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A Critical Scoping Review of Disability Employment Research in the Construction Industry: Driving Social Innovation through More Inclusive Pathways to Employment Opportunity

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Abstract: Innovation research in construction has almost exclusively focused on economic and technological innovation. In contrast, the emerging concept of social innovation has been largely ignored. This is despite the global growth of social procurement policies which incentivize construction firms to innovate in providing employment opportunities for equity-seeking groups. While there is an emerging body of research which is starting to explore innovative employment pathways into construction for certain equity-seeking groups such as women, refugees and Indigenous people, there has been relatively little research into employment pathways for people with a disability. Addressing this gap in research, this paper reports the results of a critical scoping review of Web of Science, Scopus, PubMed and Google Scholar publications on the employment of people with disability in construction. Using the Preferred Reporting Items for Systematic reviews (PRISMA-ScR) approach, extant research was mapped across seven themes of hiring disability practices. Results indicate that research into the employment of people with disability in construction internationally remains nascent with significant knowledge gaps compared to mainstream disability employment research. These key gaps include: barriers to employment based on the lived experiences of people with disability seeking employment in construction; the facilitation of cross-sector relationships with organizations that support people with disability into employment; the reduction of biases, ingrained stigmas and inequalities in recruitment practices for people with disability; and the role of informal norms and practices in undermining formal laws, regulations and policies designed to reduce barriers to employment. The scoping review also identifies a methodological gap in the research reviewed by highlighting the need for more construction research designs to include people with disability as prioritized research participants as well as research investigators and to adopt phenomenological and interpretive approaches which respect the lived experiences of people with a disability seeking work in the construction industry.

Keywords: disability; social innovation; corporate social responsibility; social value; employment; social procurement



Citation: Bailey, S.; Carnemolla, P.; Loosemore, M.; Darcy, S.; Sankaran, S. A Critical Scoping Review of Disability Employment Research in the Construction Industry: Driving Social Innovation through More Inclusive Pathways to Employment Opportunity. *Buildings* **2022**, *12*, 2196. <https://doi.org/10.3390/buildings12122196>

Academic Editor: Osama Abudayyeh

Received: 20 November 2022

Accepted: 8 December 2022

Published: 12 December 2022

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1. Introduction

There has been a considerable amount of research into construction innovation going back more than four decades [1–3]. However, the vast majority of this research has focused on economic and technological innovations, whereas the concept of social innovation has received virtually no attention. In contrast, social innovation is a rapidly emerging field of research outside construction, encompassing business and management, sociology, economics, and other social science disciplines [4,5]. As an emerging area of innovation research, the concept of social innovation has many definitions. However, the Office of Economic Cooperation and Development [6] defines social innovation as the design and implementation of new solutions that imply conceptual, process, product, or organisational

change, which ultimately aim to improve the welfare and wellbeing of individuals and communities. Although social innovations can be technological, many seek to address unresolved social needs with novel organisational solutions.

The neglect of social innovation in the field of construction is somewhat surprising given the growing focus on corporate social responsibility in the industry and the recent proliferation of social procurement requirements in many countries, which specifically weight social innovation in construction tender decisions [7,8]. In simple terms, social procurement involves construction clients requiring their construction supply chains to innovate in creating social value in the communities in which they build [9]. Social value can take many forms but social procurement policies tend to focus on creating employment and training opportunities for disadvantaged equity-seeking groups such as people with a disability, Indigenous people, refugees and migrants, ex-offenders and disengaged youth [10,11].

The construction sector is the world's largest employer but has struggled to increase the diversity of its workforce [12–14]. The long tradition of research in this area highlights that the industry has a strongly normalised view of an ideal construction industry employee (typically male and able-bodied) [15–17]. Barriers to more diverse employment are reinforced by narrow and exclusionary networks from which people are recruited into the construction industry, and negative stereotypes of those who lie outside the sector's institutionalized norms [8]. While diversity research in the field of construction management has focused on a wide range of excluded groups such as women [15], Indigenous Australians [18], culturally and linguistically diverse people [19] and refugees [20], research on the employment of people with disability has received relatively little attention. The term disability refers to a long-term physical, mental, intellectual, neurological or sensory impairment which can hinder [a person's] full and effective participation in society on an equal basis with others. Disability can be caused by genetic disorders, illnesses, workplace accidents, ageing, injuries or a combination of these factors and the way that people experience disability varies significantly depending on environmental factors such as community and employer attitudes, services and support available to them and personal factors such as an individual's determination and resilience in overcoming barriers.

