labor markets, project costs, and social dynamics. Sepehrdoust [40] examined the positive contributions of Afghan laborers to Iran's construction sector, concluding that their involvement provided significant benefits and that Afghan laborers were difficult to replace with Iranian workers for certain construction tasks. Conversely, Abdul-Rahman et al. [41] highlighted several negative impacts of MCWs in Malaysia, including over-dependence, increased criminal activity, and the presence of illegal workers. Golden and Skibniewski [42] addressed the cost implications of immigration reform in

the Washington, D.C. area, noting potential increases in labor and project costs. Bratsberg and Raaum [43] found that a 10% increase in immigrant labor in Norway's construction industry led to a 0.6% decrease in wages for native construction workers, especially low- and medium-skilled ones, while also reducing construction service prices by 0.4% to 1.1%.

4.1.2. MCW-Related Challenges and Their Solutions (Group 2)

The challenges faced by MCW have been explored in various countries and regions. For example, Han et al. [7] identified key factors contributing to the underperformance of MCWs in South Korea's construction industry, such as poor communication and limitations on the duration of MCW employment. Similarly, Kongchasing and Sua-iam [8] highlighted concerns in Thailand, noting that foremen often received inadequately trained MCWs when transferring them between construction sites.

Various strategies have been proposed to address these migration challenges. In South Korea, recommendations include implementing a flexible employment system to enhance foreign labor performance [7]. In Malaysia, measures such as attracting native workers to the sector were suggested to reduce reliance on MCWs [41]. Ling et al. [44] examined strategies for managing the cultural diversity of MCWs in Singapore, including engaging highly skilled MCWs and closely administering employment contracts. To improve housing conditions for MCWs, Li et al. [45] introduced a semi-customized container accommodation design framework. Cheng et al. [46] proposed the "You Only Watched Once" productivity evaluation framework, which can be used for training and education to enhance the productivity of foreign labor.

4.1.3. Cultural Integration and Diversity Management (Group 3)

Cultural differences, such as high-power distance and collectivism, significantly influence communication, motivation, and performance. Research by Al-Bayati et al. [47] and Kim et al. [48] highlights how these cultural barriers can lead to misunderstandings and diminished safety performance. High power distance often causes communication breakdowns between workers and supervisors, whereas collectivism may impact individual motivation. Al-Bayati [49] demonstrates that training modules to address cultural differences among diverse teams can effectively improve communication and understanding.

Ethnic divisions and barriers to employment further complicate integration. Friberg [50] identifies how ethnic segmentation in Norwegian construction reinforces stereotypes, while Alkilani et al. [51] highlight the challenges faced by refugees and migrants in Australia, such as limited resources. Addressing these issues necessitates support from educational and community organizations to improve integration and employment opportunities.

4.1.4. Trade Union Strategies for MCWs in Construction (Group 4)

Trade union strategies play a central role in addressing the unequal opportunities faced by MCWs and promoting labor market equality under current conditions. Eldring et al. [52] investigated how trade unions in Denmark, Norway, and the U.K. adapted to the influx of construction workers from new EU member states, highlighting that proactive, grassroots organizational efforts significantly influence the effectiveness of union strategies. Despite these efforts, many MCWs remain hesitant to challenge the system, complicating attempts to improve their working conditions. Thus, trade unions need to adopt more proactive strategies to shield these workers from cross-border recruitment pressures and market competition [53]. The complex interplay of subcontracting, transnational mobility, legal barriers, and employer resistance to unions hampers the ability of unions to represent highly mobile construction workers, even in environments with strong regulatory frameworks and well-resourced unions [54]. Frangi et al. [55] suggest that unions should implement tailored ethnic strategies to support highly segregated MCWs better. These strategies could

address the specific needs of various ethnic groups to ensure they receive appropriate rights and protections, thereby enhancing labor market inclusivity and addressing the unique challenges MCWs face.