The relative lack of research into the employment of people with disability in construction, compared to other equity-seeking groups is surprising given that the construction industry in many countries is facing calls to diversify its workforce to address severe skills shortages [21,22]. Furthermore, there is significant potential to increase the number of people with disability in the industry's workforce. For example, in the UK people with disability make up only 6% of the construction workforce [22] and in Australia it is around 8% [23] and these jobs are typically focused in low income, insecure and administrative type jobs which provide little opportunity for career progression compared to people without a disability. While there have been a small number of studies highlighting barriers to employment for people with disability in construction ranging from physical barriers and inaccessible workplace settings to negative attitudes and assumptions about higher costs, lower productivity and safety risks [10,12,24–27], there have been virtually no studies of pathways to more inclusive employment opportunities for people with disability in the construction industry. This contrasts starkly with the extensive body of research into disability employment outside construction which continues to identify entrenched personal and societal attitudes towards people with disability [28], a lack of knowledge of accommodations to enable people with disability to secure and maintain a career [29] and a lack of understanding of the diversity of disabilities [30]. Research also shows that those injured or disabled in the workplace face significant direct and indirect discrimination in maintaining their positions [31,32].

Given the above, there is a need for more research to understand and improve the opportunities for the employment of people with disability in construction. To address this gap in research, the aim of this paper is to present a scoping review of extant academic evidence relating to the inclusion of people with disability in the construction industry

workforce. Specifically, this research addresses the question of what knowledge gaps exist in construction disability employment research, compared to Gewurtz et al.'s [29] review of mainstream disability employment research. The overall objective is to identify future research directions to advance this important yet under-researched area, enabling the construction industry to better harness the untapped potential benefits of a more diverse workforce [11,33].

As Munn et al. [34] notes, scoping reviews are especially useful when research is in an exploratory, disorganised and nascent state, as it is in the field of construction disability employment research. In contrast to systematic literature reviews, scoping reviews do not aim to explore a specific research question or testable hypothesis, but aim to provide an overview or map of the evidence in a particular field. To ensure that the results of this scoping review are valid and robust, this review employs the widely used Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) methodology [35]. Scoping reviews using PRISMA-ScR have been successfully applied across many built environment disciplines [36,37]. However, scoping reviews are less common in the field of construction management.

2. Method

Following the PRISMA-ScR method in Figure 1, the systematic literature review employed applied bibliometric analysis of relevant peer-reviewed research relating to the employment of people with disability in the construction industry. The searches were conducted in July 2021 and inclusion criteria related papers with key words: “disability” or “disabled” combined with “employment” or “recruitment” and “construction industry” or “construction sector”. We excluded papers with keywords relating to ‘safety’ and ‘injury’ because while disability can arise from injury and safety risks in construction, such papers tend to focus on safety risks and laws and regulations rather than the forms of disability arising from them. We extracted data on: year of publication; journal/location of report; study design; study participants; main findings; sample size; key results.

While it is acknowledged that any bibliometric analysis is subject to the limitations of scientific research evaluation based on citations and potential biases towards certain types of publications in databases [38], this research focused explicitly on peer-reviewed journal articles published in the Scopus data base, ISI Web of Science (WoS), PubMed and Association of Researchers in Construction Management database. Peer-reviewed articles ensure a high degree of data integrity and are widely considered to encompass validated knowledge which has a more significant and reliable impact on a field's development than non-peer reviewed research [39]. In the review, duplicate citations were removed and we excluded protocol papers and commentaries with no reported results. The search was limited to literature written in English and was not restricted by date of publication. Eligible study designs included qualitative and quantitative methodologies as well as policy discussion. Whilst we did not include systematic literature reviews in the search criteria all systematic reviews resulting from our searches were analysed for relevant, empirical studies which were then assessed separately against our inclusion and exclusion criteria.

Based on the above criteria, 113 articles were initially identified. After removing duplicates and screening abstracts, we identified 91 articles that discussed disability in the construction sector but only 24 met the inclusion criteria and were included in this review. These articles were then coded using Gewurtz et al.'s [29] analytical framework which is based on a scoping review of mainstream disability employment literature outside construction which categorizes research into key seven themes, which are defined in Table 1. Gewurtz et al.'s [29] framework was chosen because it provides the most recent scoping review of the wider disability employment literature (not construction-specific) and thereby a useful point of comparison between our sector-specific findings and their findings in the wider field of disability employment research. While we acknowledge that the profile of mainstream disability research will have evolved since Gewurtz et al.'s [29] scoping review, the classification they produced remains the most up-to-date and valid.

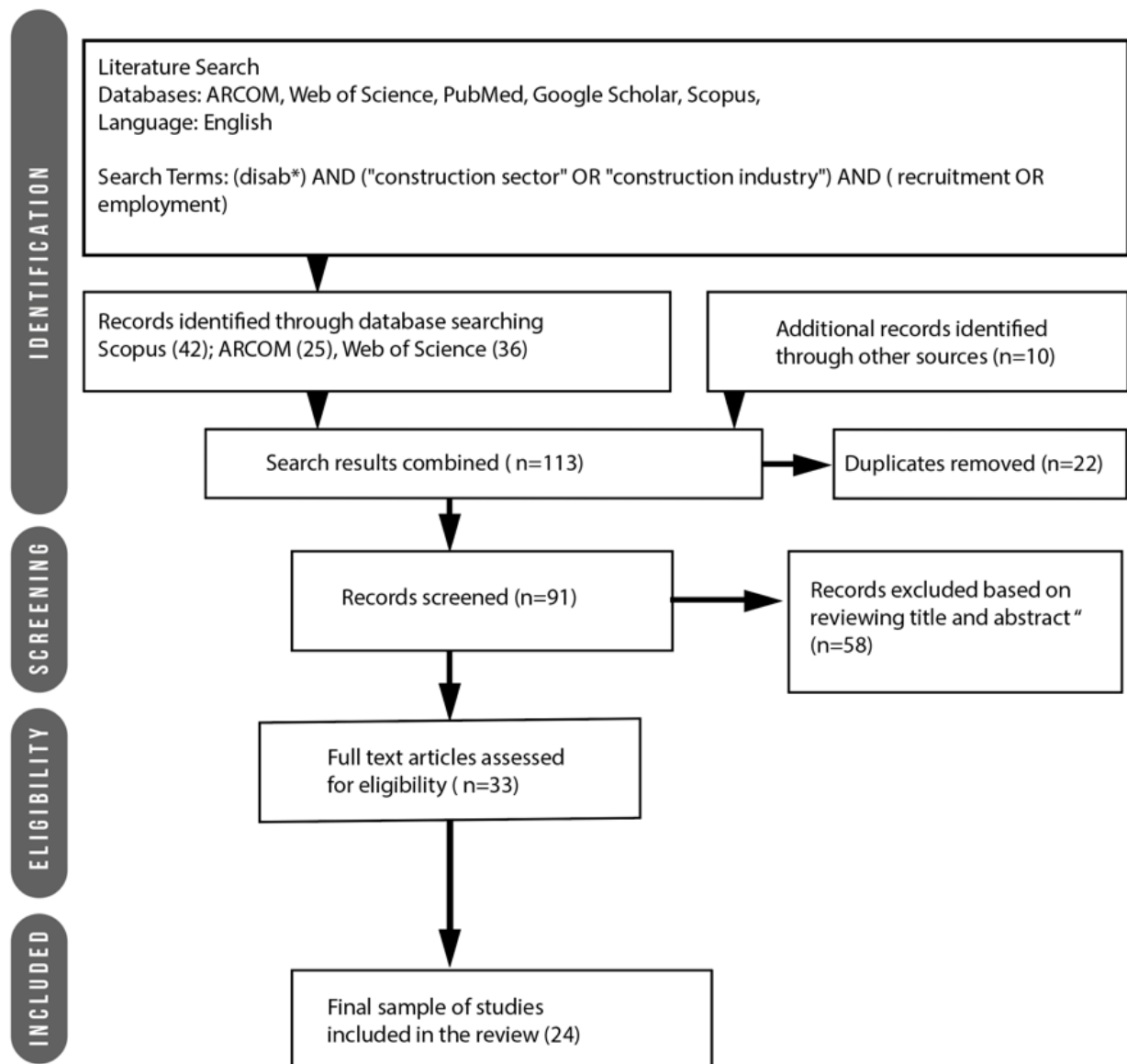


Figure 1. PRISMA Flow Chart. (* disability).

The coding process was conducted by a team of researchers from within and outside the construction industry to provide different perspectives on the data. This insider/outsider approach is widely used in psychology and social sciences research to provide different perspectives on data [40]. Comparing and cross-checking codes, categories, and themes between the researchers helped to minimized any potential disciplinary bias in the results. Instances of disagreement were resolved through discussion, a process which continued until 100% inter-rater agreement was achieved, providing a high level of 'fit' between the selection criteria and the articles and confidence in the validity of the coding process.

Table 1. Gewurtz et al.’s [1] seven themes.

Theme (Barriers and Enablers of Disability Employment)	Definition
Theme 1: Requirements versus Practice	Relates to the tensions and conflicts often found between actual disability employment practices and the laws, policies and rules that seek to protect or increase access to employment for people with disability but may also operate as barriers to employment.
Theme 2: Stigma or attitudinal barriers	Relates to the stigma and attitudinal barriers experienced by people with disability and the different ways in which stigma can act (directly and indirectly) as a barrier to employment and manifest and influence the hiring process through for example, instilling a sense of risk, fear, unpredictability, and avoidance behaviours that thwart hiring people with disability.
Theme 3: Disclosure	Relates to attitudes towards disclosure of disability, timing of disclosure, options faced by people with different disabilities, the various forms these disclosures can take and the employment consequences these choices have for the individuals concerned.
Theme 4: Accommodations	Relates to the legal requirement to offer and implement reasonable accommodations in the workplace which enable the employment of people with disability to perform their work with equal opportunity.
Theme 5: Relationship building	Relates to the idea that building relationships between employers and disability organisations that specialise in placing people with disabilities into jobs is critical to the hiring process, providing specialist advice to employers, addressing employer concerns, and showcasing opportunities and success stories.
Theme 6: Information and support to employers	Relates to the provision of information and support to employers in order to improve hiring practices and employment opportunities for people with disability. Types of information include: required accommodations and their cost, the impact of disability on job performance, the business benefits of hiring people with disability and education and support for employers.
Theme 7: Hiring practices that invite people with disability	Relates to the variety of approaches which normalise and support the hiring of people with disability, and provide equality of opportunity in applying for jobs for people with disability. Examples of such hiring practices include having disability recruitment plans, revamping job descriptions and hiring processes to minimise subjective bias, application forms that are available in a variety of formats to make them more accessible to applicants, etc.