4.1.5. Social Networks and Livelihoods (Group 5)

Many MCWs, particularly women, experience a conflict between their livelihoods and personal lives. Awumbila et al. [56] emphasize that, while social networks are often viewed as supportive of migration and beneficial to migrants' livelihoods, they can also be exploited to take advantage of vulnerable MCWs. This exploitation typically arises from unequal power dynamics between MCWs and employers, which impedes workers' ability to negotiate fair employment conditions [56]. Social networks initially provide valuable social capital during recruitment and pre-recruitment stages but often lose their effectiveness post-recruitment. Morales [57] observed that foremen often use their workers' networks to recruit additional labor to increase productivity. These undocumented workers frequently receive low and unstable wages, work in non-unionized environments, face unsafe working conditions, and struggle to secure protection under labor laws. Hammad et al. [58] highlight the need for policymakers to increase awareness of local labor markets, work cultures, and legal systems, and to address negative stereotypes to alleviate employment barriers for MCWs.

4.1.6. Employment Challenges and Opportunities (Group 6)

The employment challenges and opportunities for MCWs are closely linked. Migration is often driven by higher wages and job prospects in host countries [59]. However, MCWs frequently encounter wage disparities due to discrimination, resulting in lower earnings compared to local workers carrying out similar roles [59]. Economic fluctuations exacerbate these challenges. For example, the construction boom in Ireland during the early 2000s provided numerous job opportunities for immigrants, but subsequent economic downturns increased employer bargaining power, worsening conditions for MCWs [60]. Addressing these issues necessitates a focus on organizational commitment and job satisfaction. Hsu and Liao [61] argue that enhancing job characteristics and implementing strategic policies can improve the job satisfaction of MCWs and address their diverse skill needs. Gender, age, education, experience, salary, and career development opportunities influence MCWs' job satisfaction [10,62]. Loosemore et al. [63] advocate for improved work experience opportunities and increased engagement between policymakers and employers to address MCWs' challenges.

Furthermore, addressing human rights violations requires effective regulatory and enforcement measures. Ida and Talit [64] examined the reform in Israel's construction sector. They found that, while the new system improved wages and working conditions for MCWs and significantly reduced illegal employment, it also increased broker fees and restricted MCWs' mobility.

4.1.7. Safety Challenges and Strategies for MCWs (Group 7)

MCWs globally face a range of safety challenges that vary by region. In the U.S., Hispanic workers contend with issues such as project deadlines, racial discrimination, communication barriers, family distractions, job safety concerns, and pressures from supervisors and job competition [65,66]. In Europe, MCWs in Italy, Spain, and the U.K. encounter challenges, including the misuse of MCWs, discriminatory assignment of high-risk tasks, cultural differences, language barriers, and inadequate training [67]. In Hong Kong, safety issues are exacerbated by insufficient government support, a lack of organizational culture supporting MCWs, language barriers, restricted career development opportunities, inadequate safety facilities and personal protective equipment (PPE), and ethnic exploita-

tion [68–70]. Of these challenges, communication barriers are prevalent, with workers' language abilities and personality traits being significant factors [2,71]. Variations in translator skills can further exacerbate issues related to safety information transmission [71].

To address these challenges, researchers have proposed several strategies. Key approaches include expanding safety training for both workers and supervisors and promoting innovations such as digitalization and visualization [67]. Improving communication is important and can be facilitated through training in native languages, encouraging local language learning [72], and using translators, visual aids, and non-verbal tools to bridge language gaps [73,74]. Kim et al. [75] recommend that construction companies implement customized safety communication training, incorporating language, culture, and safety management training.

4.1.8. Development in Safety Training for MCWs (Group 8)

The safety training of MCWs presents significant challenges, rendering it a prominent area of research. Current studies focus on both the design of training programs and their effectiveness. In recent safety training design, Williams et al. [39] emphasized the importance of teamwork and advocated for implementing customized, peer-facilitated safety training. Innovative approaches, such as those introduced by Evia [76], have expanded training design by integrating computer-based training (CBT) that uses humor and real-world scenarios to enhance engagement. Lin et al. [77] advanced scenario-based fall prevention training by employing 3D visualization technology, which improves interactivity and realism, addressing issues such as low literacy and the necessity for hands-on learning. Vignoli et al. [78] further progressed the field by combining face-to-face and online training methods, addressing both technical and non-technical skills. This body of research suggests that effective safety training for MCWs necessitates a multifaceted approach, incorporating cultural, linguistic, and educational considerations and technological innovations.