3. Results

This section discusses the results in relation to our analytical framework which is based on a direct comparison to Gewurtz et al.’s [29] disability employment themes as discussed above and identified in the broader non-construction disability employment literature.

A comparison of studies in each of Gewurtz et al.’s [29] seven themes is illustrated in Figure 2 as a visualization device which has been applied in other scoping reviews such as [36].

In Figure 2, the height of each column illustrates the percentage of included studies that report on each theme in Table 1 rather than the number of studies, noting that an individual study can be reported across multiple themes. Interestingly, Figure 2 shows that the construction disability employment literature reflects different interests and priorities compared to mainstream disability employment literature reviewed by Gewurtz et al. [29]. In particular, the construction literature pays relatively more attention to the ‘requirements versus practice’, ‘stigma’ and ‘accommodation’ themes than mainstream disability employment literature. This may reflect the relatively high levels of psychological, cultural, procedural and environmental barriers that have been found to limit the employment of people with disability in the construction industry, and perceptions that people with a disability represent a risk rather than an asset who cannot be easily accommodated in the construction workplace [21,26,28]. In contrast, relatively less attention is paid to the ‘disclosure’, ‘relationship building’ and ‘hiring practices’ themes reflecting the immature state of corporate social responsibility reporting, human resource management and collaborative relationships with social economy organizations in the construction industry [8,12,41]. This lack of maturity of the sector, in terms of social models of disability, is

also reflected in [26]’s study investigating enabling and disabling factors in the British and Dutch construction sectors.

The construction literature within each of these themes is discussed in more detail below to elaborate and explain these key differences.

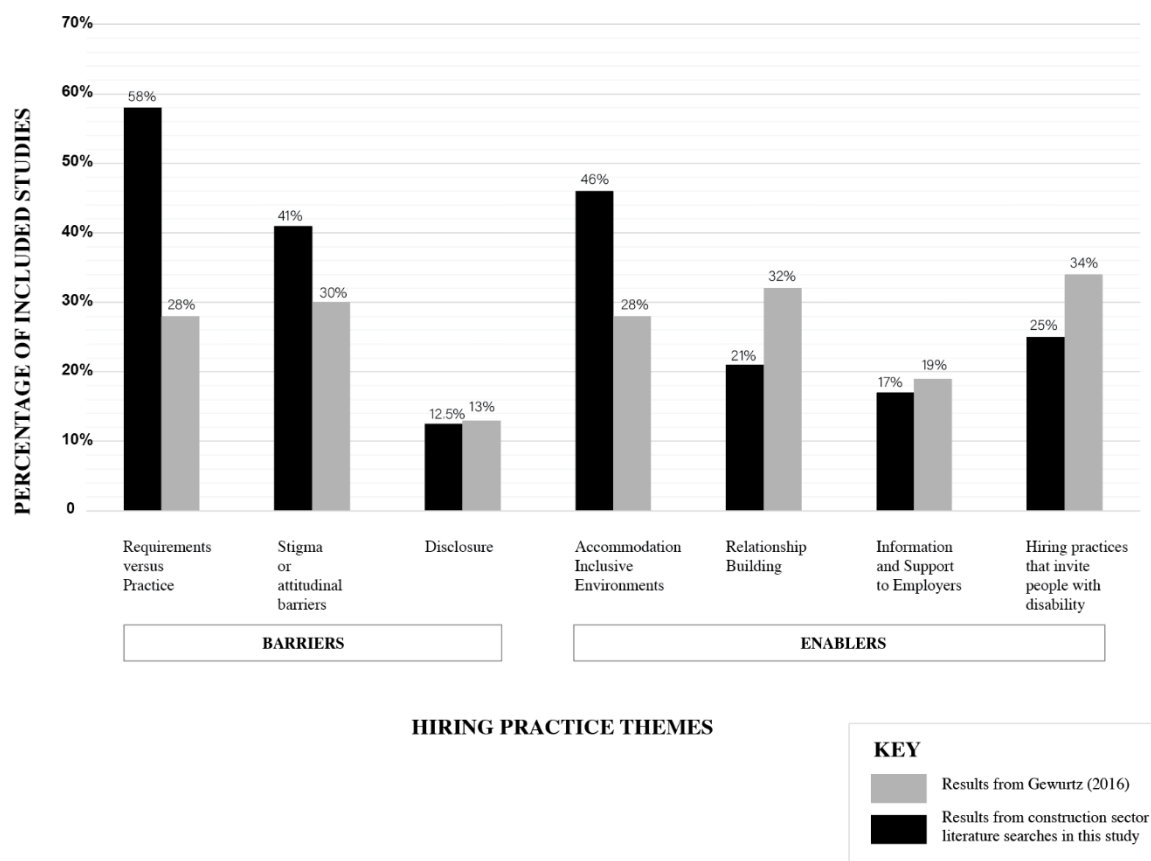


Figure 2. Research on employment of people with disability in construction mapped against Gewurtz et al.’s [29] themes.

3.1. Theme 1: Requirements Versus Practice

The literature included in this theme focusses largely on the laws, policies and rules that dictate anti-discrimination requirements within the hiring process and recognize the right of people with disability to access paid work compared to the actual hiring practices observed. Construction employment research contributes additional literature which identifies industry-specific barriers that limit the opportunity for people with disability to work in that sector in practice. For example, the traditionally homogenous (male and able-bodied) workforce of self-employed contractors, inflexible employment conditions and the practice of contractors to recruit tradesmen from their established, narrow social networks are barriers to the employment of people with disability in the construction industry in Britain, Holland and Australia [10,25,42]. The construction literature reports poor employment outcomes in practice. For example, Ref. [43]’s study reported low rates of participation in the UK construction workforce on the basis of gender, ethnicity and disability. Notably, although [43] made suggestions for increasing the representation of women and ethnic minorities, there were no suggestions for improving the employment participation rate for people with disability. Ref. [44]’s study focussed on professional transport employees and employee experiences of both invisible and visible disability types in a non-construction but comparable male-dominated industry. The employer’s perspective on barriers to hiring people with disability was explored in [45]’s early Israeli research.

Only a small number of articles (all based on US and Canadian studies) demonstrate an effort to educate construction employers on their obligation not to discriminate in employment. For example, Ref. [46] described how the Americans with Disabilities Act (ADA) applies to real-life employment situations in the construction industry and explained the impact of the ADA on the hiring process. Ref. [47] developed a Construction Disability Management Maturity Model. Ref. [48] also delved into the implications of the ADA for the construction sector, more specifically focusing on the liabilities of engineers, as non-discriminatory employers as well as the designed outcomes of their work. Subsequent research by [49] examined cross-sector employer practices in relation to the ADA. Another study investigated the underemployment of people with disability in the construction industry in South Africa, and the role of that country's Employment Equity Act [50]. These research projects collectively demonstrate the importance of legislation in driving diverse employment practices in a compliance-based industry where competitive pressures and industry norms have not yet materialized to drive the employment of non-traditional workers [11]. Clarke and Gribling's [12]'s research reflects a new theme of social procurement research which is responding to the contractual imposition of disability employment requirements on construction supply chains. For example, Guimarães [51] explored the emergence of diverse employment requirements in the Swedish construction industry, as part of social procurement and as a tool to mitigate issues of exclusion on the job market. In Australia Loosemore et al [11] highlighted the value of cross-sector collaboration in implementing social procurement processes to find meaningful and sustainable work for people with disability (among others). This focus on collaboration across organisations (internally and externally) was reflected in Clarke and Gribling's [12] study of different strategies for reducing barriers to employment for people with disability, among other groups on the Heathrow Terminal 5 construction project in London. A group of studies of construction companies in Brazil focused on the higher rate of employment of people with physical disability under the employer quota obligations in that country [52,53]. Those studies investigated the types of accommodation for people with different types of disability working in different construction site roles in the context of the legal requirement to make reasonable accommodations in Brazil.

3.2. Theme 2: Stigma or Attitudinal Barriers

The literature in this theme includes research that explores or reports on stigma or attitudinal barriers to the employment of people with disability in the context of the hiring process and includes studies that explain the reasons behind the underemployment of people with disability. These barriers include the perceptions, assumptions, attitudes or beliefs that people with disability cannot work long hours, increase the cost of supervision and have health needs that will impact on productivity and absenteeism. Loosemore et al. [8,42] conducted research with Australian construction subcontractors, and reported that the main barriers to building a diverse and inclusive workforce include the perception of employers that marginalized groups (including people with disability) are a risk, not able to fit-in and not able to work effectively in the construction industry. People with disability suffered the third highest barriers of the six groups compared (women, refugees and migrants, Indigenous people, ex-offenders and disengaged youth) and a unique set of barriers which were different to the other groups, suggesting targeted employment strategies were necessary. This study also supported previous research which shows that many perceived barriers (such as higher costs) to employment are unfounded. For example, one study in Brazil compared the levels of absenteeism of people with disability to those without disability on construction worksites and concluded that the assumption or belief that people with disability have higher rates of absenteeism was not established [54]. Ref. [55]'s research into employment in the construction sector discussed the prejudice and discrimination experienced by people with disability in the UK. Clarke et al.'s [25] study explored the enablers and barriers to disability employment in the UK and Dutch construction sectors. The UK applies a capabilities approach that focuses on the individual's capability and

the Dutch approach applies a social model of disability that views disability as socially constructed and, hence, focuses on the abilities of applicants.

Gewurtz et al.'s [29] review identified literature with a different focus, including strategies to reduce stigma like education and sharing success stories. Those authors cited research that found employers who had successfully employed a person with disability had a greater likelihood of employing other people with disability [56]. This finding is consistent with one construction study in the UK which concluded that UK contractors (among the top 100) were likely to continue to employ people who had acquired disability when employed [25], although this reflects the emphasis in construction research on people acquiring a disability by being injured in work. See for example, Clarke et al. [2] who reported regulatory initiatives in Britain and Holland for re-integrating injured employees into the construction workforce because of the high rate of injury and disability among that workforce.