Regarding the evaluation of training effectiveness, Nielsen et al. [79] utilized mixed methods to assess training effectiveness across five stages—pre-training, training, post-training, follow-up, and evaluation—across four levels: reaction, learning, transfer, and outcomes. Peiró et al. [15] emphasize the need for more longitudinal, multidimensional studies on the impact of safety training on learning, transfer, and organizational safety. Recent research trends include the use of virtual reality (VR), artificial intelligence (AI), and conversational AI for real-time instruction, reflecting ongoing innovations in safety training [80].

4.1.9. Safety Climate, Safety Behaviors, and Safety Outcomes of MCWs (Group 9)

Research has identified key safety climate factors for MCWs, explored the elements that significantly influence their perceptions, and compared these perceptions with those of local workers. Chan et al. [69] identified three essential safety climate factors that MCWs perceive. Studies conducted in Spain and Saudi Arabia have highlighted how individual behaviors and demographic factors significantly impact MCWs' safety climate perceptions [81,82]. Further research indicates that MCWs perceive the safety climate less favorably than local workers or managerial personnel [83,84]. Additionally, safety climate is closely related to safety behaviors and outcomes; factors such as emotional arousal, role modeling by leaders, peer examples, supervisory enforcement, and safety priorities influence MCWs' safety compliance behaviors [85].

MCWs are found to be at a significantly higher risk of occupational injuries and fatalities compared to local workers. In the U.S., Hispanic construction workers experience higher rates of both fatal and non-fatal injuries [37,86,87]. This issue is not exclusive to Hispanic MCWs in the U.S.; similar patterns are observed in MCWs from various regions

and ethnicities. For instance, Chinese construction workers in South Korea face higher rates of occupational injury and fatalities [88], while Italian MCWs exhibit a lower level of risk awareness compared to local workers [89].

4.1.10. Physical and Mental Health of MCWs (Group 10)

Barriers to healthcare access frequently compromise MCW health [90,91]. Research identifies several obstacles, including financial, cognitive, and structural barriers; a pronounced lack of trust in public health services [91]; and the absence of sick leave coupled with fear of job loss [90], which hinder MCWs' ability to access healthcare. Addressing these barriers requires improving health services, building trust, and addressing socioeconomic challenges to enhance healthcare access [91].

In examining MCWs' mental health, factors such as illness rates, indebtedness, feelings of discrimination, and exposure to adversity are identified as risk factors. Conversely, life satisfaction, sleep quality, and family support are considered protective factors for mental health [92]. Further research indicates that ethnicity and a lack of understanding of job scope are significant predictors of depression, anxiety, and stress [93]. These mental health issues can be addressed through targeted mental health assessments, training in native languages, avoiding reliance on occupational intermediaries, redesigning work hours [4], and offering formal employment contracts [94].

4.2. Future Directions

After discussing the main topics and research trends concerning MCWs in the construction industry, this section presents a systematic process for deriving future research directions through content analysis of the relevant literature (Figure 9). The specific steps are as follows:

Content analysis of the literature. Through the content analysis, gaps in the current research are highlighted. These gaps could include under-researched areas, emerging trends, or inconsistencies in existing findings.

Synthesis of emerging topics. The identified gaps are synthesized into emerging research topics. The initial research directions are then discussed and refined through in-depth discussions within the research team.

Formulation of future research directions. The final future research directions are formulated based on the synthesis and validation of themes from the content analysis and team discussions.