3.3. Theme 3: Disclosure

The literature in this theme explores the person's experience or practice regarding the timing of disclosing disability when writing to apply for a job, during the interview or after employment. In contrast to Gewurtz et al.'s [29] review there were no construction studies regarding employee disclosure experiences or practices in the recruitment context. However, three studies discussed access to disclosed information [9,13,43] and three studies focused on the employment by construction companies of people with disability to meet employment quota obligations [52–54]. Briscoe [43] used UK Labour Force Survey data collected from people with and without disability to analyze the job/workforce share of people with disability (and other minority groups) working in the UK construction sector. There were insufficient statistics to provide an accurate understanding of the number of people with disability who work in construction because of low levels of disclosure and no information on workers who chose not to disclose their disability.

In contrast, the broader field of mainstream disability employment research provides insights into disclosure strategies of potential employees and the attitudes of employers in response [1,30]. Some of those studies reported potential employees resisting disclosure, the employee's choice or decision not to disclose invisible disability [57,58], the employer's response to disclosure in a cover letter [59,60] and the employer's negative response to late disclosure including disclosure at the end of the interview [58,61,62]. This is a gap for future construction disability employment research to address.

3.4. Theme 4: Reasonable Accommodations

The literature in this theme analyses the legal requirement and practices to offer and implement reasonable accommodations in the workplace, including during the hiring process [48]. Reasonable accommodations are referred to as reasonable adjustments under the law in some countries (like Australia) and some governments provide financial assistance for employers to make reasonable accommodations or adjustments to equipment or the work environment. Our scoping review highlighted a significant proportion of studies in this area. For example, a recent study by McCall and Simmons [17] explored the opportunities brought by new technologies to support more inclusive and productive workplaces in construction. A group of Brazilian studies investigated adaption and accommodation types for people with different disabilities to support them performing a range of construction labour roles on site [52–54]. Clarke and Gribbling's [12] case study of Terminal 5 construction at Heathrow Airport documents the role of accommodations to retain workers on one of the largest construction sites in Europe while Newton and Ormerod [24] found that contractors in the UK construction sector were more likely to make the required adjustments to adapt workplaces for employees who acquired a disability if already employed.

In contrast to the construction literature, the mainstream disability employment literature reported by Gewurtz et al [29] notes the frequent lack of knowledge of employers of the requirement to provide reasonable accommodations and their lack of knowledge that

accommodations are frequently nil or low cost [29]. The research also identified the belief of some employers that providing accommodations for the hiring process or the workplace creates financial and legal risks [29].

3.5. Theme 5: Relationship Building and Use of Disability Organisations

This theme includes studies that explore building relationships between employers and disability organizations that specialize in placing people with disability into jobs. We mapped three of the included articles to this theme [8,12,25]. However, we did not find the topic was prominent in the construction literature other than in relation to the recent emergence of social procurement as an approach to increase workforce diversity through new cross-sector collaborations between construction organizations and disability support organizations [9]. Interestingly, these collaborations were reported as immature and problematic due to different institutional drivers and constraints. This contrasts with Gewurtz et al.'s [29] review which revealed considerable emphasis in this area of research, leading to their conclusion that “building relationships between community employers and disability organizations that specialize in placing people with disability into a job is critical to the hiring process” (p. 141). Indeed, Gewurtz et al. [29] identified that the relationship between the employer and these organizations was a factor associated with the likelihood of employment and appropriate supports in the workplace; and prospective employers could ask these organizations about disability and the employer's legal obligations to make accommodations. However, there were also concerns that some disability organizations do not provide a person-centered employment service, only help people with particular supports and not all disabilities, or give priority to the employers' interests [63]. This was seen as an important area of future research.

3.6. Theme 6: Information and Support to Employers

Research included in this theme reported on the provision of information and support for employers to improve their hiring practices and employment opportunities for people with disability. Loosemore et al. [8] reported on an innovative project-based intermediary in Australia which has been developed by a major contractor to reduce information asymmetries between the construction industry and the organizations which specialize in providing employment support for people with disability. It did this by providing important practical training, information and support to both job seekers and employers in the construction supply chain about the employment of marginalized groups like people with a disability. Collaboration between construction contractors and disability employment service providers was key to this support, reducing complexity and perceived risks for employers previously reluctant to employ people with disability. This research built on the collaborative theme of earlier research by [64]'s who reported on the opportunity for employers in the construction industry to employ and use the knowledge and expertise of people with disability across all aspects of the construction process including the design and planning stages of architectural projects. However, it should be noted that the intermediary analyzed by Loosemore et al. [8] was a unique single case study and the only one that could be found internationally by the authors. Innovation in this area therefore appears to be scant and Gewurtz et al. [29] also acknowledged the needs of employing organizations can best be met when the needs of the employer are understood based on a larger number of studies.