Therefore, the main directions for future research were summarized as follows:

4.2.1. Impact of Mobility and Social Integration of MCWs on Projects

High mobility can harm organizational performance, but studies often ignore factors like skill levels and mobility costs. The connection between social integration and transnational mobility is also underexplored. Future research should examine how national economic conditions, industry traits, and social security influence MCWs' mobility. Understanding how placement and isolation affect their integration—particularly regarding living arrangements and socialization—will enhance our knowledge of MCWs' social integration.

4.2.2. Performance of Strategies in Dealing with MCW-Related Issues

Various issues related to MCWs have been reported, and strategies to address these issues have been proposed. However, the effectiveness of these strategies remains unclear. Future studies need to concentrate on evaluating these strategies. It is important to note that performance measurement involves taking into account the specific socio-economic context of the location under study, as the effectiveness of these strategies may vary across different countries or regions.

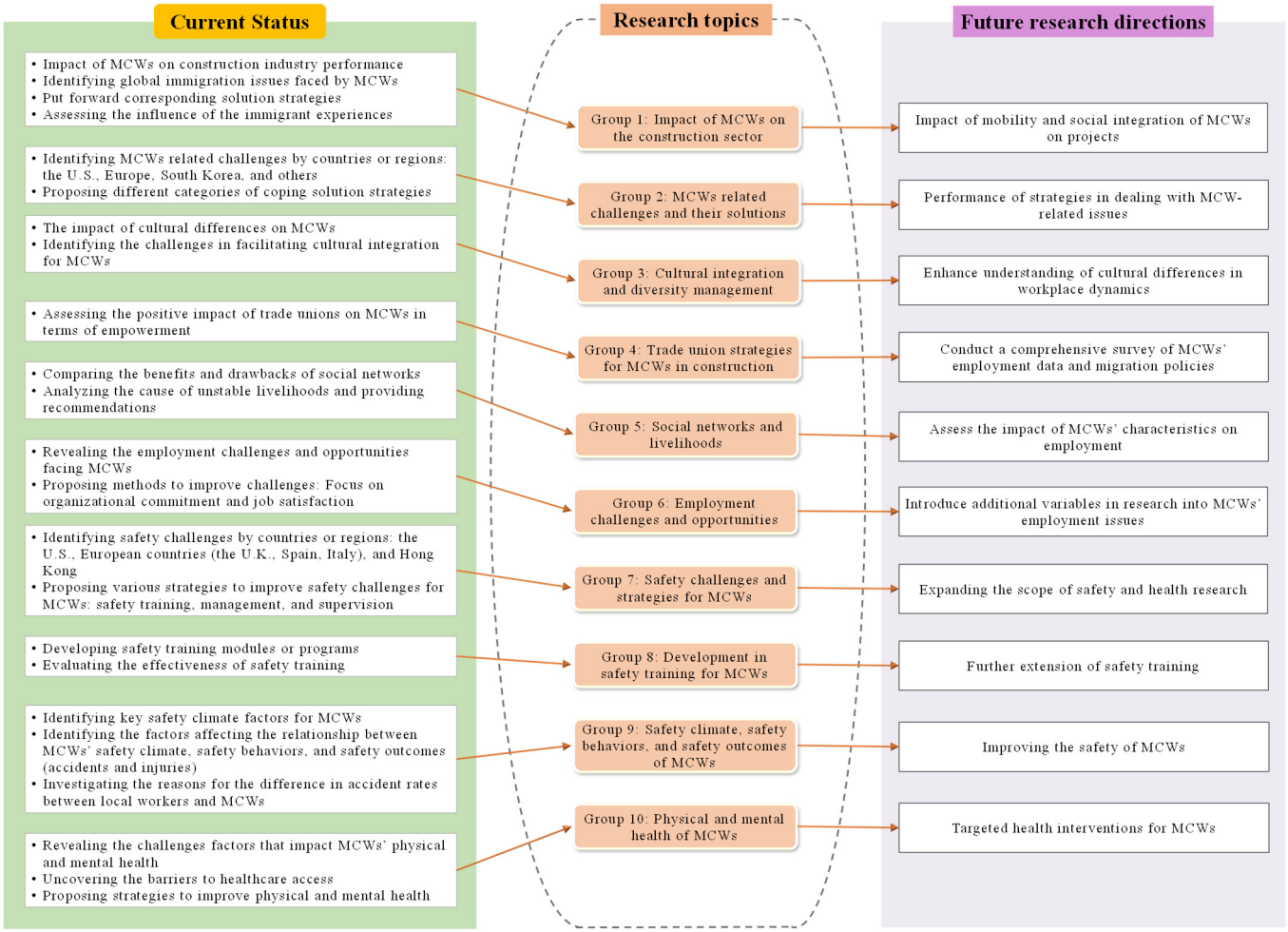

Figure 9. Framework of current research hotspots and future research directions.

4.2.3. Enhance Understanding of Cultural Differences in Workplace Dynamics

The research addresses strategies for managing cultural differences and factors contributing to stereotypes or cultural barriers. However, a significant portion of the data are self-reported and may be influenced by cognitive biases, limiting the ability to explore potential causal relationships. Future research needs to incorporate objective measures, observational studies, and mixed-method approaches to provide a more comprehensive understanding of how cultural differences affect workplace dynamics and to identify effective management strategies.

4.2.4. Conduct a Comprehensive Survey of MCWs' Employment Data and Migration Policies

Most research depends on official employment statistics, which frequently omit unregistered work, complicating the accurate identification of MCWs' countries of origin due to cyclical and return migration complexities. While the significant impact of government policies and labor organizations on MCWs is well-documented, future studies need to examine how migration policies can better support these workers and contribute to the development of the construction industry. This analysis could focus on the influence of such policies on labor dynamics and worker protection.