3.7. Theme 7: Hiring Practices That Invite People with Disability

The literature included in this theme reported on the importance of hiring practices that invite job seekers with disability to apply for jobs including organizational strategies to ensure the hiring process is accessible, organizational policies that support the employment of people with disability, and the broader study of organizational culture to build a culture of respect towards candidates and employees with disability. In our review, we identified six relevant articles in the construction sector, although the employment outcomes

for those workers and their subsequent career trajectory is not reported. These papers included Loosemore et al.'s [8] case study of social procurement in Australia highlighted the importance of project-based intermediaries to bypass traditional recruitment processes which exclude people with disability being recruited into construction. Two other papers recommended changes in hiring practices to assist employers comply with the employment discrimination and accommodation provisions of the ADA when that US law was introduced [46,48]. Maroto and Pettinicchio's [65] chapter concluded that employer attitudes to hiring people with disability in the UK are improved when employers themselves have worked with a person with disability, and that it is a responsibility of the construction sector to support people with disability in pathways to employment (as well as supporting them when employed including career development opportunity). Clarke and Gribling [12] identified that existing recruitment practices in the construction sector in the UK were a major barrier to more inclusive recruitment of people in the community, from diverse backgrounds including people with disability. Ians et al.'s [57] survey of the top 100 UK contractors identified their lack of organisational policies and strategies of construction contractors to support people with disability through the hiring process, or provide evidence those contractors were complying with their employer obligations under the then UK Disability Discrimination Act 1995.

Overall, our analysis shows that while there is an established body of knowledge pointing to the role of organizational culture, strategies for inviting people with disability to apply for work and tools used to build and retain a diverse workforce (budget allocation, co-worker training and CEO commitment and leadership on diversity, etc.) [56,65,66], there has been little or no equivalent sector-specific research exploring how construction sector culture, organizational structures or other factors (job design, workforce planning, the managers or relationships that control the hiring process, recognition of jobs in technical and/or management roles, and allocation of jobs or even government policy, etc.) may be exclusionary, create work disincentives and contribute to current low levels of employment of people with disability [67].

There has also been little or no construction research studying hiring strategies and practices deployed for increasing the employment of people with disability in ways that can be made equitable whilst considering career access points, quality of work and career progression from the employee's perspective. Furthermore, while construction researchers have explored the employment barriers facing people with disability in construction, there is a clear contrast with the considerable research having been undertaken in other fields investigating strategies to navigate and reduce the barriers experienced by people with disability in gaining employment [30,65,68,69]. Another related gap in research which has received little attention in construction is the reporting of the effectiveness of these strategies in achieving improved employment outcomes for people with disability.

Connections have been made between technological advancement in the construction sector, and an increase in accessibility of construction workplaces and activities [17]. This opportunity to take advantage of technological and work changes has not yet been fully explored—one example being off-site construction. There is evidence within the literature that employers and agencies do not believe people with disability are suited for many construction professions [70]. There is also evidence of ableist practices within the sector that perceive people with disability as a homogenous group rather than a heterogenous group. An example of this is that the work environment for construction workers is often cited as a reason that all people with disability are less likely to be considered for work in the sector [25,43]. While there has been a considerable body of research into the benefits of offsite construction such as [71] there is a timely opportunity to address the gap in research of how off-site construction can support more inclusive employment, by better recognizing the diversity of disability and providing more-accessible work environments that can integrate assistive technology into construction work practice.

There is also a gap in construction research regarding disclosure, both from the perspective of people with disability and employers. Studies have identified that employees

are reluctant to disclose any form of disability because of stigmas surrounding this and that employers are uncomfortable asking about an applicant's disability in the employment process making it hard to assess whether the person can do the job [30]. Employers seem to be uncertain about communicating necessary inherent requirement of jobs at the beginning of the application process and their right to ask all applicants how they would be able to perform the role.

Finally, the role of cross-sector collaboration, project-based intermediaries and organizational champions is also worthy of further investigation, especially within the context of emerging social procurement policies which mandate the employment of people with disability as part of project contractual requirements [8,51]. Such intermediaries are designed to encourage employment of people with disability within established supply chains. However, since the goals of social procurement is also to encourage supply chain diversity [72], the role of minority disability business and social enterprises merits particular attention in increasing employment of people with disability indirectly within the industry. Recent work on self-employment and entrepreneurship of people with disability, identified opportunity for the construction industry to draw on the skill and ability base of allied technical, professional and management businesses [73]. Questions revolve around whether they represent a sustainable long-term solution to diversity in construction or whether the focus should be on incumbent supply chains [74]. One of the differentiating characteristics of construction is its project-based production environment and the way that organizational champions and intermediaries can facilitate collaboration with specialist organizations which support people with disability could make a significant contribute to knowledge in this nascent field of research and practice.

4. Conclusions

The aim of this paper was to address the lack of social innovation research in construction relating the employment of people with a disability in the industry. The objective was to identify knowledge gaps in comparison to mainstream disability employment research and to clarify concepts to inform future research in this important yet under-explored area. Such research is important in informing social innovation practice, considering that the construction industry is experiencing severe skills shortages combined with a lack of diversity within the workforce population.

Our scoping review of the limited and fragmented academic evidence relating to the inclusion of people with disability in the construction industry workforce shows that it remains a relatively under-explored and under-theorized field and has identified significant gaps between research in construction disability employment compared with research in the broader field of mainstream disability employment. Overall, our analysis shows that while there is some research in construction relating to barriers to employment and stigmas surround people with disability, there is far less research relating to the enablers which can overcome these barriers. While there has been some research into accommodations which need to be made for employing people with a disability (especially around technological developments such as off-site prefabrication), there is a paucity of research in construction on relationship-building and cross-sector collaboration with support agencies, the role of social procurement and social enterprises and disability organizations in supporting disability employment, the provision of information to support employers to reduce ingrained stigmas and insights in to how to reduce biases and inequalities in highly traditional construction recruitment practices. In order to support social innovation in this area, construction research needs to balance its current emphasis on barriers (seeing people with disability as a risk) with equivalent research on solutions (seeing people with disability as an opportunity in a constrained labor market and because of their ability).

It has also become evident from our review that none of the extant research explores the employment cycle or addresses the project-based, itinerant and casual nature of construction employment and its impact on the quality work for people with disability. Therefore, further research is also needed to understand the informal factors influencing inclusive

employment strategies and the identification of barriers within the workplace culture itself. It is clear from our review that despite the implementation of numerous ‘formal’ laws and regulations relating to inclusive employment for people with disability, there are numerous under-researched ‘informal’ and unwritten industry norms and practices which can potentially undermine the intent of these policies. This highlights the potentially valuable role of New Institutional Theory, employed successfully in construction gender studies and social procurement [11,14] in better understanding the interactions between formal and informal norms and practices in the construction industry which can undermine the intent of formal policies to employ people with disability. The results also reflect on the additional responsibility of the construction sector to engage with inclusive employment strategies given the high level of disabling injuries experienced by the construction workforce internationally.

The scoping review also identifies a methodological gap in the research reviewed by highlighting the need for more construction research designs to include people with disability as prioritized research participants as well as research investigators and to adopt phenomenological and interpretive approaches which respect the lived experiences of people with a disability seeking work in the construction industry. While the value of a phenomenological methodology has recently been acknowledged by in the area of housing design for neurodiversity [75], such research is rare in the field of construction, which has a long tradition of positivist research methodologies which tend to subjugate research participants. The lack of longitudinal research including success stories in construction employment and long-term employment outcomes in the construction industry are also methodological gaps for future construction researchers to address. The important role of these success stories is emphasized by Lundberg [76].

If the sector hopes to innovate in finding new employment pathways into construction for people with disability, it is critical that research investigates the perspectives of people with disability currently employed in the sector, and the large numbers of people who have been disabled as a result of working in the sector and who are working or no longer able to work in the sector. Understanding the how people with disability perceive the sector from the inside will help build successful recruitment strategies for people from the outside.

In conclusion, given the extent of the research gaps identified we recommend that there are twelve fundamental research questions that should be prioritized in finding innovative new pathways for people with a disability into construction, and thereby move this nascent field of social innovation research forward:

- What are the open employment opportunities in construction for people with disability? This includes exploration of the potential for types of roles, heterogeneous nature of disability, and in what parts of the construction sector?
- In what ways can the construction sector draw on open employment and disability employment services to improve the integration of recruitment of people with disability coming out of high school, TAFE and university education?
- What is the scope and quality of work that people with disability can be considered for in the sector?
- How can equality of opportunity in recruitment and career progression be supported for people with a disability?
- What are the barriers to the employment ‘experienced’ by people with disability in construction?
- What are the ‘lived experiences’ of people with disability when seeking work and in employment across all parts of the strategic human resource management process?
- How do employers improve the opportunities for construction employment for people with disability through innovative collaborative cross-sector partnerships and facilitative like project-based intermediaries?
- What is the role of self-employed professionals, social enterprises and disability enterprises in providing sustainable long-terms solutions to disability employment in construction?

- How does the industry reverse existing perceptions of risk associated with disability employment in the existing construction supply chain and make them a perceived opportunity for new labor supply?
- What role can off-site manufacturing play in providing more accessible workplace settings?
- How are the productivity benefits of disability assistive technology promoted to employers to challenge the conventional wisdom of lower productivity and higher costs employing people with disability?

Author Contributions: Conceptualization, S.B., P.C., M.L., S.D. and S.S.; methodology, S.B., P.C., M.L., S.D. and S.S.; validation, S.B., P.C., M.L., S.D. and S.S.; formal analysis, S.B., P.C., M.L. and S.D.; investigation, S.B. and P.C.; resources, S.B., P.C., M.L., S.D. and S.S.; data curation, S.B., P.C., M.L., S.D. and S.S.; writing—original draft preparation, S.B., P.C., M.L. and S.D.; writing—review and editing, S.B., P.C., M.L. and S.D.; project administration S.S.; funding acquisition, S.B., P.C., M.L., S.D. and S.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by a University of Technology Social Impact seed grant.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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