4.2.5. Assess the Impact of MCWs' Characteristics on Employment

Research highlights the importance of social networks among MCWs. However, additional investigation is required to evaluate the impact of skilled MCWs' networking

abilities and industry connections on obtaining meaningful employment. Furthermore, there is a gap in research concerning the employment disadvantages experienced by female MCWs, which necessitates targeted exploration in this area.

4.2.6. Introduce Additional Variables in Research into MCWs' Employment Issues

Current research into MCWs frequently concentrates on specific regions, employment conditions, or worker satisfaction, typically within the cultural context of a single country. Considering the varied cultural contexts of MCWs, future studies need to broaden their scope to include regional industry culture, demographic characteristics, and national laws and regulations impacting MCWs across different regions.

4.2.7. Expanding the Scope of Safety and Health Research

Current research into the safety and health of MCWs predominantly addresses specific regions, including the United States [66], Europe [67], and Hong Kong [72]. Future research could broaden its focus to encompass safety challenges and strategies across these and other regions and conduct comparative analyses. Such comparative research will address gaps in the literature and support the development of more effective, region-specific interventions and policies to enhance the safety and health of MCWs globally.

4.2.8. Further Extension of Safety Training

While safety training programs primarily target MCWs, they frequently overlook the pivotal role of frontline supervisors in enhancing safety. Future research needs to prioritize the development of supervisor-centric training that addresses intercultural competence, organizational fairness, and the prevention of discrimination or maltreatment towards MCWs.

The construction industry has adopted advanced technologies, including virtual reality (VR), artificial intelligence (AI), drones, machine learning, eye tracking, and wearable devices [4,80]. However, their effectiveness remains insufficiently studied. Future research needs to assess how these technologies address practical issues, such as using VR to enhance the safety awareness of MCWs during safety training and explore the integration of Building Information Modeling (BIM) with the Internet of Things (IoT) for real-time supervision.

4.2.9. Improving the Safety of MCWs

Current studies predominantly employ cross-sectional data, which provides only a static view of safety perceptions and fails to capture the evolving nature of safety climate over time. Future research could implement longitudinal methods to monitor changes in safety climate, offering a deeper understanding of its evolution and impact on MCWs' safety and the effectiveness of interventions. By collecting data at multiple time points, researchers can track changes in safety climate and its effect on MCWs' safety behaviors over time. For example, surveys or interviews at different stages of construction projects can show how safety climate improves or worsens due to interventions or changes in project conditions. Additionally, outdated injury data restrict the development of timely and effective safety interventions for MCWs. Future studies could adopt modern, real-time data collection techniques to understand the causes of accidents better, identify emerging trends, and inform responsive safety policies. Moreover, ineffective communication is a significant issue for MCWs, often leading to safety problems. Current research primarily addresses this issue from an organizational perspective. Future research needs to focus on MCWs' perspectives on effective safety communication and investigate how such communication influences safety behavior, thereby facilitating the development of more tailored and effective communication strategies.

4.2.10. Targeted Health Interventions for MCWs

MCWs frequently experience elevated psychological stress due to factors such as discrimination, cultural differences, and homesickness. However, research into how cultural exchange can mitigate these issues is limited. Future studies need to investigate the potential of cultural exchange programs and peer support networks in reducing stress and enhancing the psychological well-being of MCWs.

Moreover, current research often treats MCWs as a homogeneous group, neglecting mental health variations across different construction roles, such as scaffolders and roofers. Health interventions should be tailored to address the unique challenges of specific roles. Scaffolders, at high risk of falls and musculoskeletal injuries, require fall prevention and ergonomic training. Roofers, exposed to heat stress and hazardous materials, need heat stress management and protective equipment. Mental health interventions must also be role-specific. Scaffolders face stress from physical demands and high-risk environments, while roofers may struggle with isolation and long hours. Role-targeted mental health support, such as stress management and peer assistance, is essential for addressing these challenges. Customizing interventions ensures the physical and mental health needs of MCWs are effectively met.

5. Conclusions

This study presents a comprehensive bibliometric and content analysis of research on MCWs from 2004 to 2024. The research trajectory on MCWs has demonstrated steady growth across two distinct phases, with an anticipated continuation of this trend, influenced by the 2023 UN SDGs, which stress the importance of sustainable and inclusive work environments. Contributions to the field have come from 307 authors across 30 countries, with significant research output from Asia and Europe. The top ten contributing countries—led by the U.S., U.K., China, and Australia—accounted for 57.6% of the studies, highlighting the global relevance of MCWs, particularly in regions facing labor shortages and infrastructure development challenges. The bibliometric analysis revealed robust citation networks among key journals in the MCW field, and the collaboration map highlighted substantial international institutions. Highly cited studies emphasize the significance of injury rates and safety training for Hispanic and Latino construction workers.

The content analysis of the MCW literature identified ten key research areas: their impact on the construction sector, challenges and solutions, cultural integration, trade union strategies, social networks, employment opportunities, safety challenges, developments in safety training, safety climate and safety outcome, and physical and mental health. These topics reveal the diverse and complex issues faced by MCWs. The findings highlight the need for comprehensive strategies addressing both systemic and individual concerns to enhance MCWs' working conditions and overall quality of life. Following a discussion of the main topics and research trends related to MCWs in the construction industry, potential future research directions have been outlined, and a framework mapping current research hotspots and future directions has been proposed.

The theoretical understanding of MCWs is enhanced by systematically mapping the research landscape through bibliometric and qualitative analysis. A comprehensive framework is provided for grasping the complex experiences of MCWs, and key shifts in research focus over time are highlighted. Practically, valuable insights are offered for researchers, policymakers, and practitioners aiming to improve conditions for MCWs in the construction industry. The identified research areas and trends serve as a foundation for developing targeted strategies to address systemic and individual concerns, ultimately leading to improved safety, health, and working conditions for MCWs. The proposed framework and research directions can guide future policy formulation and practice efforts,

contributing to a more stable and equitable work environment for MCWs. However, the study has limitations. First, the database search was limited to WoS and restricted to English-language publications, potentially excluding relevant works in other languages. Second, bibliometric research is time-sensitive and databases are continuously updated, indicating a need for further studies to address these limitations.

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